

KERBEL GROUP INC.

KERBEL WHL EMPLOYMENT LANDS TRANSPORTATION IMPACT STUDY

JUNE 20, 2023





KERBEL WHL
EMPLOYMENT
LANDS
TRANSPORTATION
IMPACT STUDY
KERBEL GROUP INC.

PROJECT NO.: 231-01612-00
DATE: JUNE 20, 2023

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June 20, 2023

Kerbel Group Inc.
23 Lesmill Road
North York, ON, M3B 2T5

Attention: Joanne Barnett

Dear Madam/Sir:

Subject: Kerbel WHL Employment Lands Transportation Impact Study

WSP Canada (WSP) is pleased to present the findings of the transportation study for the proposed development located northwest of the intersection of Crimson King Way and Highway 11 in the Town of East Gwillimbury.

Based on the enclosed study findings of this report, it is expected that the proposed development can be readily accommodated by the study area transportation network. The proposed auto parking arrangements will also adequately serve the needs of the subject development based on the proposed supply. The loading requirements of the building, and all loading spaces can be accessed adequately.

Please do not hesitate to contact us if you have any questions or comments.

Yours sincerely,

Ismet Medic, B.A.Sc.
Senior Project Manager

Rebekah Clarke Robinson, B.Eng.
Transportation Planner

XX/xx

Encl.

cc:

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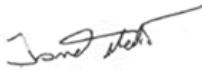
SIGNATURES

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TABLE OF CONTENTS

1	INTRODUCTION	1
2	EXISTING TRANSPORTATION CONTEXT ...	3
2.1	Boundary Roadways	3
2.2	Traffic Data	5
2.3	Modelling Methodology	9
2.3.1	Inputs and Parameters.....	9
2.3.2	Intersection Level of Service	9
2.4	Existing Traffic Operations	10
2.5	Active Transportation and Transit Network	12
3	FUTURE BACKGROUND CONDITIONS...	13
3.1	Horizon Years.....	13
3.2	Future Road Network Improvements	13
3.3	Background Traffic Growth	13
3.4	Background Developments.....	13
3.5	Future Background Traffic Operations.....	16
4	SITE TRAFFIC.....	19
4.1	Site Accesses	19
4.2	Trip Generation	19
4.3	Trip Distribution and Assignment.....	20
5	FUTURE TOTAL CONDITIONS.....	26
5.1	Basis of Assessment.....	26
5.2	Phase 1 Highway 11 Site Access	26
5.2.1	Exclusive Turning Lanes.....	26
5.2.2	Signal Warrant	26
5.3	Future Total Traffic Operations	27

6	MULTIMODAL TRAVEL ASSESSMENT	31
6.1	Transit Assessment.....	31
6.2	Active Transportation Assessment	31
6.2.1	Existing Active Transportation Conditions	33
6.2.2	Future Active Transportation Conditions	33
7	PARKING REQUIREMENTS.....	34
7.1	Vehicular Parking Requirements	34
7.1.1	Accessible Parking Space Requirements	35
7.2	Bicycle Parking Requirements.....	35
8	SITE PLAN REVIEW	36
8.1	Site Access Review	36
8.2	Additional Geometric Requirements	36
8.3	Pavement Marking and Signage Plan	36
8.4	Site Circulation Assessment.....	36
8.4.1	Fire Truck.....	36
8.4.2	Garbage Truck	37
8.4.3	Tractor-Trailer (WB-20).....	37
8.4.4	Passenger Vehicles	37
9	TRANSPORTATION DEMAND MANAGEMENT	45
9.1	Information Packages Provided to New Employees	45
9.2	Summary of Proposed TDM Measures.....	46
10	CONCLUSIONS	47

TABLES

TABLE 2-1	INTERSECTION TURNING MOVEMENT COUNT SOURCES.....5
TABLE 2-2	INTERSECTION PEAK HOUR FACTORS9
TABLE 2-3	EXISTING TRAFFIC OPERATIONS ANALYSIS.....10
TABLE 2-4	EXISTING QUEUEING ANALYSIS... 11
TABLE 3-1	BACKGROUND GROWTH RATES 13
TABLE 3-2	BACKGROUND DEVELOPMENTS PER EAST GWILLIMBURY MAPPING TOOL 13
TABLE 3-3	FUTURE BACKGROUND TRAFFIC OPERATIONS ANALYSIS..... 16
TABLE 3-4	FUTURE BACKGROUND QUEUEING ANALYSIS16
TABLE 4-1	SITE TRIP GENERATION.....19
TABLE 5-1	FUTURE TOTAL TRAFFIC OPERATIONS ANALYSIS..... 27
TABLE 5-2	FUTURE TOTAL QUEUEING ANALYSIS..... 27
TABLE 6-1	TRANSIT LEVEL OF SERVICE CRITERIA ¹ 31
TABLE 6-2	ACTIVE TRANSPORTATION LEVEL OF SERVICE CRITERIA ¹ 31
TABLE 6-3	EXISTING ACTIVE TRANSPORTATION LEVEL OF SERVICE 33
TABLE 7-1	PARKING REQUIREMENTS PER BY-LAW 2018-04334
TABLE 7-2	ACCESSIBLE PARKING SPACE REQUIREMENTS 35
TABLE 9-1	TDM COST SUMMARY.....46

FIGURES

FIGURE 1-1	SUBJECT SITE LOCATION1
FIGURE 1-2	SITE PLAN2
FIGURE 2-1	LANE CONFIGURATIONS..... 4
FIGURE 2-2	RAW TMC TRAFFIC VOLUMES.....6
FIGURE 2-3	BALANCING APPLIED TO RAW TMC TRAFFIC VOLUMES7

FIGURE 2-4	BALANCED EXISTING TRAFFIC VOLUMES.....	8
FIGURE 3-1	BACKGROUND DEVELOPMENT TRAFFIC VOLUMES.....	15
FIGURE 3-2	FUTURE BACKGROUND TRAFFIC VOLUMES.....	18
FIGURE 4-1	FUTURE LANE CONFIGURATIONS	21
FIGURE 4-2	PHASE 1 SITE GENERATED TRAFFIC VOLUMES.....	22
FIGURE 4-3	PHASE 2 SITE GENERATED TRAFFIC VOLUMES – VEHICLES..	23
FIGURE 4-4	PHASE 2 SITE GENERATED TRAFFIC VOLUMES – HEAVY VEHICLES	24
FIGURE 4-5	TOTAL SITE GENERATED TRAFFIC VOLUMES.....	25
FIGURE 5-1	2028 FUTURE TOTAL TRAFFIC VOLUMES.....	29
FIGURE 5-2	2033 & 2038 FUTURE TOTAL TRAFFIC VOLUMES.....	30
FIGURE 8-1	DIMENSIONS.....	38
FIGURE 8-2	PAVEMENT MARKING & SIGNAGE PLAN.....	39
FIGURE 8-3	FIRE TRUCK CIRCULATION	40
FIGURE 8-4	GARBAGE TRUCK CIRCULATION.	41
FIGURE 8-5	WB-20 MANEUVERS AT SITE ACCESSES.....	42
FIGURE 8-6	WB-20 MANEUVERS AT CRITICAL LOADING BAYS	43
FIGURE 8-7	PASSENGER VEHICLE CIRCULATION.....	44

APPENDICES

A	TERMS OF REFERENCE
B	TRAFFIC DATA
C	LEVEL OF SERVICE DEFINITIONS
D	EXISTING TRAFFIC CONDITIONS
E	BACKGROUND GROWTH RATE
F	FUTURE BACKGROUND TRAFFIC CONDITIONS



G	WARRANT ANALYSES
G-1	Left-Turn Warrant
G-2	Signal Warrants
H	FUTURE TOTAL TRAFFIC CONDITIONS
I	MULTIMODAL ANALYSIS BACKGROUND INFORMATION

1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by Kerbel Group Inc. to prepare a Transportation Impact Study for the proposed development located northwest of the intersection of Highway 11 and Crimson King Way in the Town of East Gwillimbury. As shown in **Figure 1-1**, the subject site is bounded by Highway 11 to the west, Crimson King Way to the south, a residential neighbourhood to the west, and trees to the north.



Figure 1-1 Subject Site Location

The subject site is currently vacant. The proposed development will be completed in two phases. Phase 1 of the proposed development will be a self-storage facility and is planned to be completed by 2028. It includes three buildings with a total gross floor area (GFA) of 9,327.47 m². Phase 2 includes three industrial buildings with a combined GFA of 29,515.85 m² and is planned to be completed by 2033. The proposed development includes three site accesses. The first access onto Highway 11 will be completed as part of Phase 1, with the remaining two accesses onto Crimson King Way being completed along with Phase 2. The site plan is shown in **Figure 1-2**.

The objective of this study is to evaluate if there are any adverse impacts on the local transportation network related to the proposed development and to evaluate the proposed parking and loading arrangements, in support of a development application to the Town of East Gwillimbury. Our study approach and findings are documented herein.

A terms of reference (TOR) was established with the Town of East Gwillimbury and the Region of York with consideration of the *York Region Transportation Mobility Plan Guidelines*, dated 2016. The TOR is provided in **Appendix A**.

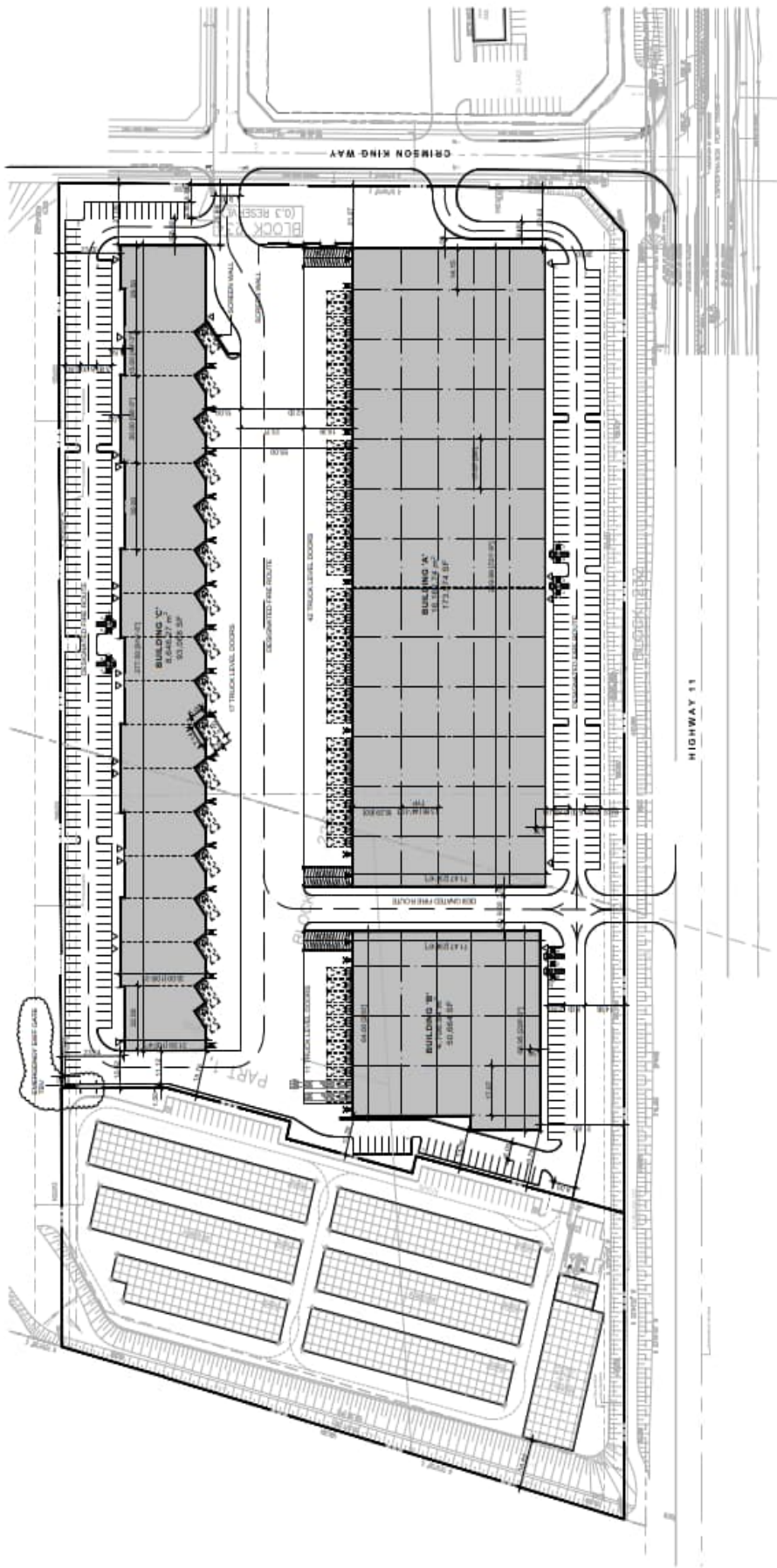


Figure 1-2
Site Plan

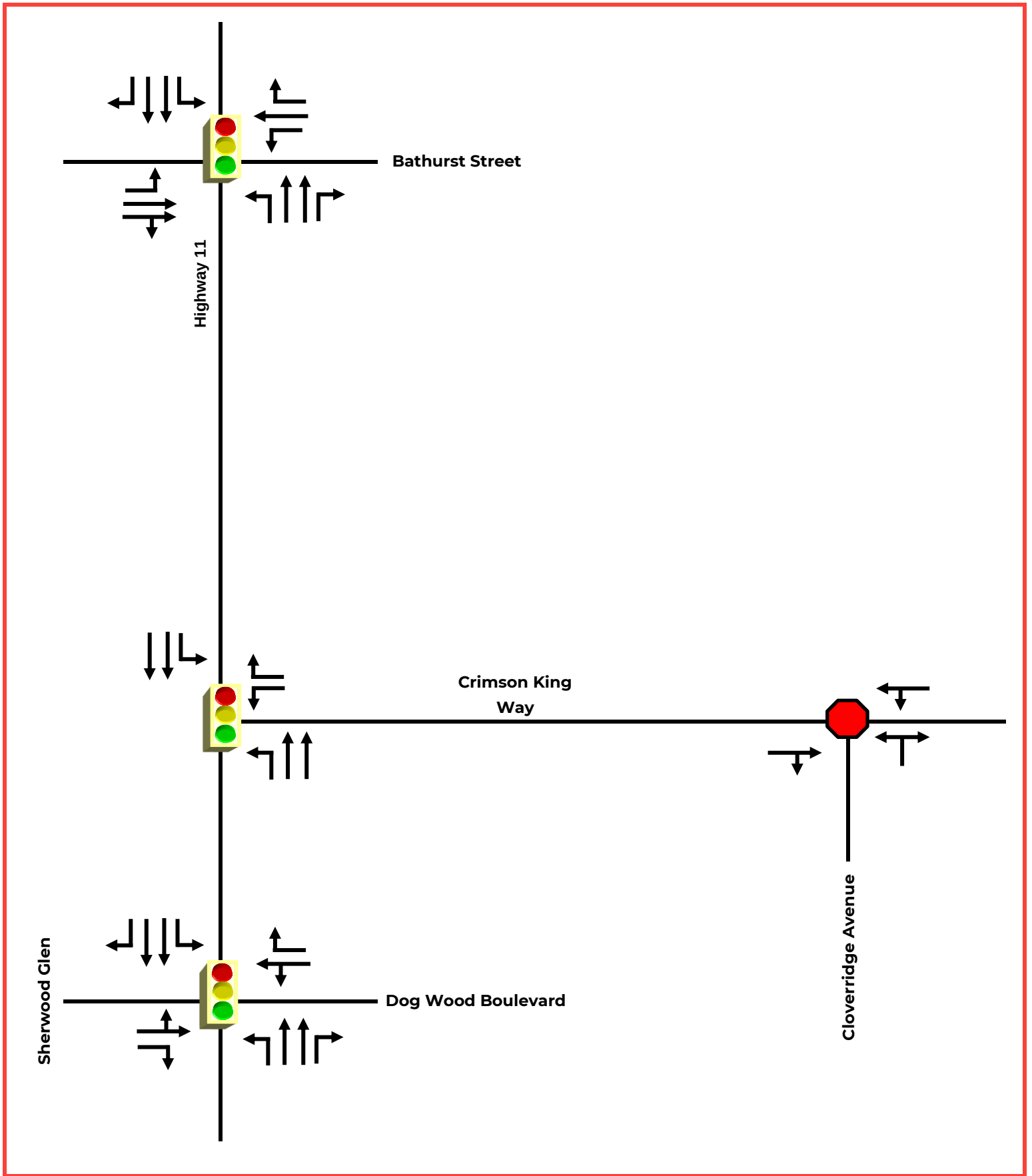
2 EXISTING TRANSPORTATION CONTEXT

2.1 BOUNDARY ROADWAYS

The characteristics of the study area roadways, including active transportation infrastructure, are summarized as follows:

- **Highway 11** is a regional arterial road under the jurisdiction of the Region of York. Within the vicinity of the site, it generally runs in the north-south direction and has a posted speed limit of 80 km/hr. There are pedestrian crossing facilities at the intersection with Bathurst Street;
- **Bathurst Street** is a regional arterial road under the jurisdiction of the Region of York. Within the vicinity of the subject site, it generally runs in the north-south direction and has a posted speed limit of 60 km/hr. Per the *York Region 2021-2022 Cycling Map*, there is a paved shoulder for cyclists, and there are pedestrian crossing facilities at the intersection with Highway 11;
- **Crimson King Way** is a local road under the jurisdiction of the Town of East Gwillimbury. It runs in the east-west direction and has an assumed speed limit of 40 km/hr. There is a sidewalk along the southern side of the road;
- **Dog Wood Boulevard** is a local road under the jurisdiction of the Town of East Gwillimbury. It generally runs in the north-south direction, however approximately 700 metres south of Crimson King Way it begins to run east-west and connects with Highway 11. It has an assumed speed limit of 40 km/hr. There is a sidewalk along the northern side of the street;
- **Sherwood Glen** is a rural road under the jurisdiction of the Town of East Gwillimbury. While Google Streetview imagery (dated 2015) shows a posted speed limit of 50 km/hr, based on the Town's Safer Streets Initiative, the speed limit has been reduced to 40 km/hr. It generally runs in the east-west direction within the vicinity of the subject site; and
- **Cloverridge Avenue** is a local road under the jurisdiction of the Town of East Gwillimbury. It runs in the north-south direction and has an assumed speed limit of 40 km/hr. There is a sidewalk along the eastern side of the road.

The lane configurations at the study intersections are illustrated in **Figure 2-1**. The proposed site accesses onto Highway 11, and Crimson King Way are also shown. It should be noted that the Phase 1 site access onto Highway 11 is proposed to be signalized and that exclusive northbound-right and southbound-left turning lanes are proposed to be added, which will be further discussed in Section 5.2.



Signalized

Legend



Unsignalized

Figure 2-1
Lane
Configurations

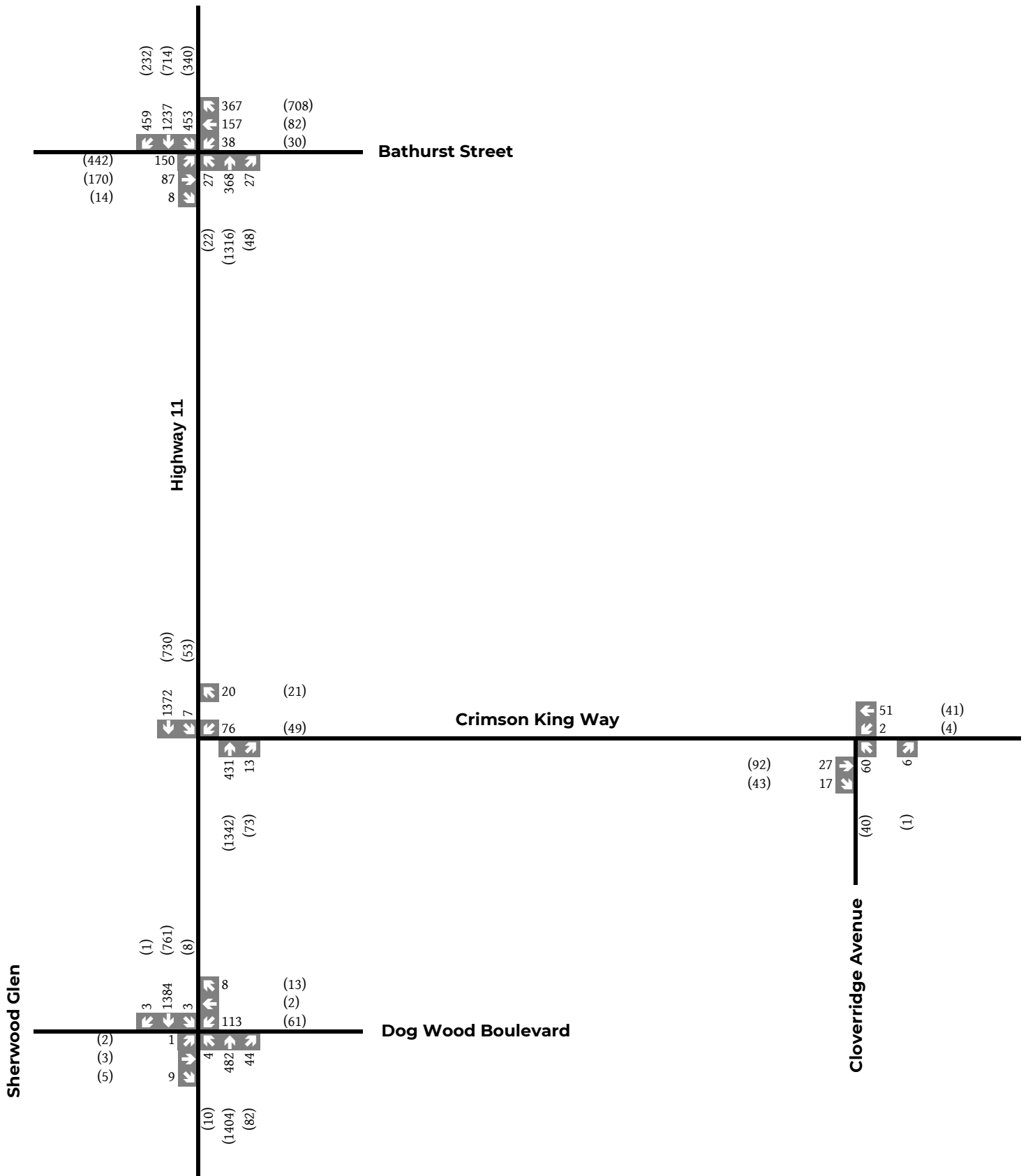
2.2 TRAFFIC DATA

Turning movement counts (TMCs) were collected for all study intersections as summarized in **Table 2-1**. These volumes are illustrated in **Figure 2-2**, and the detailed TMCs are included in **Appendix B**. Signal timing plans (STPs) were obtained from the Region of York and are also included in Appendix B. Existing traffic volumes were balanced using a conservative approach. The balancing applied to these volumes is shown in **Figure 2-3**, and the resulting balanced existing volumes are shown in **Figure 2-4**.

Table 2-1 Intersection Turning Movement Count Sources

Intersection	Count Date	Source
Highway 11 and Dog Wood Boulevard / Sherwood Glen	February 21 st , 2023	Ontario Traffic Inc.
Highway 11 and Crimson King Way		
Crimson King Way and Cloverridge Avenue		
Highway 11 and Bathurst Street	March 7 th , 2023	

At the intersection of Highway 11 and Bathurst Street during the p.m. peak hour data collection there was a collision between an eastbound-left turning and a westbound-through vehicle at approximately 4:56 p.m. Due to the presence of emergency services vehicles on scene until approximately 5:56 p.m., WSP assumed the counts taken between 4:15 and 4:45 p.m. would be most representative of typical conditions. To estimate the peak hour volumes those counts were multiplied by two. This represents a conservative estimate as the total vehicles at the intersection between 4:15 p.m. and 4:45 p.m. was higher than the total number 4:45 p.m. and 5:15 p.m. (2059 versus 1949).

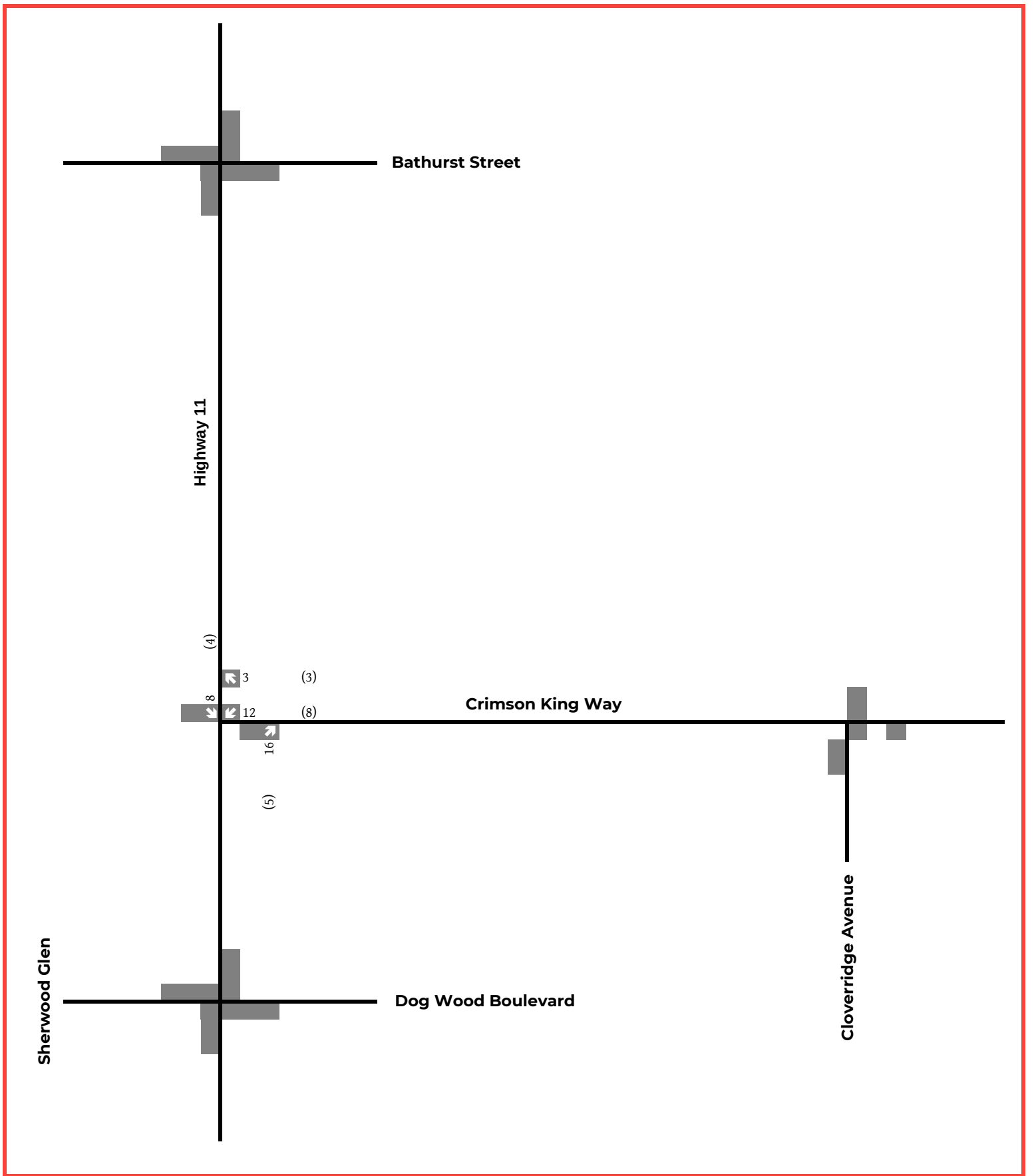


Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 2-2

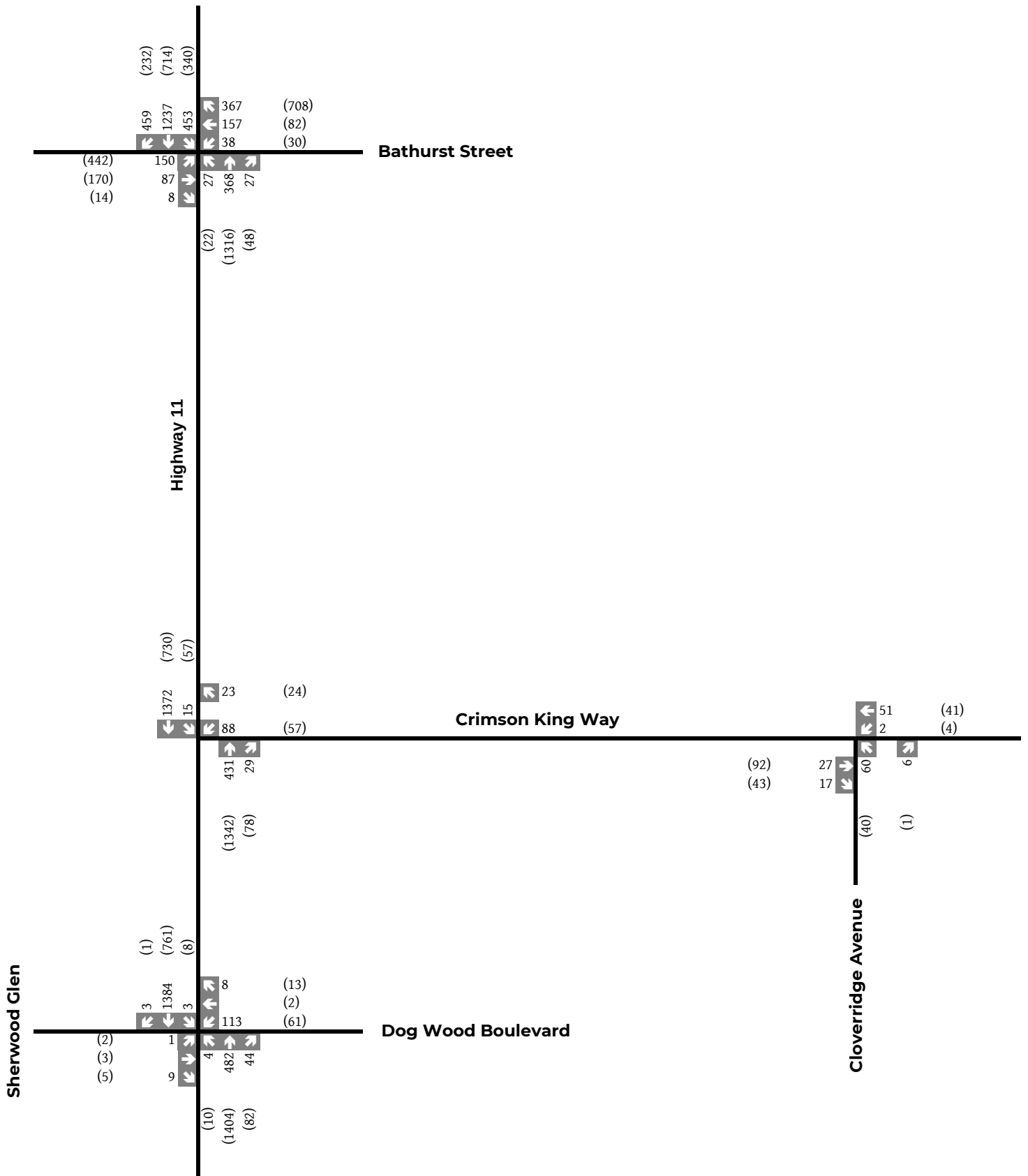
Existing Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 2-3
Balancing Applied to
Existing Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 2-4
Balanced Existing Traffic Volumes

2.3 MODELLING METHODOLOGY

2.3.1 INPUTS AND PARAMETERS

The Synchro input parameters used in the analysis were established in accordance with the *York Region Transportation Mobility Plan Guidelines*, dated November 2016.

Existing lane configurations were obtained from Google Earth satellite and Street View imagery. Heavy vehicle percentages and conflicting pedestrian volumes as derived from the existing turning movement counts. The Synchro default heavy vehicle percentage of 2% and peak hour factor of 0.92 were applied at the site accesses.

The Synchro default ideal saturation flow rate of 2000 vehicles per hour per lane (vphpl) was applied to all roads.

Default loss time adjustments (LTA) of 0 seconds were applied to all movements.

Intersection peak hour factors (PHF) were calculated from the 15-minute peak hour traffic counts and are summarized in **Table 2-2**.

Table 2-2 Intersection Peak Hour Factors

Intersection	Peak Hour Factor	
	A.M. Peak Hour	P.M. Peak Hour
Highway 11 and Dog Wood Boulevard / Sherwood Glen	0.89	0.95
Highway 11 and Crimson King Way	0.89	0.97
Crimson King Way and Cloverridge Avenue	0.91	0.83
Highway 11 and Bathurst Street	0.92	0.96 ¹

1. The peak hour factor for the intersection of Highway 11 and Bathurst Street during the p.m. peak hour was calculated using the volumes counted between 4:15 pm and 4:45 pm as discussed in Section 2.2.

2.3.2 INTERSECTION LEVEL OF SERVICE

Intersection level of service (LOS) is a method of quantifying the quality of traffic operations at signalized and unsignalized intersections. LOS is indicated through a lettering system, with LOS A representing an excellent level of service (generally under free-flow conditions), and LOS F representing a very poor level of service (generally under congested conditions). **Appendix C** contains the definitions for level of service for both signalized and unsignalized intersections.

In addition to LOS, the volume-to-capacity (v/c) ratio represents the sufficiency of an intersection to accommodate the vehicular demand, as compared to the vehicular capacity. A v/c ratio less than 0.85 generally indicates adequate capacity and vehicles are not expected to experience significant delays or queueing conditions. As the v/c ratio approaches or exceeds 1.00, traffic flow becomes unstable resulting in significant delays and queueing conditions. LOS D is typically considered acceptable peak hour performance in an urban setting, and lower LOS conditions may be tolerable for short term time periods during peak hours when heavier traffic volumes are expected.

The 50th percentile queue length represents the median queue, meaning that half of the queues that occur within a peak hour will be of this length or less. The 95th percentile queue length provides the queue length that would only be exceeded five percent of the time. The 95th percentile queue is considered to represent the worst-case scenario and is used as an indicator to determine where further examination of storage length is required.

The operations of the study area intersections have been evaluated using Synchro 11, with Highway Capacity Manual (HCM) 2000 procedures. The analysis has considered Level-of-Service (LOS), volume-to-capacity (v/c) ratios, and queueing conditions.

2.4 EXISTING TRAFFIC OPERATIONS

The results of the existing intersection operations analysis are summarized in **Table 2-3** for both the a.m. and p.m. peak hours. Only movements operating under critical conditions (i.e., v/c ratios great than 0.85 or LOS 'E' or 'F') are included. Detailed Synchro intersection capacity analysis sheets are included in **Appendix D**.

Table 2-3 Existing Traffic Operations Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS (Delay in seconds)	Critical Movements [v/c Ratio] ¹	LOS (Delay in seconds)	Critical Movements [v/c Ratio] ¹
Signalized Intersections				
Highway 11 and Crimson King Way	A (7.7)	-	B (12.6)	-
Highway 11 and Dog Wood Boulevard / Sherwood Glen	B (14.6)	-	A (6.5)	-
Highway 11 and Bathurst Street <i>Uncalibrated</i>	C (23.2)	-	E (70.0)	EB-L (0.88) WB-R (1.28) NB-T (0.98) SB-L (1.04)
Highway 11 and Bathurst Street <i>Calibrated</i>	N/A	N/A	D (39.7)	EB-L (0.88) WB-R (0.91) NB-T (0.98) SB-L (0.96)
Unsignalized Intersections²				
Crimson King Way and Cloverridge Avenue	A (7.7)	NB-TR (0.09)	A (7.8)	NB-TR (0.06)

1. Critical movements are defined as those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection.

2. The LOS at an unsignalized intersection is defined by the movement with the highest delay.

As shown in Table 2-3, all intersections are operating at an LOS of 'C' or better during both peak hours, with the exception of the intersection of Highway 11 and Bathurst Street during the p.m. peak hour which is operating at an LOS 'D'. All movements are projected to operate within capacity, except for the westbound-right and southbound-left movements at the intersection of Highway 11 and Bathurst Street during the p.m. peak hour, which operate at v/c ratios of 1.28 and 1.04, respectively. As it is theoretically impossible for movements to be over-capacity under existing conditions the following calibration measures were applied to bring the movements to just within capacity:

- Peak hour factors of 1.00 were applied to the westbound-right, and southbound-left movements. As intersection conditions become busier, the PHF becomes closer and closer to 1.00, given these movements were operating over-capacity, the increased PHF is appropriate;
- A lost time adjustment of -2.0 seconds was applied to the westbound-right, and of -1.0 seconds was applied to the southbound-left during the p.m. peak hour;
- The observed number of vehicles making the westbound-right turn on red was greater than the Synchro-calculated right-turn on red (sRTOR) saturation flow rate. The following calibration approach was followed:
 - The videos used to collect TMC data were reviewed the count the number of vehicles making the westbound-right turn on red during the p.m. peak hour prior to the accident (between 4:15 p.m. and 5:45 p.m. (as discussed in Section 2.2), and then multiplied by 2 to get an estimate for the full peak hour. Based on the video footage, 117 vehicles were observed making the westbound-right turn on red for the 30-minute period which translates to 234 vehicles for the full hour;
 - Per Synchro 11 User Guide, the following equation was used to calculate sRTOR based on observed field volumes: $sRTOR = (\text{field measured RTOR volumes}) * (\text{Cycle length}) / (\text{red time, seconds})$;

- Given the intersection does not have a set cycle length as it operates under free conditions the actuated cycle length of 131.8 seconds as calculated by Synchro was used. Red time was calculated by subtracting both the actuated effective green time (44.3 seconds) and the amber time for phase 5 the southbound-left/westbound-right phase (1.0 second) from the actuated cycle length;
- Based on the above noted equation and values a sRTOR of 365 was calculated and applied to the westbound-right movement during the p.m. peak hour.

These Synchro parameters are carried forward from the existing conditions to the future assessment to allow for the “Apples to Apples” comparisons.

The results of the queuing assessment at exclusive turning lanes are shown in **Table 2-4**. The 50th percentile queue length represents the median queue, meaning that half of the queues that occur within a peak hour will be of this length or less. The 95th percentile queue length provides the queue length that would only be exceeded five percent of the time. The 95th percentile queue is considered to represent the worst-case scenario and is used as an indicator to determine where further examination of storage length is required. Detailed queuing reports are included in Appendix D.

Table 2-4 Existing Queueing Analysis

Intersection	Movement	Storage Length (m)	95th Percentile Queue (m) [50th Percentile Queue (m)] ¹	
			A.M. Peak Hour	P.M. Peak Hour
Highway 11 and Crimson King Way	WBL	-	44 [26]	28 [15]
	WBR	45	9 [0]	9 [0]
	NBR	92	0 [0]	10 [5]
	SBL	84	3 [1]	5 [2]
Highway 11 and Dog Wood Boulevard / Sherwood Glen	WBR	65	0 [0]	0 [0]
	NBL	71	2 [1]	4 [1]
	NBR	45	3 [0]	7 [1]
	SBL	70	m1 [1]	1 [1]
	SBR	90	m0 [0]	m0 [0]
Highway 11 and Bathurst Street <i>Uncalibrated</i>	EBL	67 (175) ²	50 [32]	166 [109]
	WBL	44	16 [8]	13 [6]
	WBR	42	42 [12]	314 [237]
	NBL	137	9 [3]	7 [3]
	NBR	162	0 [0]	0 [0]
	SBL	148	108 [65]	157 [86]
	SBR	154	20 [0]	15 [0]
Highway 11 and Bathurst Street <i>Calibrated</i>	EBL	67 (175) ²	N/A	#166 [109]
	WBL	44		13 [6]
	WBR	42		#185 [103]
	NBL	137		7 [3]
	NBR	162		0 [0]
	SBL	148		#143 [75]
	SBR	154		15 [0]

1. All queues have been rounded up to nearest whole number.

2. Based on the pavement marking the storage length is 67 metres. However, the EBL lane extends, as a lane separated from a through traffic by yellow solid line, all the way to Graham Sideroad. Hence, the effective storage length is 175 metres.

The results of the queuing analysis, summarized in Table 2-4, shows that all 95th or 50th percentile queue lengths at exclusive turning lanes are contained within their available storage lengths except for the westbound right turn movement at the intersection of Highway 11 and Bathurst Street during the p.m. peak hour. The westbound approach is the 80-metre leg between Highway 11 and Holland Landing Road. The westbound-right queue extends

to the T-intersection of Bathurst Street and Holland Landing Road. However, since the intersection of Bathurst Street and Holland Landing Road is stop controlled, and most of the westbound-right traffic is originating from the northbound-left traffic on Holland Landing Road, this queuing issue does not represent a safety concern.

2.5 ACTIVE TRANSPORTATION AND TRANSIT NETWORK

There are no transit services within the vicinity of the study area and very little active transportation infrastructure along the study area roadways. As previously noted in Section 2.1, there are sidewalks along one side of Crimson King Way, Dog Wood Boulevard, and Cloverridge Avenue, and there are pedestrian crossing facilities at the intersection of Highway 11 and Bathurst Street. Additionally, there is a paved shoulder along Bathurst Street for cyclists.

3 FUTURE BACKGROUND CONDITIONS

3.1 HORIZON YEARS

Horizon years of 2028 (full build-out of Phase 1), 2033 (full build-out of Phase 2), and 2038 (5-years after full build-out of Phase 2) were analyzed.

3.2 FUTURE ROAD NETWORK IMPROVEMENTS

Based on confirmation with Regional staff, there are no planned changes or improvements in the vicinity of the site, as per the Region's 2022 10-Year Roads and Transit Capital Construction Program. Therefore, the future background road network is assumed to remain the same as existing conditions (illustrated in Figure 2-1).

3.3 BACKGROUND TRAFFIC GROWTH

The general background growth rate applicable to Highway 11 was determined based on a review of historical TMC data. The TMCs and further details on the growth rate calculations are included in **Appendix E**. A summary of the average annual growth rates at the two intersections examined is shown in **Table 3-1**. The analysis found that along Highway 11, growth rates were either negative or almost 0%. Therefore, no background growth rates were applied at the intersection.

Table 3-1 Background Growth Rates

Intersection	Average Annual Growth Rate (%)	
	A.M. Peak Hour	P.M. Peak Hour
Highway 11 and Dog Wood Boulevard / Sherwood Glen	-0.48%	-3.37%
Highway 11 and Bathurst Street	-0.08%	-2.57%

3.4 BACKGROUND DEVELOPMENTS

In addition to background traffic growth, traffic generated background developments within the vicinity of the subject site were considered. **Table 3-2** summarizes the developments which were included based on a review of the Town of East Gwillimbury's Interactive Mapping Tool for active planning applications and knowledge of other projects WSP has completed nearby.

Table 3-2 Background Developments per East Gwillimbury Mapping Tool

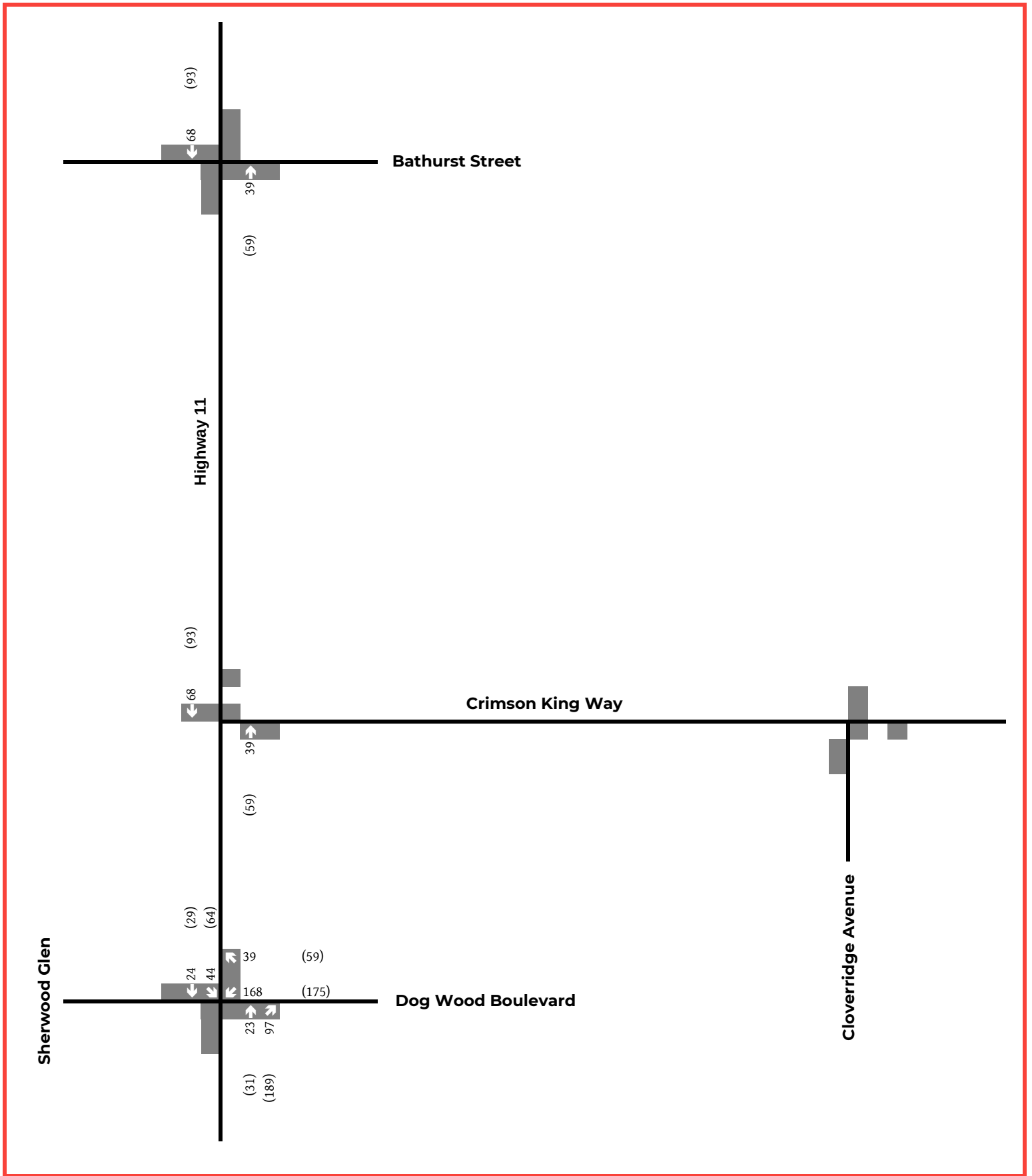
Background Development	Description	Traffic Volume Source
West Holland Landing Subdivision (Multiple Owners, File No: 19T-88085, 19T-94036, 19T-89112, 19T-90015, and 19T-09001.)	1289 residential units, 7 part lots, and blocks dedicated to business park, commercial, and school uses	Transportation Impact Study, dated February 2015, prepared by MMM Group. ¹

Background Development	Description	Traffic Volume Source
Holland Green Village (OLV Developments Inc.)	522 residential units, 3,618 m ² of retail, 567 m ² of community centre, and 1,682 m ² of church space.	Transportation Study, dated December 10 th , 2021, prepared by WSP. Addendum #1 – Response to Regional and Municipal Transportation Comments, dated December 20 th , 2022, prepared by WSP.

1. Adjustments to total site generated volumes included in Holland Green Village December 2021 Transportation Study which accounted for the completed portion of the subdivision were applied.

Satellite imagery shows that portions of the West Holland Landing Subdivision (WHL) have been completed and are occupied. This is further supported by the fact that the TMCs collected showed volumes exiting both Crimson King Way and Dog Wood Boulevard onto Highway 11 (both of these roads were built along with the subdivision, in the 2015 TS they are referred to as Street E and Street A, respectively). While completing the December 2021 TIS for Holland Green Village (HGV), WSP undertook a site visit and determined that approximately 78% of the subdivision was occupied at the time of data collection in September 2021. To avoid double-counting, only volumes associated with the unbuilt 22% were considered, and they were distributed based on the location of the non-occupied blocks and the surrounding road network.

For the purposes of this study, the volumes and traffic assignment of the unbuilt 22% of the WHL as analyzed in the HGV December 2021 TIS has been applied. Given it has been approximately 1.5 years since the site visit, it is a conservative assumption to assume no further blocks have been constructed and occupied. It was assumed that both WHL and HGV would be fully built and occupied by the first horizon year in 2028. The resulting background development traffic volumes are shown in **Figure 3-1**.



Legend

xx A.M. Peak Hour Traffic Volumes
 ((xx)) P.M. Peak Hour Traffic Volumes

Figure 3-1
 Background Development
 Traffic Volumes

3.5 FUTURE BACKGROUND TRAFFIC OPERATIONS

Future background traffic volumes were developed by aggregating the volumes associated with background traffic growth and those associated with background developments (shown in Figure 3-1). Given there is no background growth and the same background development traffic volumes were applied to every horizon, the resulting future background traffic volumes are the same for all three horizon years. These volumes are shown in **Figure 3-2**. The results of the future background traffic operations and queueing analyses are shown in **Table 3-3** and **Table 3-4**, respectively. Detailed Synchro intersection capacity and queueing reports are included in **Appendix F**.

Table 3-3 Future Background Traffic Operations Analysis

Intersection	A.M. Peak Hour		P.M. Peak Hour	
	LOS (Delay in seconds)	Critical Movements [v/c Ratio] ¹	LOS (Delay in seconds)	Critical Movements [v/c Ratio] ¹
Signalized Intersections				
Highway 11 and Crimson King Way	A (7.7)	-	A (5.5)	SB-L (0.85)
Highway 11 and Dog Wood Boulevard / Sherwood Glen	C (26.2)	WB-TR (0.89)	B (19.7)	-
Highway 11 and Bathurst Street	C (24.1)	-	D (48.3)	EB-L (0.88) WB-R (0.91) NB-T (1.02) SB-L (0.96)
Unsignalized Intersections²				
Crimson King Way and Cloverridge Avenue	A (7.7)	NB-LR (0.09)	A (7.8)	NB-LR (0.06)

1. Critical movements are defined as those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection.
2. The LOS at an unsignalized intersection is defined by the movement with the highest delay.

Table 3-4 Future Background Queueing Analysis

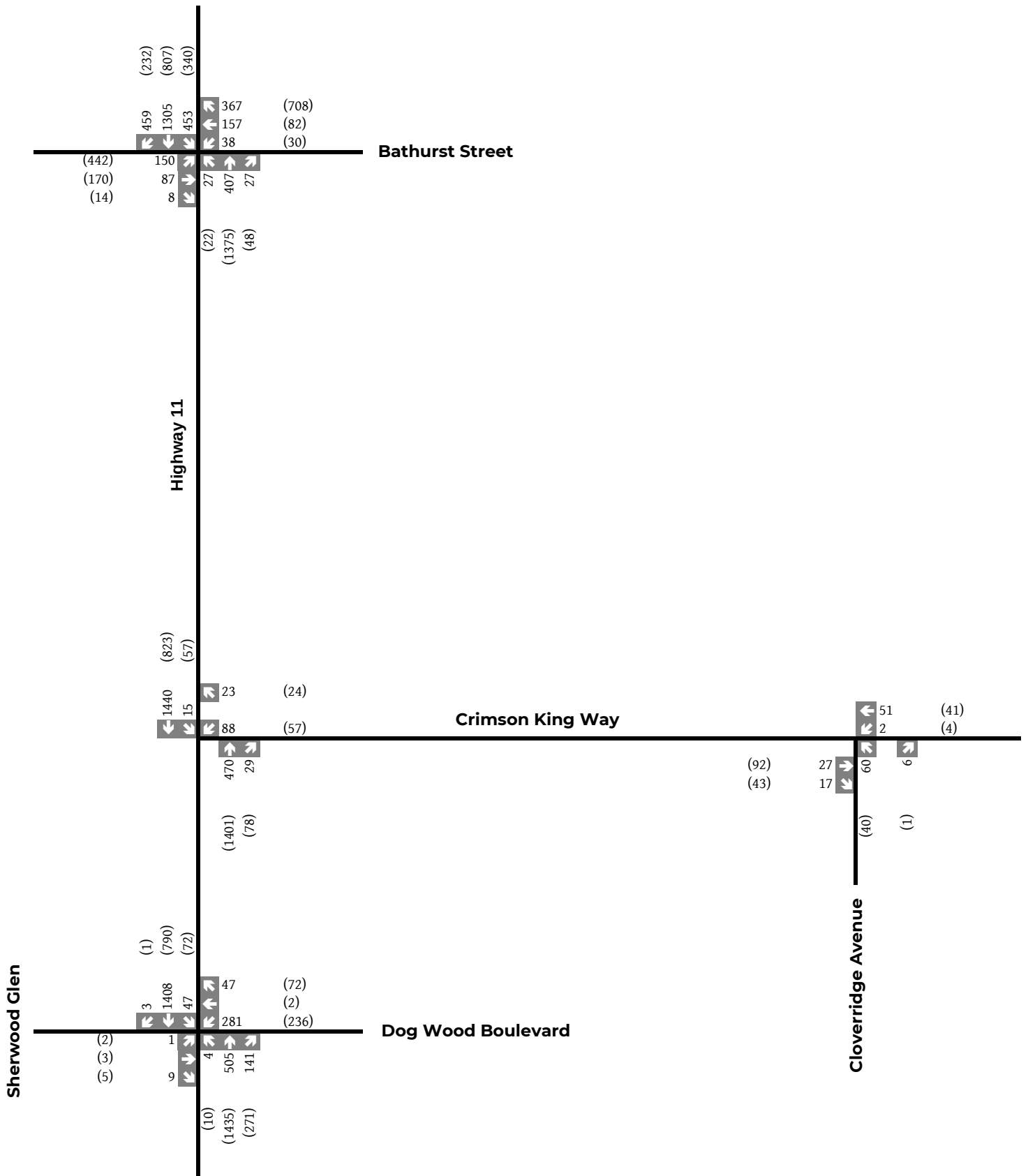
Intersection	Movement	Storage Length (m)	95th Percentile Queue (m) [50th Percentile Queue (m)] ¹	
			A.M. Peak Hour	P.M. Peak Hour
Highway 11 and Crimson King Way	WBL	-	44 [26]	28 [15]
	WBR	45	9 [0]	9 [0]
	NBR	92	1 [0]	m0 [1]
	SBL	84	3 [1]	5 [2]
Highway 11 and Dog Wood Boulevard / Sherwood Glen	WBR	65	7 [0]	12 [0]
	NBL	71	3 [1]	5 [2]
	NBR	45	11 [0]	39 [17]
	SBL	70	m14 [6]	16 [6]
Highway 11 and Bathurst Street	SBR	90	m0 [0]	m0 [0]
	EBL	67 (175) ²	50 [32]	#166 [109]
	WBL	44	16 [8]	13 [6]
	WBR	42	50 [17]	#185 [103]
	NBL	137	9 [3]	7 [3]
	NBR	162	0 [0]	0 [0]
	SBL	148	#110 [65]	#143 [75]
	SBR	154	20 [0]	15 [0]

1. All queues have been rounded up to nearest whole number.

2. *Based on the pavement marking the storage length is 67 metres. However, the EBL lane extends, as a lane separated from a through traffic by yellow solid line, all the way to Graham Sideroad. Hence, the effective storage length is 175 metres.*

Similar to existing conditions, all intersections are operating at an LOS of 'C' or better during both peak hours, with the continued exception of the intersection of Highway 11 and Bathurst Street during the p.m. peak hour which is operating at an LOS 'D'. All movements are projected to operate within capacity, except for the northbound-through movement at the intersection of Highway 11 and Bathurst Street during the p.m. peak hour which is projected to operate with a v/c ratio of 1.02.

The results of the queuing analysis shows that all 95th or 50th percentile queue lengths at exclusive turning lanes are contained within their available storage lengths except for the westbound-right movements at the intersection of Highway 11 and Bathurst Street during both peak hours. During the a.m. peak hour, the 50th percentile queue for the westbound-right movement is contained within the existing storage length. Moreover, as previously discussed in Section 2.3.2, the westbound approach is the 80-metre leg between Highway 11 and Holland Landing, and the queuing issue does not represent a safety concern. It should also be noted that in comparison with existing conditions, the 95th percentile queue during the a.m. peak hour has increased by only 1 metre, and during the p.m. peak hour neither the 95th nor 50th percentile queues for the movement have changed at all.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 3-2

Future Background Traffic Volumes

4 SITE TRAFFIC

4.1 SITE ACCESSSES

Once fully completed, the site is proposed to include three accesses: one onto Highway 11, and two onto Crimson King Way. Phase 1 of the proposed development (to be completed by the 2028 horizon year) will include only the access onto Highway 11, once Phase 2 is complete (by the 2033 horizon year), all three accesses will be used. The updated lane configurations are illustrated in **Figure 4-1**.

4.2 TRIP GENERATION

The vehicle and truck trips generated by the proposed development during the weekday a.m. and p.m. peak hours were estimated using the trip generation rates outlined in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition. Phase 1 of the proposed development is planned to be completed by 2028. It includes three buildings that will be used for self-service storage. Additionally, one of the buildings will have a small office. Phase 2 is planned to be completed by 2033. It includes three industrial buildings, one of which will be multi-use while the other two will be single use. For Phase 1, land use codes (LUC) 151 (Mini-Warehouse) and 712 (Small Office Building) were applied. For Phase 2 LUC 150 (Warehousing) was determined to be the most appropriate, it pertains to warehouses which are meant primarily for storages and includes spaces dedicated to office and maintenance uses. The trip generation rates and resulting trip generation is summarized in **Table 4-1**.

Table 4-1 Site Trip Generation

Phase	ITE Land Use Code		A.M. Peak Hour			P.M. Peak Hour		
			Inbound	Outbound	Total	Inbound	Outbound	Total
1	LUC 151: Mini-Warehouse (98,900 ft²)	Equation (X = 1000 ft²)	T = 0.09X			T = 0.15X		
		Directional Splits	59%	41%	100%	47%	53%	100%
		Sub-Total	5	4	9	7	8	15
	LUC 712: Small Office Building (1,500 ft²)	Equation (X = 1000 ft²)	T = 1.67X			T = 2.16X		
		Directional Splits	82%	18%	100%	34%	66%	100%
		Sub-Total	2	0	2	1	2	3
	Phase 1 Total		7	4	11	8	10	18
2	LUC 150: Warehouse (Vehicle) (317,706 ft²)	Equation (X = 1000 ft²)	T = 0.12X + 23.62			T = 0.12X + 26.48		
		Directional Splits	77%	23%	100%	28%	72%	100%
		Phase 2 Total	48	14	52	18	47	65
	LUC 150: Warehouse (Heavy Vehicle) (317,706 ft²)	Equation (X = 1000 ft²)	T = 0.02X			T = 0.03X		
		Directional Splits	52%	48%	100%	52%	48%	100%
		Total Heavy	3	3	6	5	5	10
	Phase 2 Total (# Heavy)		48 (3)	14 (3)	52 (6)	18 (5)	47 (5)	65 (10)
Phases 1 and 2 Total		55	18	73	26	57	83	

As shown in Table 4-1, the development is projected to generate 73 vehicle trips during the a.m. peak hour (55 inbound and 18 outbound), and 83 trips during the p.m. peak hour (26 inbound and 57 outbound). Of those totals, Phase 2, specifically, is expected to generate 6 heavy vehicle trips during the a.m. peak hour (3 inbound and 3 outbound), and 10 heavy vehicle trips during the p.m. peak hour (5 inbound and 5 outbound).

4.3 TRIP DISTRIBUTION AND ASSIGNMENT

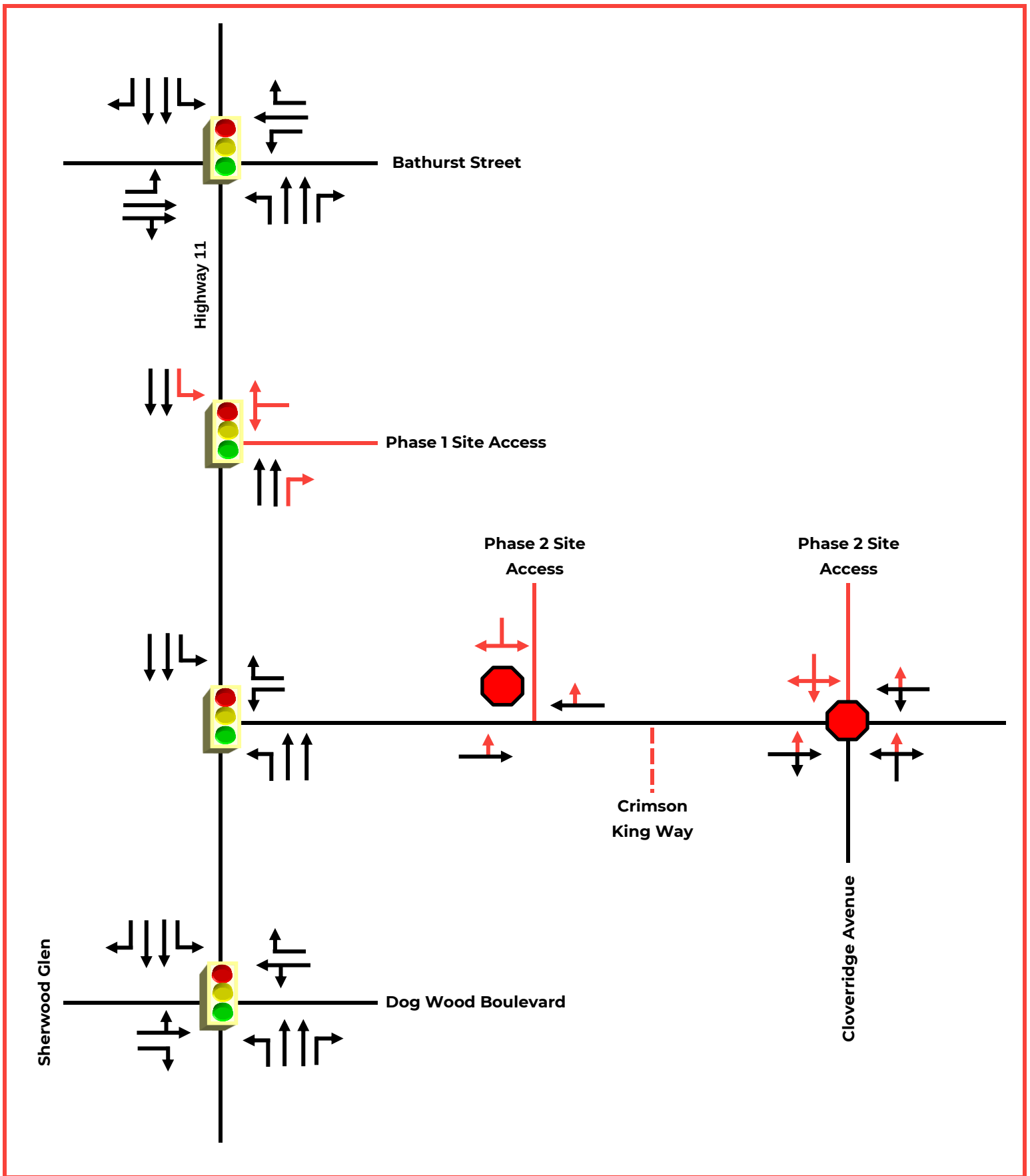
Given the unique purpose of Phase 1 of the proposed development, trip distribution was estimated based on the sizes of the surrounding communities and their locations relative to the subject site. It was assumed that 30% of trips would originate from Bradford West Gwillimbury, northwest of the subject site, and the remaining 70% would come from Newmarket, which is southeast.

For Phase 2 of the proposed development, this 70%/30% distribution was also applied given the limited available TTS data for work-related trips in the zones surrounding the proposed development.

All Phase 1 volumes were assigned to the site access along Highway 11 as shown in **Figure 4-2**.

The Phase 2 vehicle and heavy vehicle volumes are shown in **Figure 4-3** and **Figure 4-4**, respectively. Phase 2 vehicle trips were assigned to the three accesses based on the location of the parking areas and the most logical route choice. Phase 2 heavy vehicle volumes were assigned between the access on Highway 11 and the easternmost access on Crimson King Way.

The total site generated traffic volumes are shown in **Figure 4-5**.



Signalized

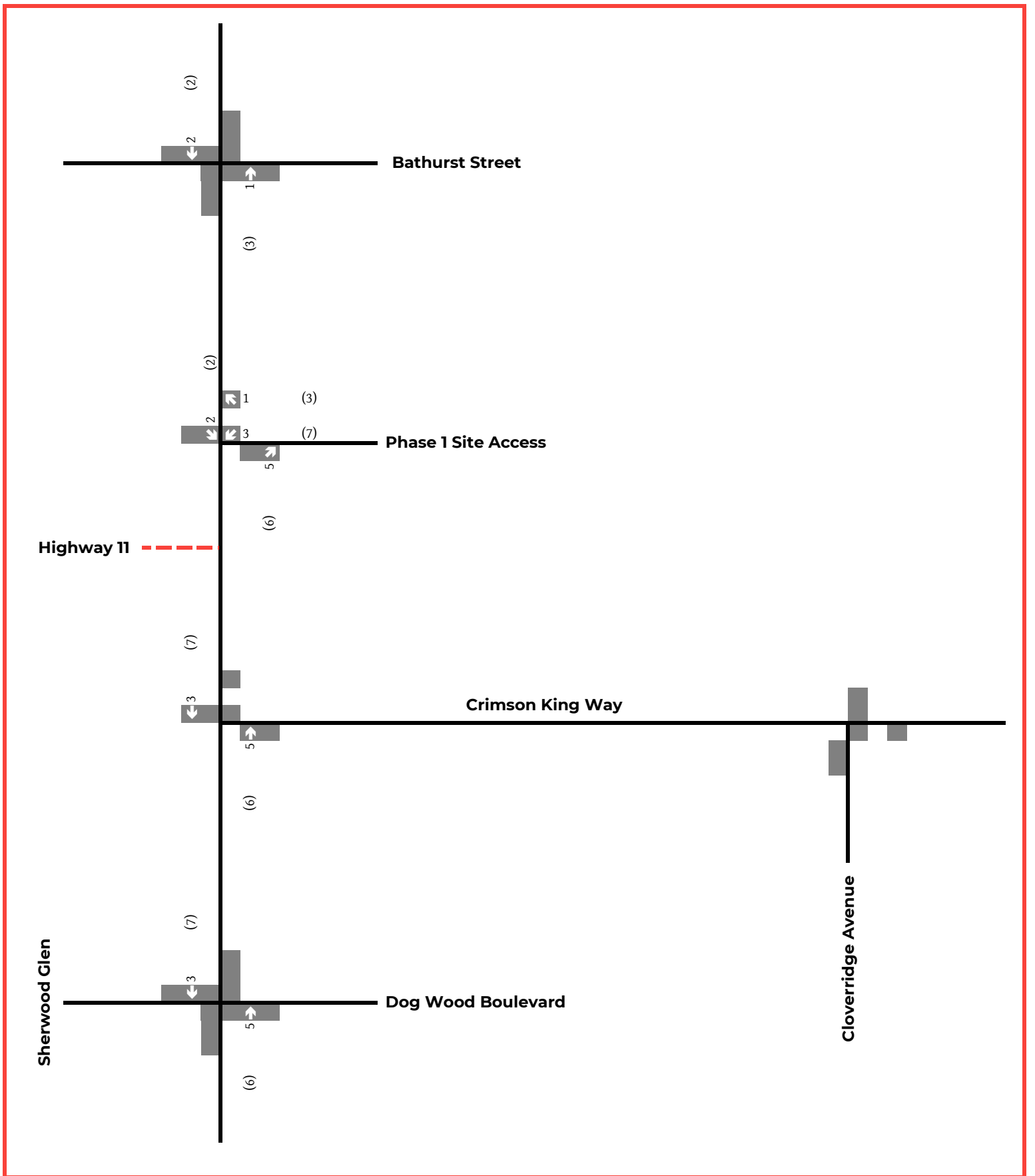


Unsignalized



Future Lane Configuration

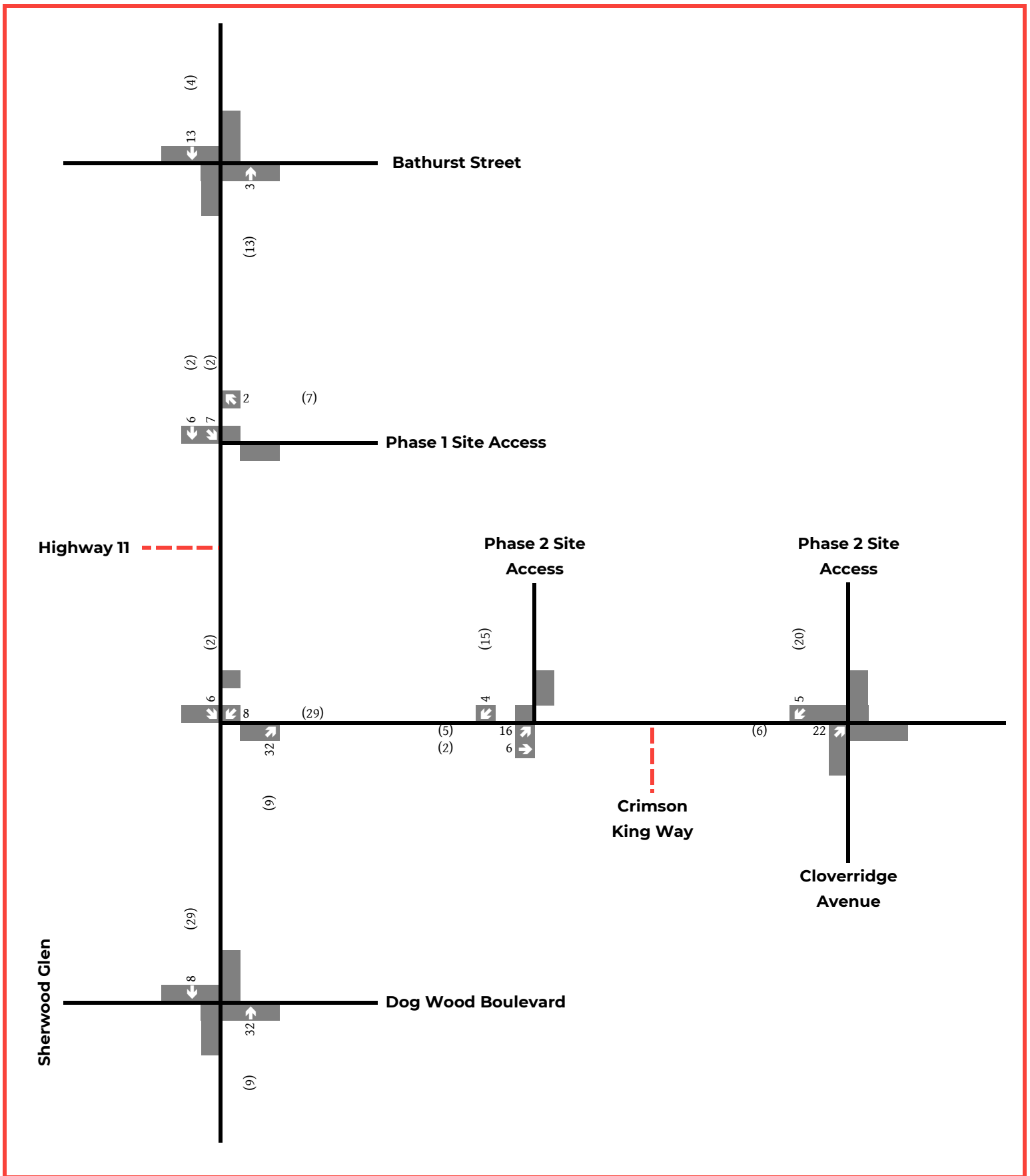
Figure 4-1
Future Lane
Configurations



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

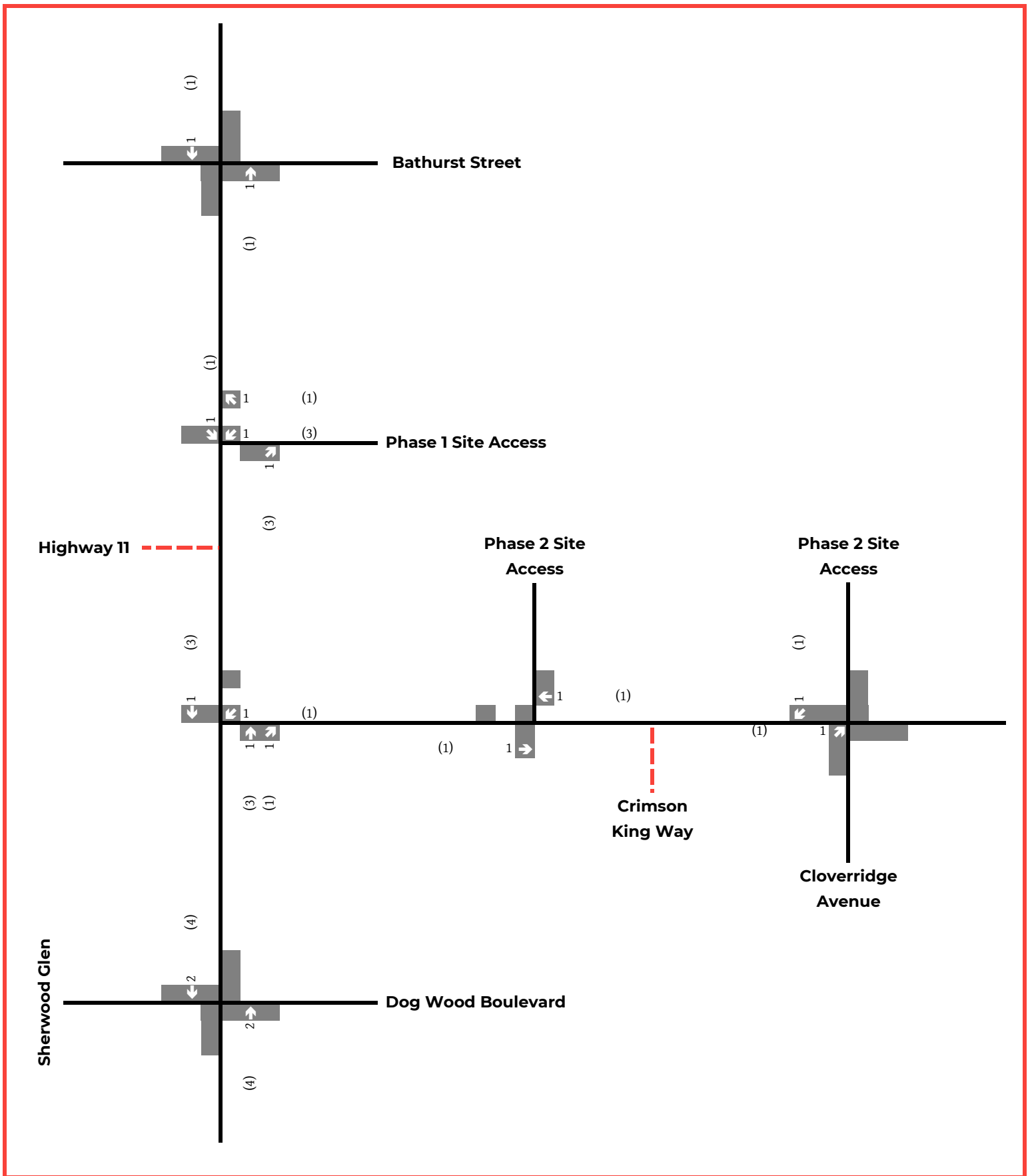
Figure 4-2
Phase 1 Site Generated Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 4-3
Phase 2 Site Generated
Traffic Volumes - Vehicles

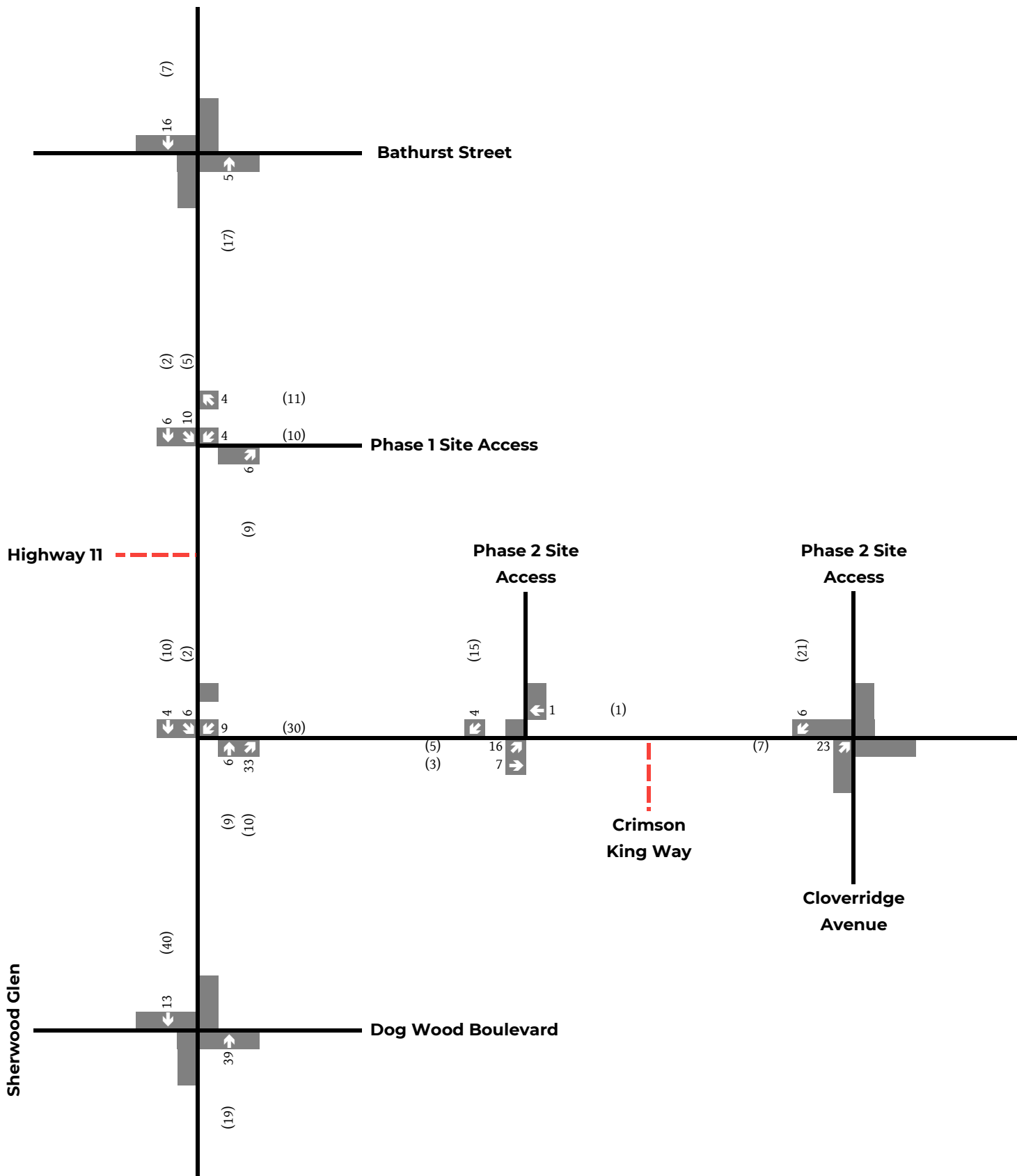


Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 4-4

Total Site Generated Traffic Volumes - Heavy Vehicles



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 4-5
Total Site Generated Traffic Volumes

5 FUTURE TOTAL CONDITIONS

5.1 BASIS OF ASSESSMENT

The future total traffic volumes for each horizon year were developed by aggregating the future background traffic volumes with the site-generated traffic volumes. The resulting future total traffic volumes are shown in **Figure 5-1** for the 2028 horizon year, and **Figure 5-2** for the 2033 / 2038 horizon years.

5.2 PHASE 1 HIGHWAY 11 SITE ACCESS

5.2.1 EXCLUSIVE TURNING LANES

Phase 1 of the proposed development will include an access along Highway 11. The Region requested exclusive turning lanes be provided at the intersection during correspondence related to the TOR.

Highway 11 is a four-lane highway. In accordance with the Region of York's *Access Guidelines* (dated November 2020), Figure EB-1 in the Geometric Design Standards for Ontario Highways was used to confirm that a southbound-left exclusive lane would be warranted and to determine the storage length which would be appropriate. The p.m. peak hour under 2038 future total conditions was analyzed. It was determined that an exclusive southbound left turning lane with a storage length of 15.0 metres would be warranted. This analysis is included in **Appendix G-1**.

An exclusive northbound-right turning lane with a storage length of 30 metres per York Region Standard Drawing DS-105 (4-Lane "X" Intersection (with Median Islands)), is required.

5.2.2 SIGNAL WARRANT

A signal warrant analysis was completed using 2038 future total volumes to confirm and determine when signals would be warranted. The analysis was based on Justification 7 (Projected Volumes) from the Ontario Traffic Manual (OTM) Book 12. The signal warrant calculations are included in **Appendix G-2**. Per Justification 7, a signal is not warranted. It is recognized that the York Region policy that the traffic signal warrants should be satisfied, the signalization of the proposed site access is recommended for the following reasons:

- Crimson King Way is a local road intended and designed to serve the local residential traffic. In case that the site access on Highway 11 is not signalized, all large trucks leaving the site and heading south will need to use Crimson King Way. This will result in mixing large trucks with local residential traffic, pedestrians and cyclist which is not desirable.
- Outbound trucks using the Crimson King Way accesses would need to encroach onto the opposing traffic lane to complete the southbound-right movement. This is because Crimson King Way is not designed to accommodate large trucks. This encroachment into the opposing traffic lane is not desirable and represents a safety concern.
- The proposed access meets minimum spacing requirements of 215 metres per Table 5 of the York Region Access Guidelines (dated November 2020).

5.3 FUTURE TOTAL TRAFFIC OPERATIONS

The results of the future total traffic operations and queuing analyses are summarized in **Table 5-1** and **Table 5-2**, respectively. Detailed Synchro intersection capacity and queuing reports are included in **Appendix H**.

Table 5-1 Future Total Traffic Operations Analysis

Intersection	Horizon Year	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements [v/c Ratio] ¹	LOS (Delay in seconds)	Critical Movements [v/c Ratio] ¹
Signalized Intersections					
Highway 11 and Crimson King Way	2028	A (7.5)	-	A (5.5)	-
	2033 / 2038	A (7.8)	-	A (8.1)	-
Highway 11 and Dog Wood Boulevard / Sherwood Glen	2028	C (25.8)	WB-LT (0.89)	B (19.6)	-
	2033 / 2038	C (26.1)	WB-LT (0.89)	B (19.5)	-
Highway 11 and Bathurst Street	2028	C (24.1)	-	D (48.5)	EB-L (0.88) WB-R (0.91) NB-T (1.02) SB-L (0.96)
	2033 / 2038	C (24.3)	-	D (49.5)	EB-L (0.88) WB-R (0.91) NB-T (1.03) SB-L (0.96)
Highway 11 and Phase 1 Site Access	2028	A (1.4)	-	A (1.1)	-
	2033 / 2038	A (1.4)	-	A (1.9)	-
Unsignalized Intersections²					
Crimson King Way and Cloverridge Avenue / Eastern Phase 2 Site Access	2028	A (7.7)	NB-LR (0.09)	A (7.8)	NB-LR (0.06)
	2033 / 2038	A (7.8)	NB-LTR (0.09)	A (7.9)	NB-LTR (0.06) EB-LTR (0.19)
Crimson King Way and Western Phase 2 Site Access	2028	N/A	N/A	N/A	N/A
	2033 / 2038	A (8.9)	SB-LR (0.00)	A (8.8)	SB-LR (0.02)

1. Critical movements are defined as those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection.
2. The LOS at an unsignalized intersection is defined by the movement with the highest delay.

Table 5-2 Future Total Queueing Analysis

Intersection	Movement	Storage Length (m)	95th Percentile Queue (m) [50th Percentile Queue (m)] ¹			
			A.M. Peak Hour		P.M. Peak Hour	
			2028	2032 / 2038	2028	2032 / 2038
Highway 11 and Crimson King Way	WBL	-	44 [26]	47 [29]	28 [15]	38 [22]
	WBR	45	9 [0]		9 [0]	
	NBR	92	1 [0]	0 [0]	m0 [1]	m0 [2]
	SBL	84	m2 [1]	m3 [1]	5 [2]	6 [3]
Highway 11 and Dog Wood Boulevard / Sherwood Glen	WBR	65	7 [0]		12 [0]	
	NBL	71	3 [1]		5 [2]	
	NBR	45	11 [0]		39 [17]	
	SBL	70	m14 [6]		16 [6]	
	SBR	90	m0 [0]		m0 [0]	
Highway 11 and Bathurst Street	EBL	67 (175) ²	50 [32]		#166 [109]	
	WBL	44	16 [8]		13 [6]	

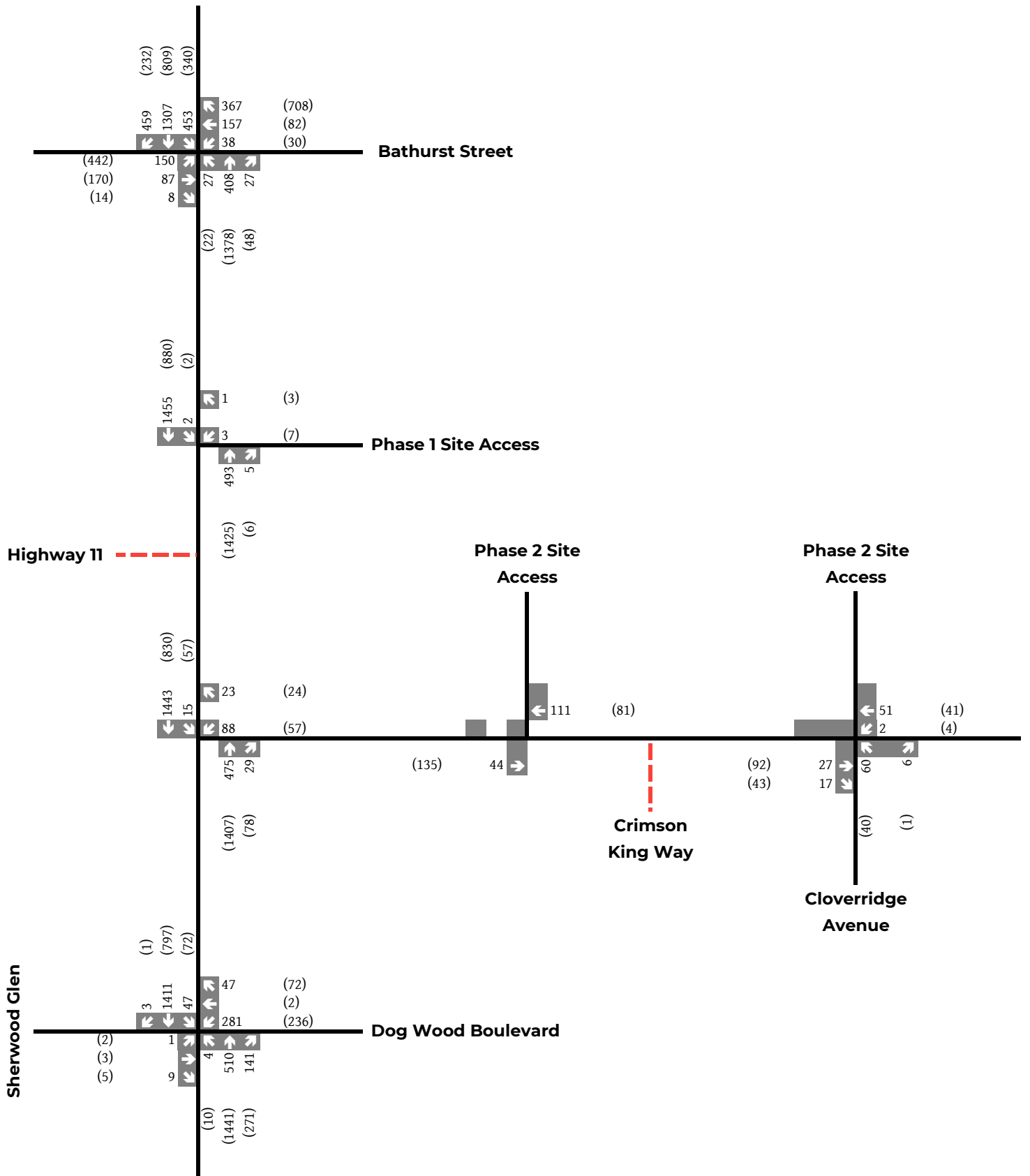
Intersection	Movement	Storage Length (m)	95th Percentile Queue (m) [50th Percentile Queue (m)] ¹			
			A.M. Peak Hour		P.M. Peak Hour	
			2028	2032 / 2038	2028	2032 / 2038
	WBR	42	50 [17]	51 [18]	#185 [103]	
	NBL	137	9 [3]		7 [3]	
	NBR	162	0 [0]		0 [0]	
	SBL	148	#110 [65]	#111 [65]	#143 [75]	
	SBR	154	20 [0]		15 [0]	

1. All queues have been rounded up to nearest whole number.

2. Based on the pavement marking the storage length is 67 metres. However, the EBL lane extends, as a lane separated from a through traffic by yellow solid line, all the way to Graham Sideroad. Hence, the effective storage length is 175 metres.

Similar to existing and future background conditions, all intersections are operating at an LOS of 'C' or better during both peak hours, with the exception of the intersection of Highway 11 and Bathurst Street during the p.m. peak hour which is operating at an LOS 'D'. All movements are projected to operate within capacity, with the continued exception of the northbound-through movement at the intersection of Highway 11 and Bathurst Street during the p.m. peak hour. Site traffic accounts for 1% of the northbound-through volumes at the intersection. Additionally, the addition of site-generated volumes to the study intersections results in a minimal increase in delays which averages to less than 1 second per vehicle.

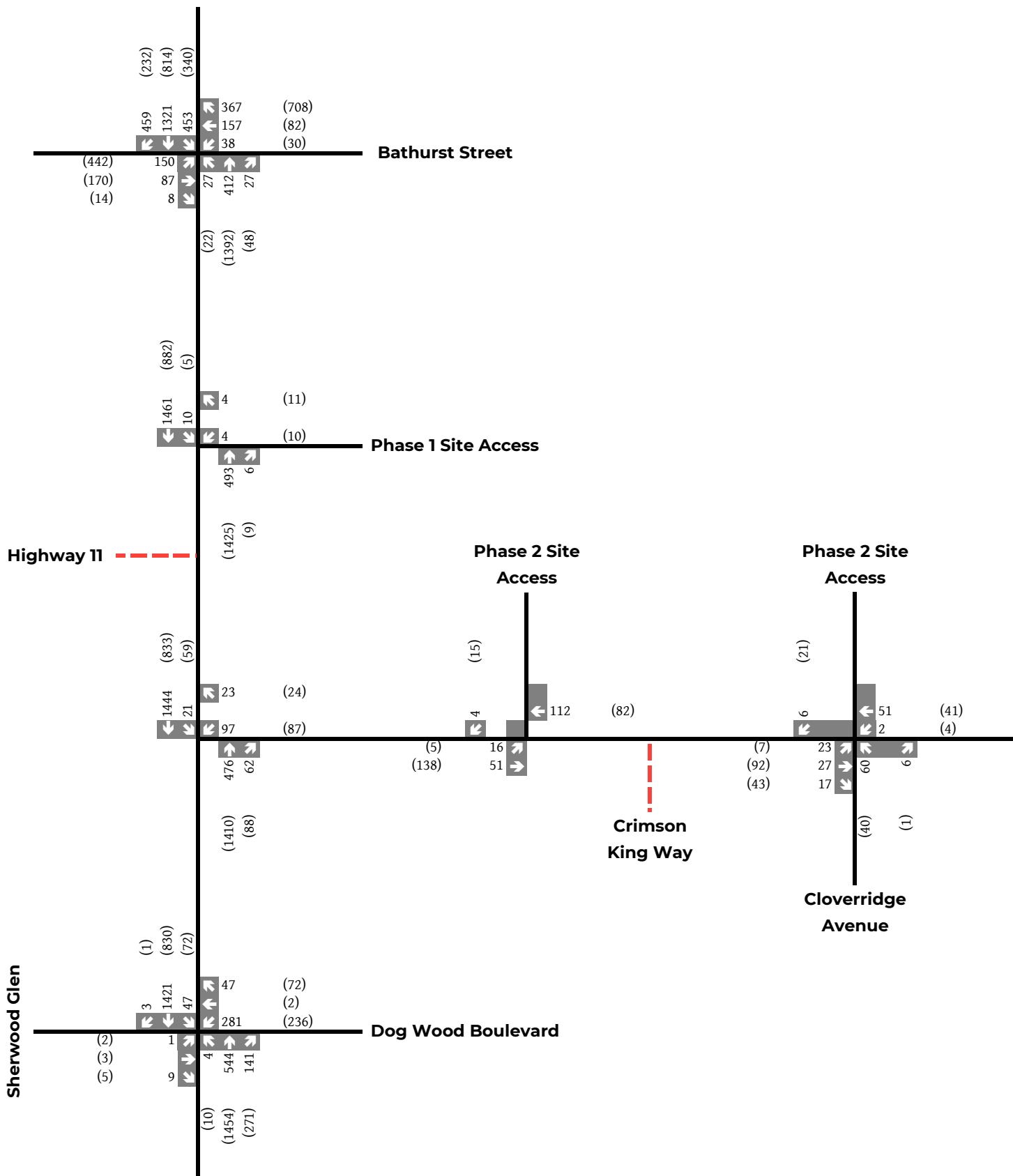
The results of the queuing analysis shows that all 95th or 50th percentile queue lengths at exclusive turning lanes are contained within their available storage lengths except for the westbound-right movement at the intersection of Highway 11 and Bathurst Street during both peak hours. During the a.m. peak hour, the 50th percentile queue for the westbound-right movement is contained within the existing storage length. Moreover, as previously discussed in Section 2.3.2, the westbound approach is the 80-metre leg between Highway 11 and Holland Landing, and the queuing issue does not represent a safety concern. Moreover, the 95th percentile queue length during the a.m. peak hour (in comparison with future background conditions) has not increased under the 2028 horizon and has increased by only 1 metre during the 2032 and 2038 horizons, and during the p.m. peak hour has not increased under any of the horizon years. Additionally, it should be noted that no site traffic is using the westbound-right movement.



Legend

xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes

Figure 5-1
2028 Future Total
Traffic Volumes



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

Figure 5-2
2033 / 2038 Future
Total Traffic Volumes

6 MULTIMODAL TRAVEL ASSESSMENT

6.1 TRANSIT ASSESSMENT

Since transit within the Town of East Gwillimbury is regionally operated, the transit level of service assessment criteria is based on the requirements of the *Transportation Mobility Plan Guidelines for Development Applications* from the York Region. **Table 6-1** summarizes the level of service for transit mode.

Table 6-1 Transit Level of Service Criteria¹

Level of Service	Access to Transit Stops	Transit Headways ²	Intersection Approach (transit or curb lanes)	
			Delay (seconds/vehicle)	V/C
A	90% within ≤200 m	≤5 minutes	≤10	0 to 0.60
B	90% within ≤500 m and 70% within ≤200	> 5-10 minutes	>10-20	0.61 to 0.70
C	90% within ≤500m and 50% within ≤200m	>10-15 minutes	>20-35	0.71 to 0.80
D	100% within ≤600m	>15-20 minutes	>35-55	0.81 to 0.90
E	100% within ≤800m	>20-30 minutes	>55-80	0.91 to 1.00
F	100% >800m	>30 minutes	>80	> 1.00

1. Source: Region of York Transportation Mobility Plan Guidelines Table 4.

2. Measured along walkway length and varies per route.

Given there are no transit services within the vicinity of the study area, all study intersections have a transit LOS of 'F'. Based on Map 3 of the York Region 2022 Transportation Master Plan, there are no improvements planned within the study area. Therefore, the LOS of 'F' is also applicable under future background and future total conditions.

6.2 ACTIVE TRANSPORTATION ASSESSMENT

The cycling and pedestrian level of service criteria in **Table 6-2** is based on the methodology outlined in the *York Region Transportation Mobility Plan Guidelines*. York Region's methodology assesses the LOS of cycling and pedestrian facilities along road segments and at intersections. Segment facilities are mainly assessed by type, signage, and width. Intersection facilities are assessed mainly based on how safe it is for cyclists and pedestrians to cross the intersection.

Table 6-2 Active Transportation Level of Service Criteria¹

Level of Service	Pedestrians		Cyclists	
	Segment	Intersection	Segment	Intersection
A	≥2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥3.0 m multi-use path	— ≥2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥3.0 m multi-use path	Separated cycling facilities (e.g. cycle tracks, multi-use path)	— Separated cycling facilities — Bicycle box or clearly delineated bicycle treatment or bicycle signal head

Level of Service	Pedestrians		Cyclists	
	Segment	Intersection	Segment	Intersection
		— Pedestrian signal head with sufficient pedestrian clearance time — Clearly delineated cross-walk		
B	≥1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or <3.0 m multi-use path	— ≥1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or <3.0 m multi-use path — Pedestrian signal head with sufficient pedestrian clearance time — Clearly delineated cross-walk	≥1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer)	— >1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer), — Bicycle box, clearly delineated bicycle treatment or bicycle signal head
C	≥1.5 m curb-faced sidewalk (no buffer)	— ≥1.5 m curb-faced sidewalk (no buffer) — Pedestrian signal head with sufficient pedestrian clearance time — Clearly delineated cross-walk	<1.8 m dedicated cycling facilities with no buffer	— <1.8 m dedicated cycling facilities with no buffer, — Bicycle box, clearly delineated bicycle treatment bicycle signal head
D	<1.5 m sidewalk	— <1.5 m sidewalk — Pedestrian signal head sufficient pedestrian clearance time — No clearly delineated cross-walk	≤1.5 m bicycle lane with no buffer	— ≤1.5 m bicycle lane and no buffer — Bicycle treatment
E	Paved shoulder or no sidewalk provision	— Paved shoulder or no sidewalk provision — No pedestrian signal head — No clearly delineated cross-walk	Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area)	— Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area) — No clearly delineated bicycle treatment
F	No sidewalk provision	— No sidewalk provision — No pedestrian signal head — No clearly delineated cross-walk	No bicycle provision	No bicycle provision

1. Source: Region of York Transportation Mobility Plan Guidelines Table 6 and Table 8.

6.2.1 EXISTING ACTIVE TRANSPORTATION CONDITIONS

There are few pedestrian and cycling facilities within the study area. **Table 6-3** summarizes the corresponding LOS for the active transportation infrastructure provided within the study area based on the criteria provided in Table 6-2. The pedestrian and cycling targets of LOS 'C' are not met at the majority of the study intersections. However, given the proposed uses of the development it is expected to generate very few (if any) pedestrian trips at all.

Table 6-3 Existing Active Transportation Level of Service

Intersection	Direction	Segment Description	Pedestrians		Cyclists	
			Segment	Intersection	Segment	Intersection
Highway 11 & Bathurst Street	Eastbound	Bathurst Street	F	D	E	F
	Westbound		F	D	E	F
	Northbound	Highway 11	F	D	F	F
	Southbound		F	D	F	F
Highway 11 & Crimson King Way	Westbound	Crimson King Way	F	D	F	F
	Northbound	Highway 11	F	D	F	F
	Southbound		F	F	F	F
Highway 11 & Sherwood Glen / Dog Wood Boulevard	Eastbound	Sherwood Glen	F	D	F	F
	Westbound	Dog Wood Boulevard	B	D	F	F
	Northbound	Highway 11	F	D	F	F
	Southbound		F	D	F	F
Crimson King Way & Cloverridge Avenue	Eastbound	Crimson King Way	B	F	F	F
	Westbound		F	D	F	F
	Northbound	Cloverridge Avenue	B	F	F	F

6.2.2 FUTURE ACTIVE TRANSPORTATION CONDITIONS

The 2022 York Region Transportation Master Plan was reviewed to understand the future improvements to active transportation facilities within the study area. 2051 Regional Road Cycling Network, illustrated in Map 1, showed cycling facilities are recommended along Highway 11 adjacent to the subject site. The map indicates that the type of cycling facilities and the timeline during which they will be implemented have not yet been determined.

The Town of East Gwillimbury is in the process of updating their 2010 Transportation Master Plan (TMP). On October 8th, 2019, the draft TMP findings were presented to council. The proposed cycling and sidewalk network maps in this presentation indicate bikeways and sidewalks are proposed along Dog Wood Boulevard, Crimson King Way, and Highway 11 in the vicinity of the subject site. The plan has not yet been approved by council and there is no official timeline on its implementation. The relevant maps from this presentation are included in **Appendix I**.

Given the uncertain implementation dates noted above, the future active transportation LOS analysis remains unchanged from existing (summarized in Table 6-3) and would be the same for all horizon years.

7 PARKING REQUIREMENTS

7.1 VEHICULAR PARKING REQUIREMENTS

The required vehicular parking was calculated in accordance with the Town of East Gwillimbury's Zoning By-law 2018-043 and is summarized in **Table 7-1**. The site plan includes 441 spaces which is a surplus 61 parking spaces in comparison with the By-law requirement of 380.

Table 7-1 Parking Requirements per By-law 2018-043

Phase	Building	Land Use	Required Parking Rate	Number of Parking Spaces	
				Required ¹	Provided
1	A 2,211.10 m ² total GFA with 139.35 m ² office GFA	Self-Service Storage Building	1/5 m ² for the office component	28	42
	B 3,623.22 m ² GFA			0	
	C 3,493.15 m ² GFA			0	
	Sub-Total			28	42
2	A 4,706.84 m ² GFA	Industrial Uses in a Single-Use Building	1/100 m ² for the first 10,000 m ² of floor area and 1/200 m ² for any floor area after the first 10,000 m ²	48	399
	B 16,162.74 m ² GFA			131	
	C 8,646.27 m ² GFA	Industrial Uses in a Building with 2 or more Industrial Uses	1/50 m ²	173	
	Sub-Total			352	399
Total				380	441

1. Parking requirements have been rounded up to the nearest whole number in accordance with Town of East Gwillimbury Zoning By-law 2018-043 Section 5.2.2.

7.1.1 ACCESSIBLE PARKING SPACE REQUIREMENTS

The number of accessible parking spaces required was calculated in accordance with Zoning By-law 2018-043 and is summarized in **Table 7-2**. The site proposes a total of 13 accessible parking spaces which exceeds the By-law requirement by 1 space.

Table 7-2 Accessible Parking Space Requirements

Phase	Number of Parking Spaces		Applicable By-law Rate ¹	Number of Accessible Parking Spaces	
	Required	Provided		Required ²	Provided
1	28	42	4% of the total number of parking spaces provided	2	2
2	380	399	2 + 2% of the total number of parking spaces provided	10	11

1. Per Table 5C of Town of East Gwillimbury Zoning By-law 2018-043.

2. Parking requirements have been rounded up to the nearest whole number in accordance with Town of East Gwillimbury Zoning By-law 2018-043 Section 5.2.2.

7.2 BICYCLE PARKING REQUIREMENTS

The Town of East Gwillimbury Zoning By-law 2018-043 does not include bicycle parking requirements for the proposed land uses. However, bicycle parking will be considered as part of the final proposed site plan.

8 SITE PLAN REVIEW

To be finalized once updated site plan is received.

8.1 SITE ACCESS REVIEW

Crimson King Way is classified as a local road. Per TAC Geometric Design Guideline Figure 8.8.2, regardless of whether the intersections of these streets are stop-controlled or signal-controlled, the minimum required corner clearance is 15 metres. As shown in **Figure 8-1**, the corner clearances at the intersection closest to Highway 11 meet TAC Geometric Design Guidelines.

The proposed site access onto Highway 11 meets the minimum intersection spacing requirements of 215 metres as shown in Figure 8-1. Per the Section 6.2 of the Region of York's *Access Guidelines for Regional Roads*, dated November 2020, the angle of intersection between the centrelines of the proposed driveway and Highway 11 is 90°. Additionally, the clear throat distance of the proposed driveway meets the minimum requirement of 15 metres (per Section 6.5) and is enough to contain the anticipated inbound and outbound vehicle queues.

8.2 ADDITIONAL GEOMETRIC REQUIREMENTS

As illustrated in Figure 8-1, the following geometric requirements have been satisfied per the Town of East Gwillimbury Zoning By-law 2018-043:

- Parking spaces are 2.75 metres wide by 5.8 metres long (Section 5.2.6);
 - Parking areas are set back a minimum of 1.5 metres from the buildings (Section 5.2.7);
 - The minimum width of all parking aisles is 6.0 metres (Section 5.2.8a);
 - All driveways have a minimum width of 6.5 metres (Section 5.2.9a); and
 - Type A accessible parking spaces have a minimum width of 3.4 metres and length of 5.8 metres. Type B accessible parking spaces have minimum widths of 2.4 metres and lengths of 5.8 metres. All accessible spaces have adjacent access aisles that are a minimum of 1.5 metres wide and extend the entire length of the space (Section 5.12b and 5.12c).
-

8.3 PAVEMENT MARKING AND SIGNAGE PLAN

A pavement marking and signage plan has been prepared for the proposed development as shown in **Figure 8-2**. It includes stop signs and stop bars at site driveways and at key internal intersections, accessible parking signage, and no-parking signage along key portions of the fire route.

8.4 SITE CIRCULATION ASSESSMENT

8.4.1 FIRE TRUCK

WSP reviewed the maneuvering simulations of a Smeal Aerial RM 105ft fire truck. The fire truck was tested maneuvering through the site as shown in **Figure 8-3**. No issues were identified.

8.4.2 GARBAGE TRUCK

WSP reviewed maneuvering simulations with a custom front-loading GFL Garbage Truck entering the site, maneuvering through the proposed internal roadways, towards the loading bays, fronting in and then reversing out of three separate loading bays (one at each building proposed as part of Phase 2), and then exiting the site. The maneuvers are illustrated in **Figure 8-4**. No issues were identified.

8.4.3 TRACTOR-TRAILER (WB-20)

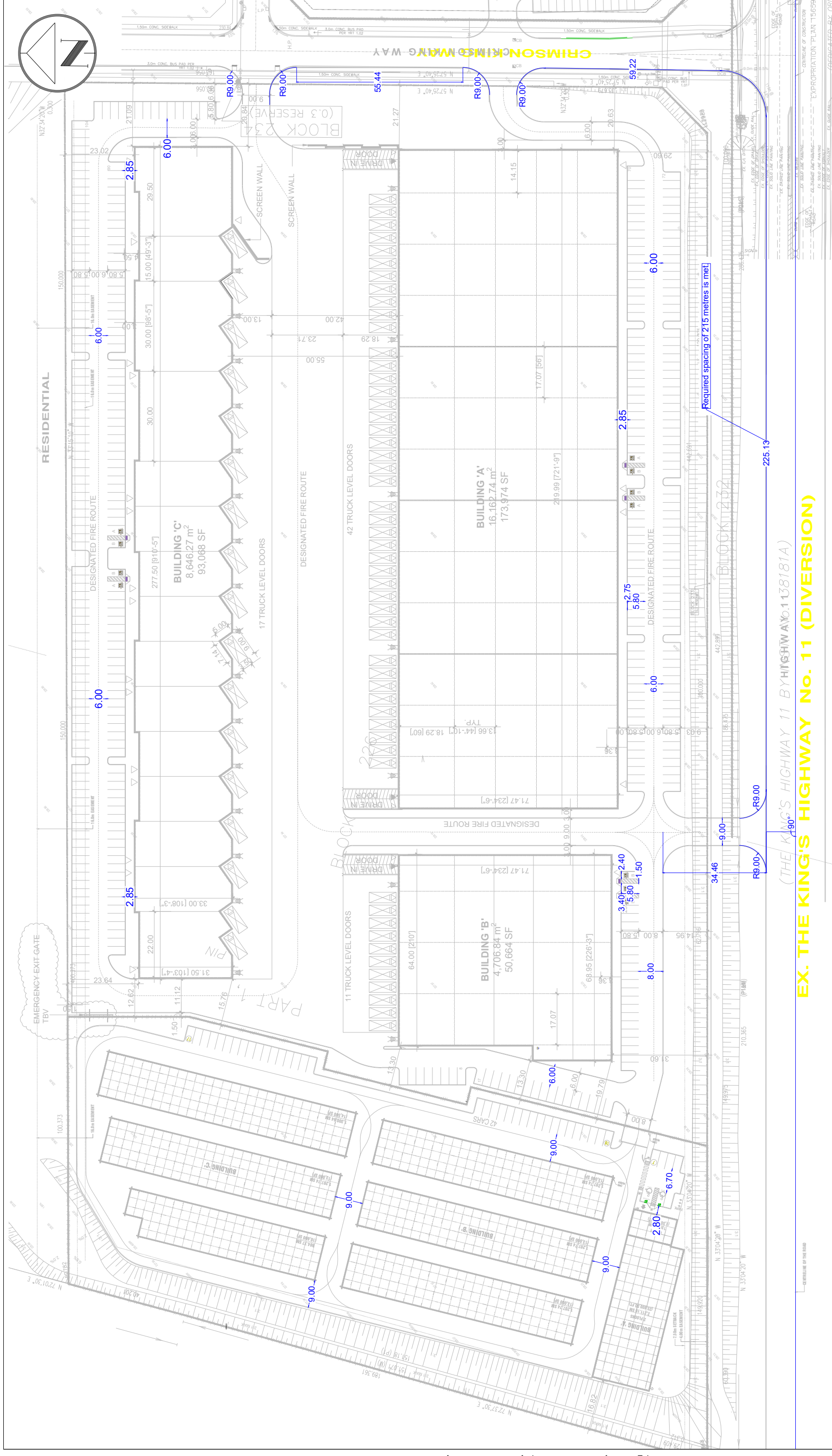
WSP reviewed maneuvering simulations with a TAC WB-20 entering the site. The WB-20s were tested maneuvering into and out-of the site access onto Highway 11 and the eastern-most site access onto Crimson King Way, as shown in **Figure 8-5**. The complete the outbound maneuver onto Highway 11, the WB-20 will need to encroach onto the adjacent travel lane.

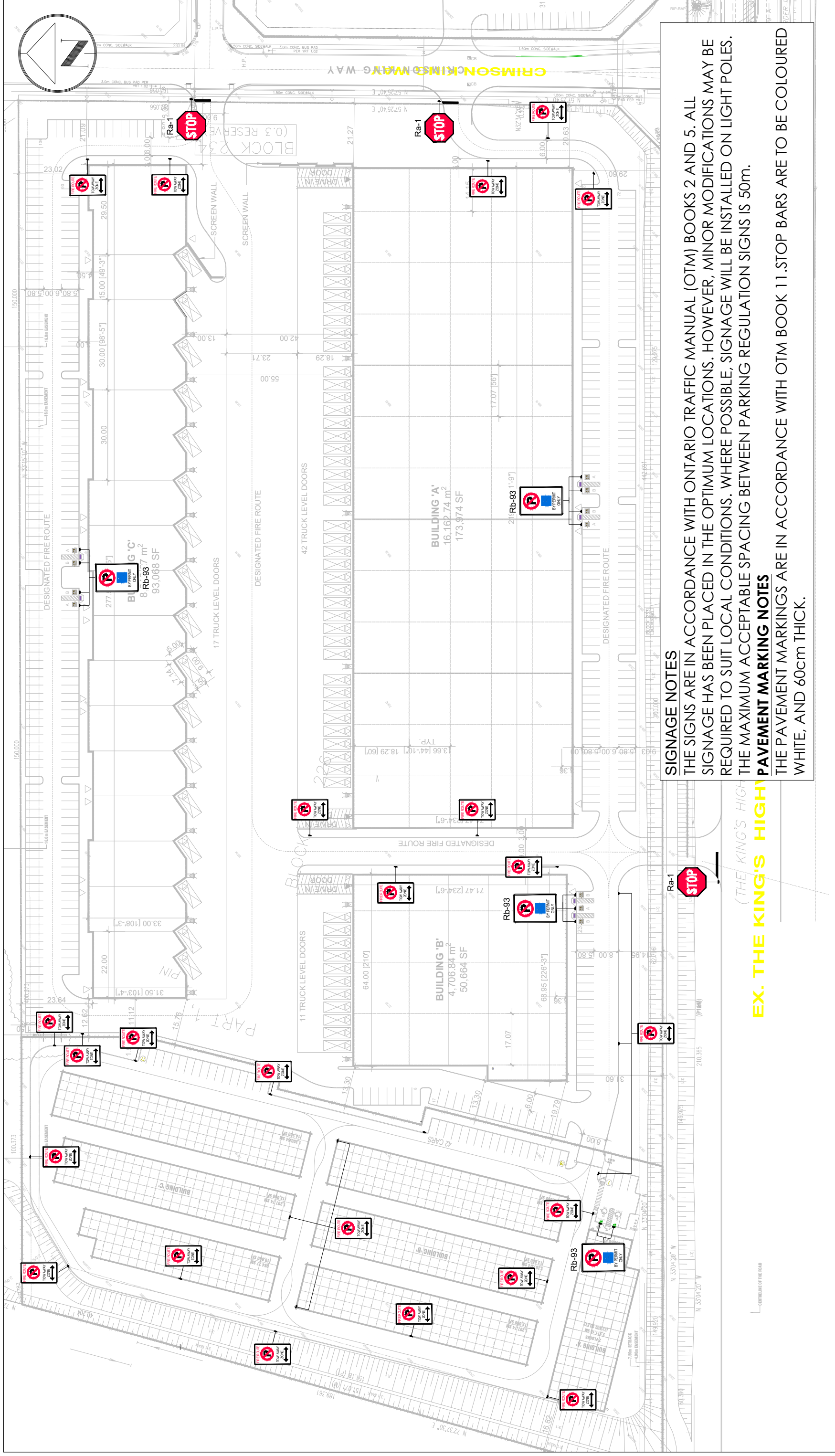
WB-20 maneuvers at critical loading bays proposed as part of Phase 2 of the development were also tested. WB-20s were tested reversing into the loading bays, and then exiting in a forward motion. The maneuvers are illustrated in **Figure 8-6**. No issues were identified.

8.4.4 PASSENGER VEHICLES

WSP reviewed TAC passenger vehicle (PTAC) maneuvers at all the proposed site driveways as shown in **Figure 8-7**, PTACs are able to maneuver without issue through the site.

Figure 8-1
Dimensions
KHL Employment Lands

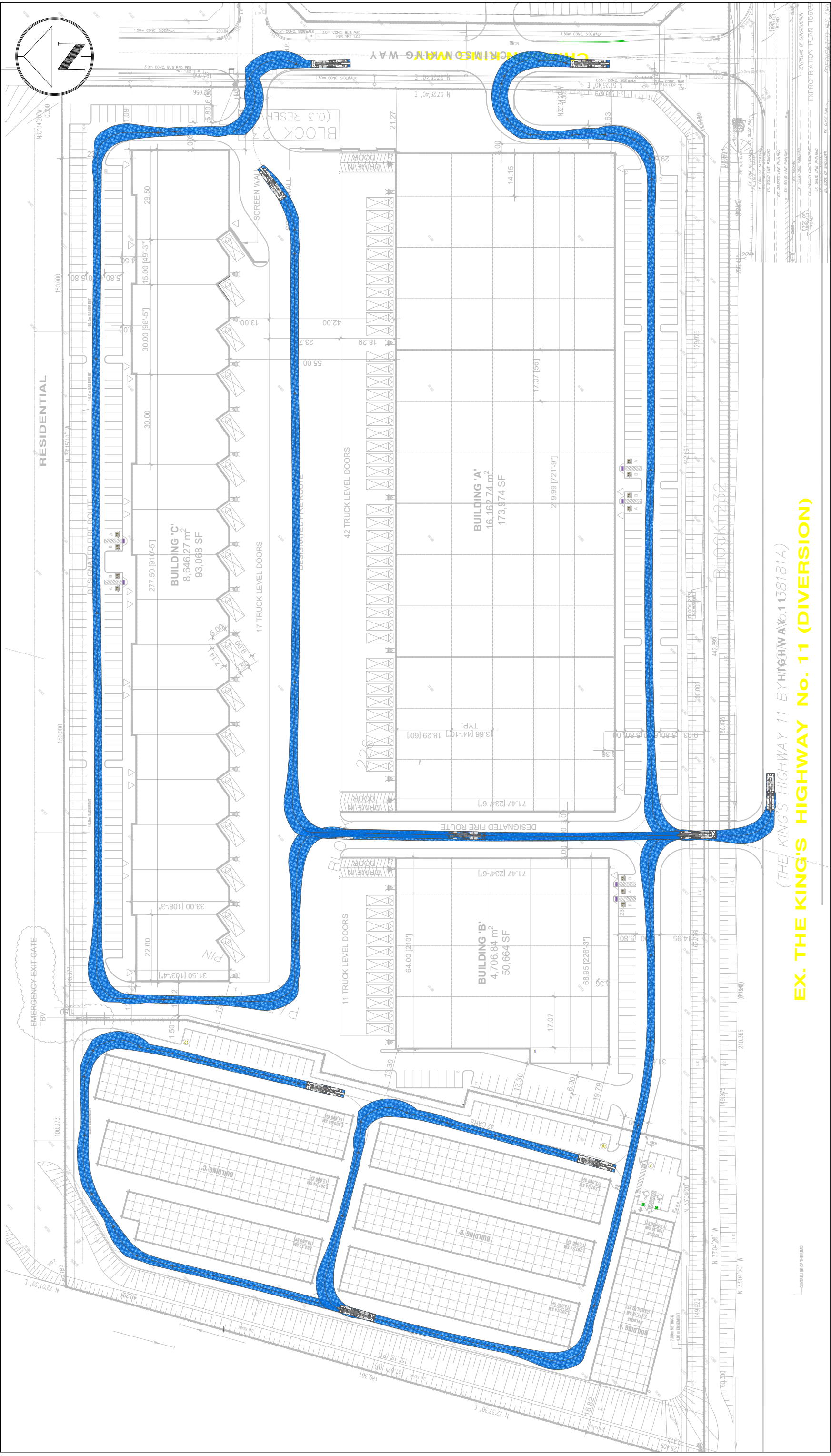




Source: x site alt1.dwg, received from Groundswell Plan on June 16, 2023.

Scale: 1:1200

Figure 8-2
Pavement Marking & Signage Plans
KHL Employment Lands



Source: x_site_alt1.dwg, received from Groundswell Plan on June 16, 2023.

Scale: 1:1200

Figure 8-3

Fire Truck Circulation

KHL Employment Lands

13.06

3.14 6.10

Smeal Aerial RM 105ft

	Width	Track	Lock to Lock Time	Steering Angle
meters	: 2.54	: 2.41	: 6.0	: 32.0

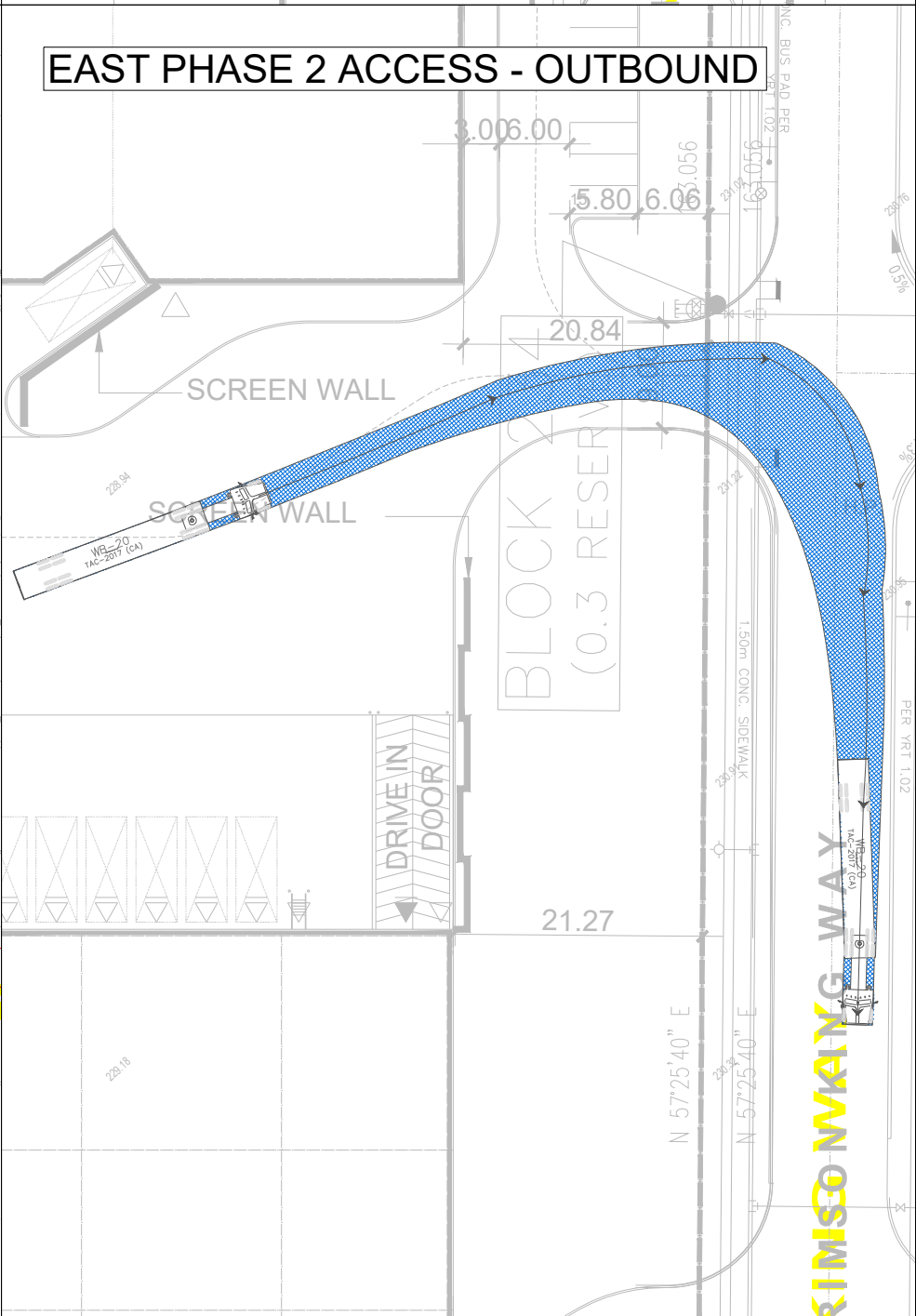
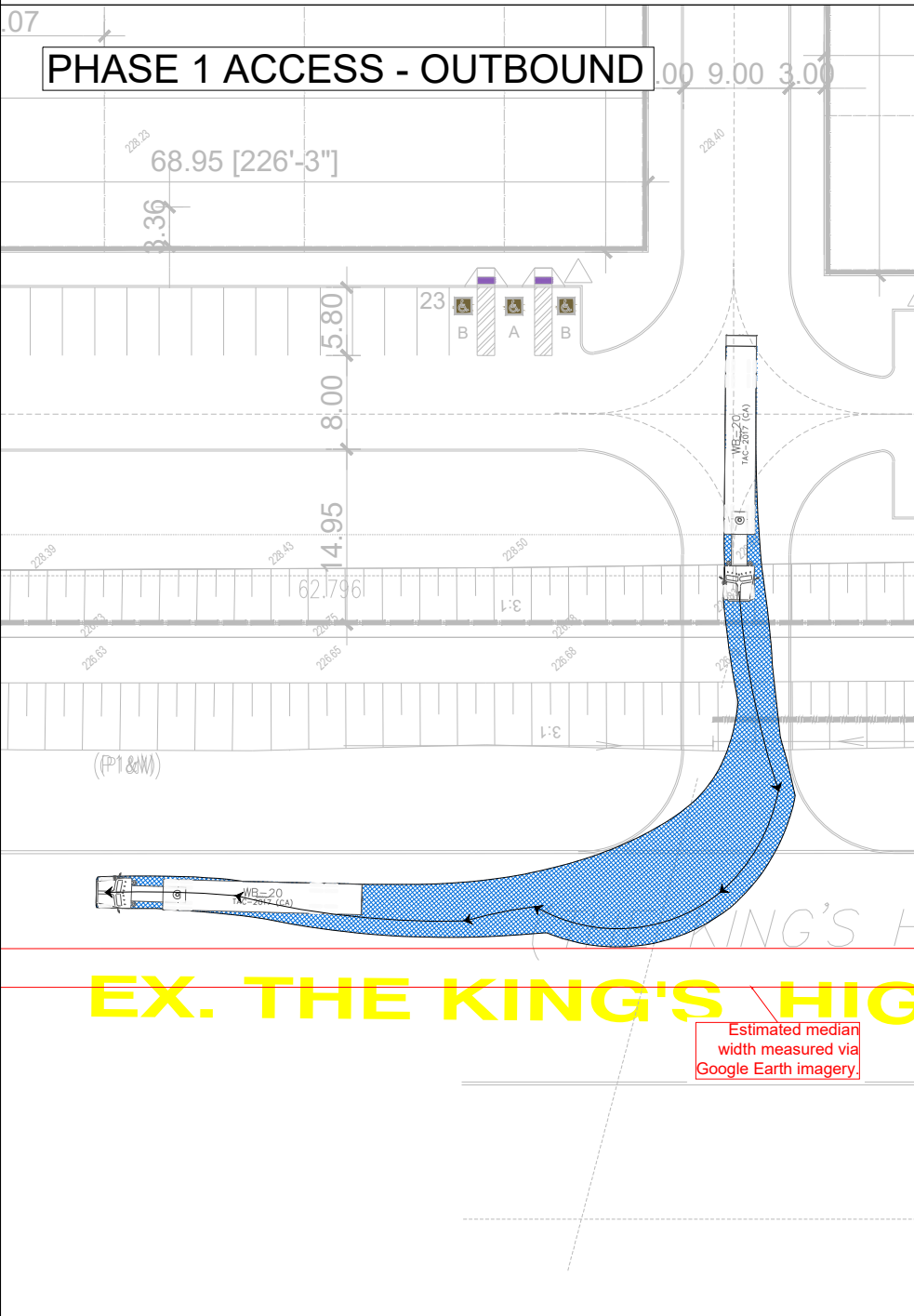
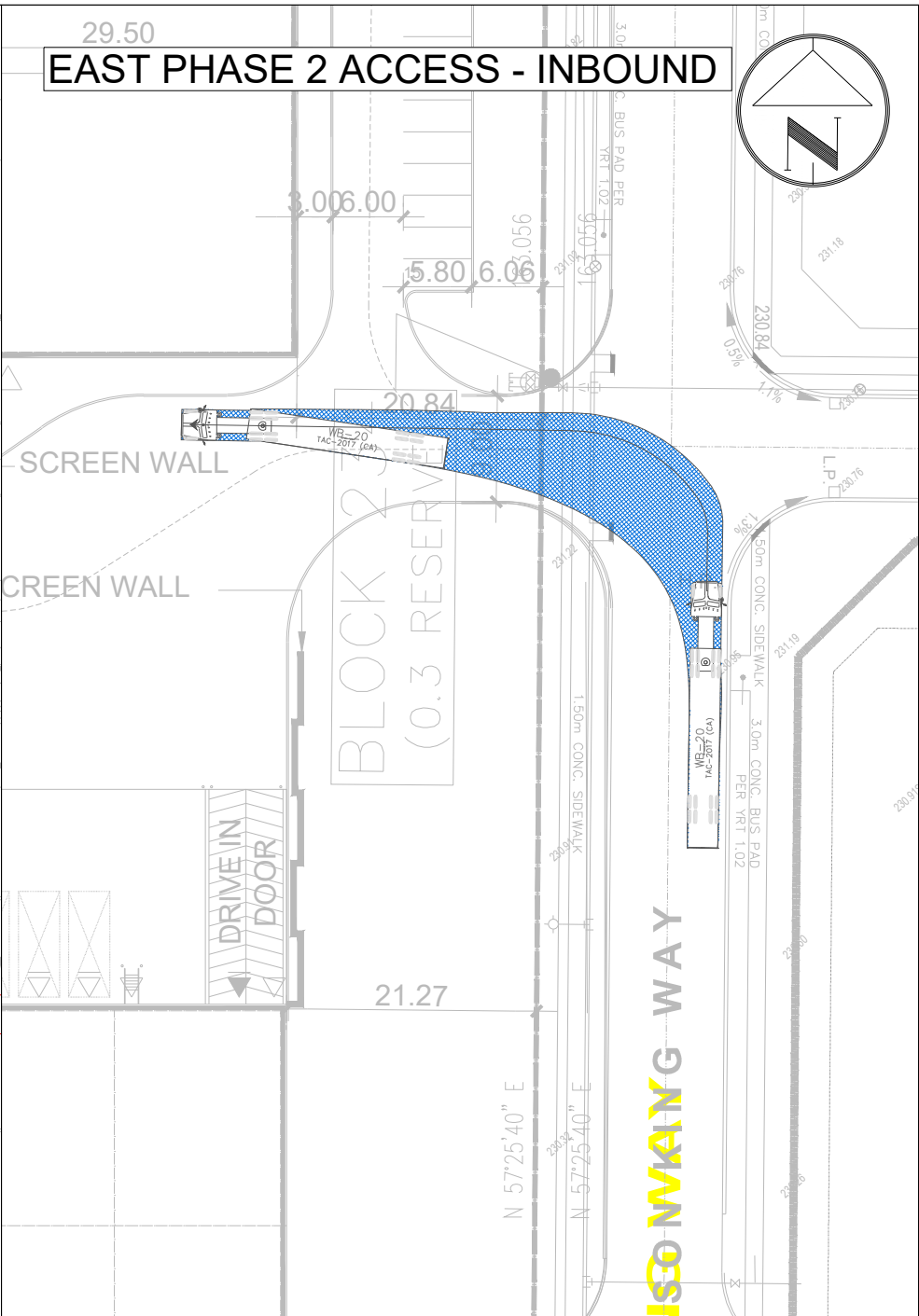
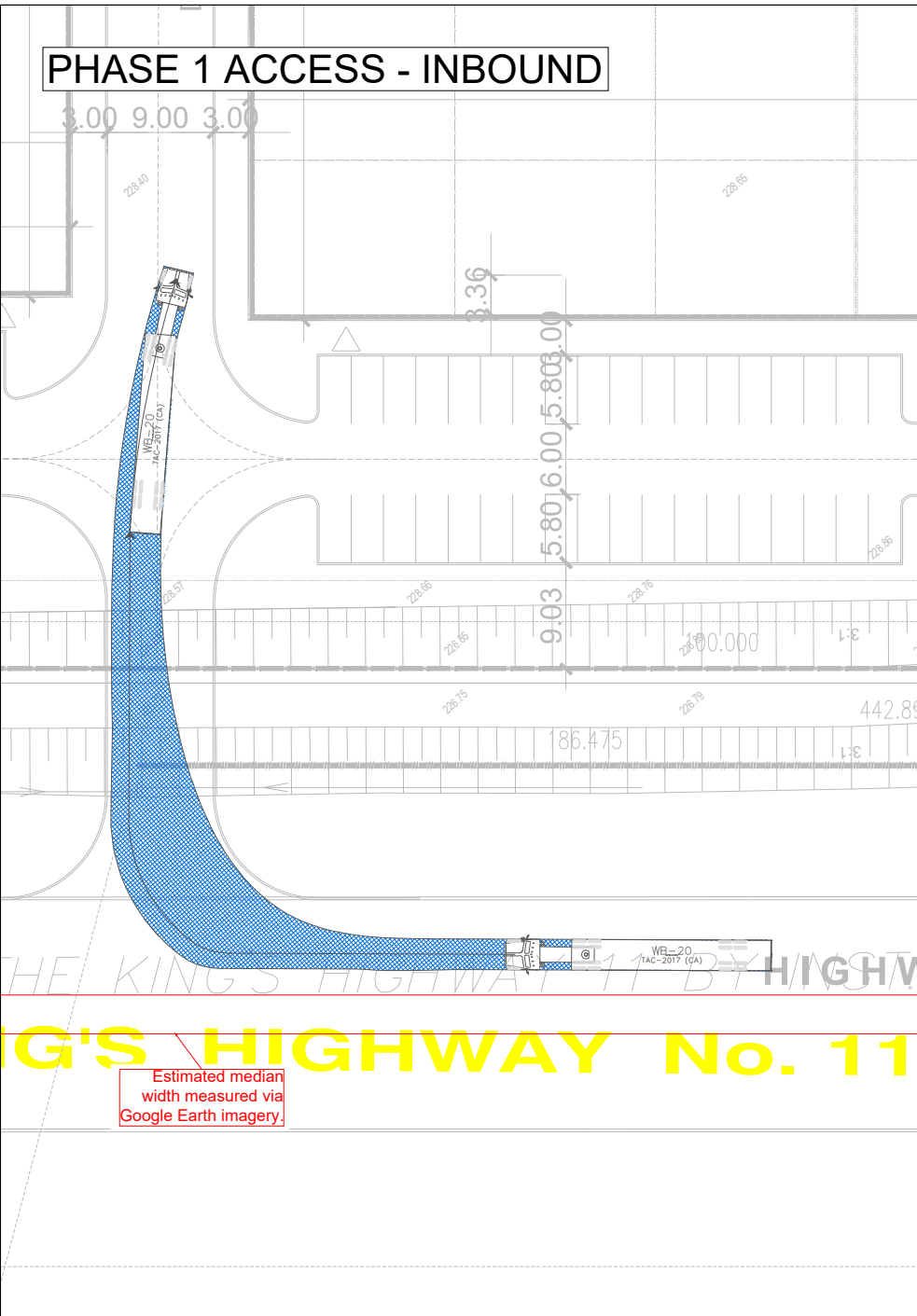


meters

:	2.89
:	2.89
:	6.0
:	30.6

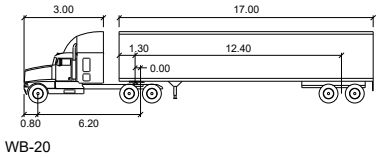
Figure 8-4
Garbage Truck Circulation
KHL Employment Lands

C:\Users\CARC070895\OneDrive - WSP O365\Desktop_2022 Projects\Kerbel WHL Employment Lands01. Analysis\01. Site Plan Review\2023-06-16



Source: x_site_alt1.dwg, received from Groundswell Plan on June 16, 2023.

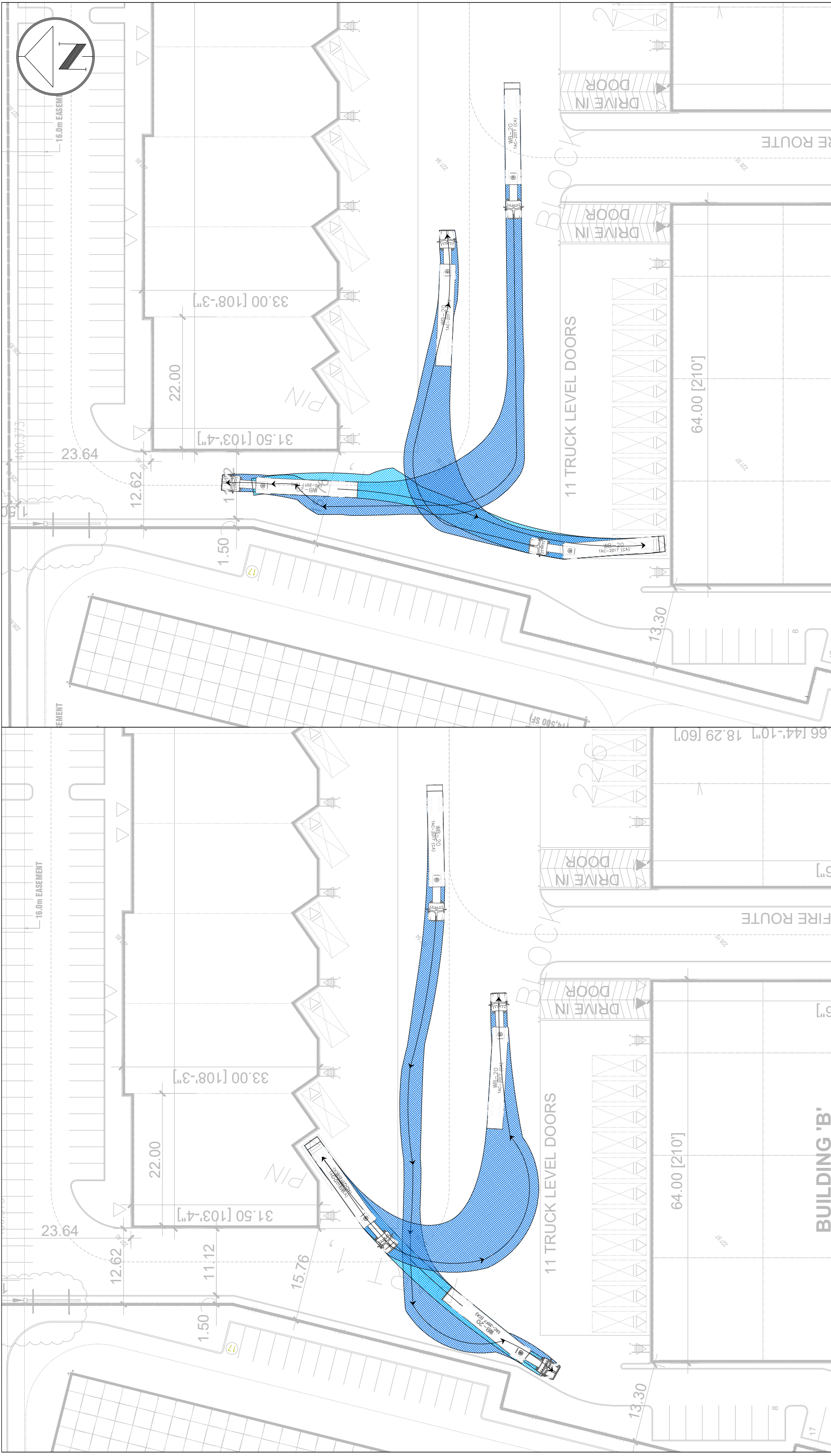
Scale: 1:600



Tractor Width
Trailer Width
Tractor Track
Trailer Track

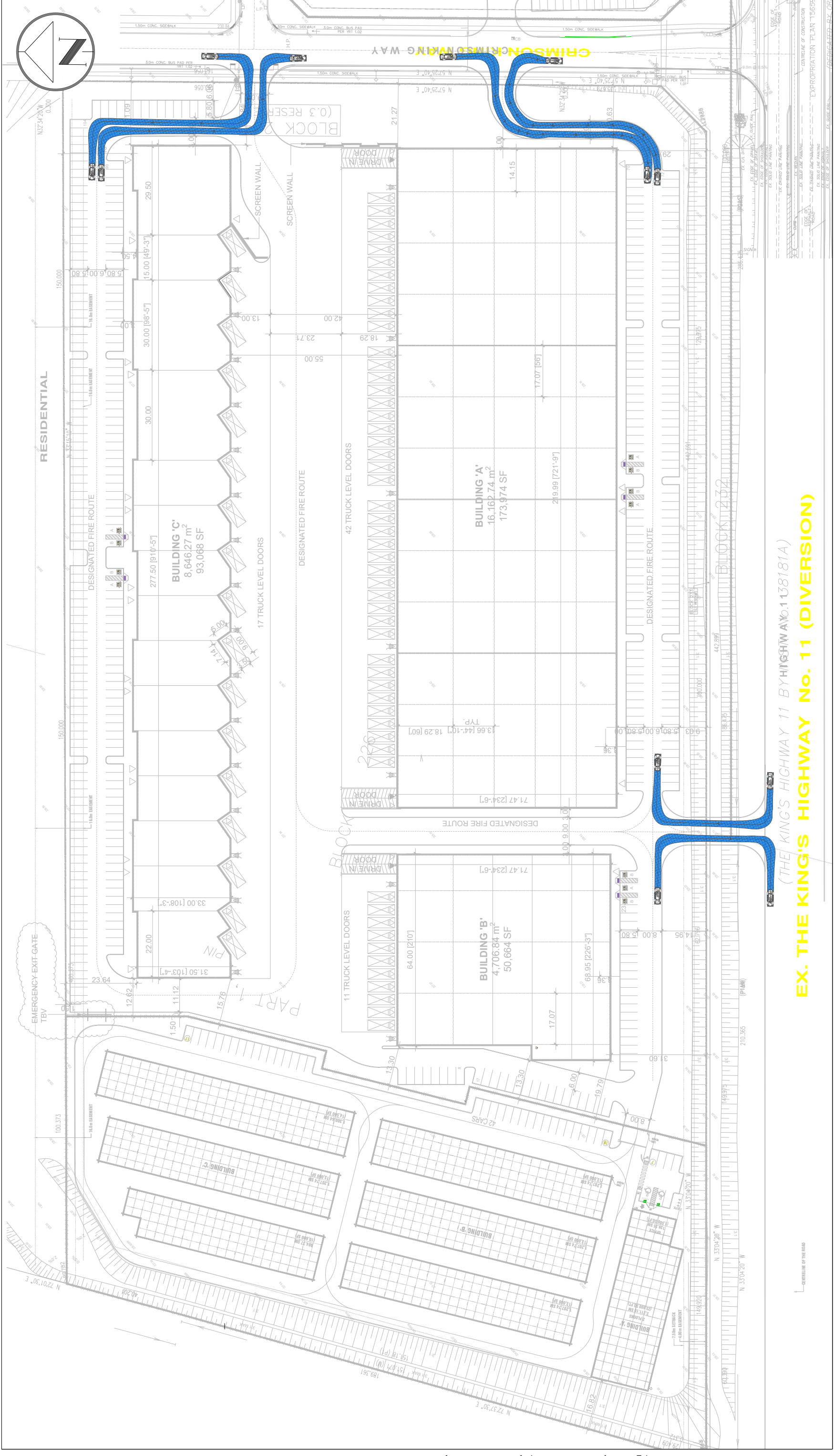
Lock to Lock Time
Steering Angle
Articulating Angle

Figure 8-5
WB-20 Maneuvers at Site Accesses
KHL Employment Lands



Source: x_site_alt1.dwg, received from Groundswell Plan on June 16, 2023. Scale: 1:600

Figure 8-6
WB-20 Maneuvers at Critical Loading Bays
KHL Employment Lands



9 TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) is a general concept that includes various strategies that manage the demand of travel to increase transportation system efficiency. Generally, single-occupant vehicle travel is discouraged, and alternate modes of transportation are encouraged in congested conditions. These modes include walking, cycling, ridesharing, public transit, and teleworking. In the context of an urban environment, TDM elements are an essential part of any progressive transportation and traffic plan for a proposed development.

The objective of the proposed TDM strategy is to inform, encourage, and facilitate the utilization of alternate modes of travel opportunities within the study area. It is recommended that a marketing strategy for the proposed development highlight key characteristics based on the below items to achieve the goals of the TDM strategy. This strategy should be communicated to employees via knowledgeable sales staff and information packages. These actions would ensure the success of the TDM strategy, thereby minimizing the need for automobile usage. The following TDM strategies are recommended for consideration.

9.1 INFORMATION PACKAGES PROVIDED TO NEW EMPLOYEES

It is important to provide transportation information to new employees to help facilitate non-auto trips. This information should help them view and understand their travel options before establishing new travel habits. In turn, this will increase the chance that these alternatives are included in the employees' travel patterns after the build out of the development.

The developer should provide information about transportation options to employees in an information package that will include items such as:

- Existing transit services, including a YRT Guide and a GO System Map. Information should include route navigators for each area transit route (including GO bus and rail), seven-day schedules for nearby stops for each of these routes, relevant fares, and incentive-based information such as GO Transit's Ride-to-GO option.
- Maps of surrounding active transportation facilities outlining available sidewalk and cycling facilities. Information should include a copy of the city's cycling network map, cycling and pedestrian safety tips, and information on active transportation events (i.e. "Bike to Work" Day or CAN-BIKE cycling lessons)
- Carpooling options, including information on Smart Commute and how one can join through their employer. Providing carpool spaces on-site, clearly signed for employees, should be located conveniently near the main entrances to provide more incentive for carpooling.
- Smart Commute offers support for staff to use sustainable mode and provides incentives on an on-going basis. The benefits of this program include:
 - Increased employee productivity;
 - Reduced commuting times and cost; and
 - Guaranteed Ride Home program that provides alternative modes of travel if an emergency arises.

The developer will be responsible for coordinating the information packages with information obtained from the Town. The information package will be provided to employers at the time of opening or at a joint information session with a Town. Costs associated with the information package would be the responsibility of the developer.

9.2 SUMMARY OF PROPOSED TDM MEASURES

A summary of the proposed TDM measures and their associated costs is shown in **Table 9-1**.

Table 9-1 TDM Cost Summary

TDM Measure / Description		Quantity	Unit Cost	Total Cost	Comment / Assumption
Pedestrian Connections	Applicant to provide connections to pedestrian infrastructure in the area	N/A	N/A	N/A	Included in construction costs
Bike Parking	Applicant to provide bike parking spaces	TBD	N/A	N/A	Included in construction costs
Information Packages	To be provided by York Region staff via information sessions	N/A	N/A	N/A	Included in construction costs
Carpool Spaces	Carpool spaces will be provided for both Phase 1 and Phase 2	2	N/A	N/A	Included in construction costs

10 CONCLUSIONS

This study has evaluated the impact of the proposed industrial development located northwest of the intersection of Highway 11 and Crimson King Way in the Town of Easy Gwillimbury. The proposed development will be completed in two phases. Phase 1 includes Phase 1 of the proposed development will be a self-storage facility and is planned to be completed by 2028. It includes three buildings with a total gross floor area (GFA) of 9,327.47 m². Phase 2 includes three industrial buildings with a combined GFA of 29,515.85 m² and is planned to be completed by 2033. The proposed development includes three site accesses. The first access onto Highway 11 will be completed as part of Phase 1, with the remaining two accesses onto Crimson King Way being completed along with Phase 2. Based on the analysis contained in this report, our conclusions and recommendations are as follows:

- Under the existing conditions, all of the study intersections are operating at an acceptable LOS 'C' or better during both the a.m. and p.m. peak hours after calibration with the exception of the intersection of Highway 11 and Bathurst Street during the p.m. peak hour which is operating at an LOS 'D'. All movements are projected to operate within capacity;
- A review of historical TMC data found no applicable background growth along Highway 11;
- Under future background conditions for all horizon years all the study intersections are operating at an acceptable LOS 'C' or better during both the a.m. and p.m. peak hours after calibration with the exception of the intersection of Highway 11 and Bathurst Street during the p.m. peak hour which is operating at an LOS 'D'. All movements are projected to operate within capacity;
- The proposed development is expected to generate 55 inbound auto trips and 18 outbound auto trips during the a.m. peak hour, and 26 inbound auto trips and 57 outbound auto trips during the p.m. peak hour;
- Based on the future total evaluations, the incremental increases in delay and v/c ratios relative to the future background conditions because of the addition of the site-generated traffic associated with the proposed development are negligible. The signalized study intersections continue to operate at the same LOS as under future background conditions without the need for improvements;
- The evaluation of the transit, cycling, and pedestrian level of service criteria indicates that there are minimal changes anticipated between existing and future conditions;
- The proposed parking supply includes 441 parking spaces, 13 of which are accessible spaces, which exceeds the parking requirements per the Town of East Gwillimbury's Zoning By-law 2018-04;
- Per Zoning By-law 2018-043, no bicycle parking spaces are required for the proposed land uses. The applicant will consider including bicycle parking spaces in the final proposed site plan.
- The signalization of the proposed Phase 1 site access onto Highway 11 is recommended to keep large trucks separate from residential traffic on Crimson King Way. Additionally, outbound trucks using the Crimson King Way accesses would need to encroach onto the opposing traffic lane to complete the southbound-right movement, which is not desirable and represents a safety concern.
- The proposed access meets minimum spacing requirements of 215 metres per Table 5 of the York Region Access Guidelines (dated November 2020).
- The site plan review of the ground floor plans indicate that the various design vehicles can be adequately accommodated with the Highway 11 access being signalized;
- All loading spaces can be adequately accessed and egressed without having to back on to the public right-of-way; and
- The proposed TDM measures, when implemented, are expected to discourage single-occupant vehicle trips, and encourage travel by other modes such as cycling, walking, transit and carpooling.

APPENDIX

A TERMS OF REFERENCE



MEMO

TO: Town of East Gwillimbury and Region of York

FROM: Ismet Medic and Rebekah Clarke Robinson, WSP

SUBJECT: Kerbel WHL Employment Lands - Proposed Industrial Development
Transportation Impact Study

DATE: March 1st, 2023

WSP Canada Inc. is undertaking a Transportation Impact Study (TIS) in support of the proposed development located northeast of the intersection of Crimson King Way and Highway 11 in the Town of East Gwillimbury. It is our understanding that the proposed development will be completed in two phases. Phase 1 of the proposed development will consist of three self-storage buildings with the total GFA of 100,400 sq. ft. and associated parking. Phase 2 of the proposed development will consist of three industrial use buildings with the total GFA of 317,706 sq. ft. and associated parking. Based on the concept site plan provided, the site will be served by three full movement accesses: one full movement access on Highway 11 and two full movement accesses on Crimson King Way. The proposed site plan is shown in **Figure 1**.

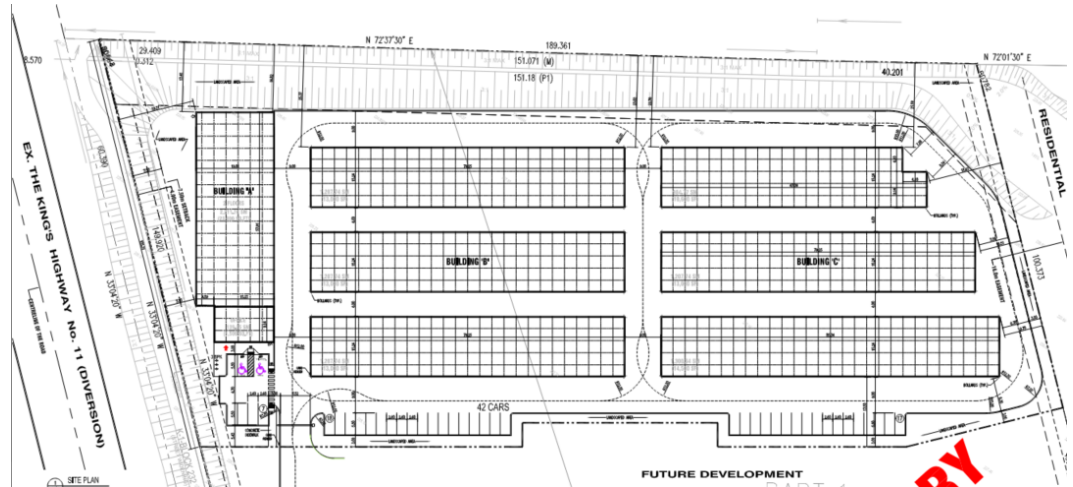


Figure 1 Proposed Site Plan

We will be following York Region's Transportation Mobility Plan Guidelines (dated 2016) for the study. The work program related to the proposed development is outlined below:

TRAFFIC DATA COLLECTION

Based on the location and magnitude of the proposed development, we have included the following study intersections for the TIS:

- Highway 11 & Crimson King Way;
- Highway 11 & Dog Wood Blvd./Sherwood Glen;
- Highway 11 & Site Access;
- Crimson King Way & Cloverridge Avenue/East Site Access; and
- Crimson King Way & West Site Access.

We will obtain TMCs for vehicles and pedestrians during a typical weekday a.m. and p.m. peak hours (2 hours each) at the existing intersections and obtain the latest signal timing plans from the municipalities.

EXISTING TRAFFIC ANALYSIS

Analyze the existing conditions using the Synchro 11.0 Traffic Software, which is the software implementation of the Highway Capacity Manual 2010, the recognized standard for traffic operations analysis in North America. The existing conditions will be modelled based on the existing transportation network and the current peak hour traffic volumes. This will be the baseline scenario to which all subsequent scenarios will be compared with. The analysis will follow the City of Toronto's Synchro Guidelines.

FUTURE BACKGROUND TRAFFIC ANALYSIS

It is WSP's understanding that Phase 1 will be built out within five years and Phase 2 within ten years. Accordingly, we will develop future background traffic volumes for the study intersections to correspond with horizon years of 2028 (full build-out of Phase 1), 2033 (full build-out of Phase 2) and 2038 (five years after Phase 2 build-out). The future background volumes for each of the horizon years will be developed on the basis of the existing traffic volumes, applicable traffic growth rate, and anticipated future traffic related to other developments in the vicinity of the site. These volumes will then be used to analyze future background traffic operations, and any necessary improvements will be identified.

Please confirm whether there are any background developments and/or roadway improvements within the study area which should be considered within our analysis. Moreover, please confirm the appropriate background growth rate to apply to the boundary road network.

TRIP GENERATION AND ASSIGNMENT

WSP will develop the weekday a.m. and p.m. peak hour site trip generation for the development on the basis of the trip generation rates in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition. The site-generated traffic volume will be distributed and assigned to the study road network based on the existing traffic patterns, as well as the TTS distribution information.

FUTURE TOTAL TRAFFIC ANALYSIS

The site-generated traffic will be superimposed onto the future background volumes to develop the future total traffic volumes on the basis of the projected a.m. and p.m. peak hour volumes for horizon year. The future study intersection performances will be evaluated in accordance with the requirements in the Region's Transportation Mobility Plan Guidelines.

The study will focus on demonstrating the level of impact the proposed development will have on the boundary road network. If necessary, improvements to facilitate the additional site-generated traffic would be outlined and evaluated as part of sensitivity scenarios. The future assessment includes review of queuing relative to existing, future background conditions and future total traffic conditions.

WSP will undertake a turning lane assessment to identify if exclusive turning lanes will need to be provided at the Highway 11 Site Access, per York Region requirements. Moreover, WSP will undertake a traffic signal warrant analysis based on the OTM Book 12 methodology to confirm if a signalization of the proposed driveway is warranted.

MULTI-MODAL ASSESSMENT

In accordance with York Region's Transportation Mobility Plan Guidelines, WSP will assess transit, pedestrian, and cycling levels of service under existing and future conditions.

PARKING AND LOADING REVIEW

WSP will review the applicable by-law parking requirements and compare them to the proposed parking supply.

SITE PLANNING

WSP will evaluate the feasibility of the proposed site plan from a transportation perspective, particularly the site access arrangement. WSP will undertake a sightline analysis for the proposed site driveways. The site review will also assess the site layout and comment on any issues regarding ramp configurations, loading bay provision, and critical parking spaces. The internal circulation of various vehicles including waste collection vehicle, deliveries and trucks will be tested and documented. Site access and circulation reviews of the development plan will be completed using AutoTURN to ensure that automobile and truck manoeuvres can be adequately accommodated. WSP will also review zoning by-law requirements to determine if the minimum dimensions for parking spaces, loading spaces, driveways, and access aisles are met. Finally, WSP will prepare a pavement marking and signage plan.

TRANSPORTATION DEMAND MANAGEMENT PLAN

WSP will provide applicable Transportation Demand Management (TDM) strategies in the report that accounts for the site context and traffic conditions.



Please provide your input on the above noted terms of reference at your earliest convenience.
Thank you so much.

Yours sincerely,

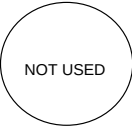
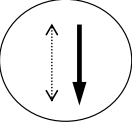
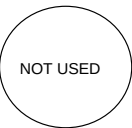
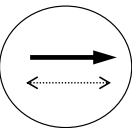
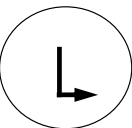
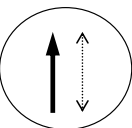
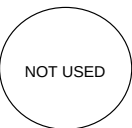
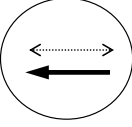
Ismet Medic, B.A.Sc.
Senior Project Manager

Rebekah Clarke Robinson, B.Eng.
Transportation Planner

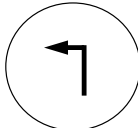
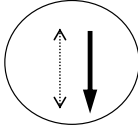
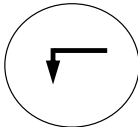
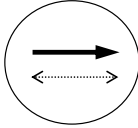
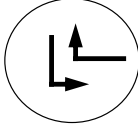
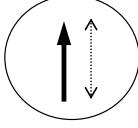
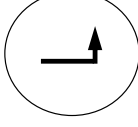
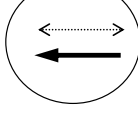
APPENDIX

B TRAFFIC DATA

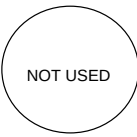
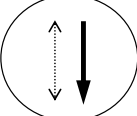
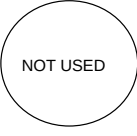
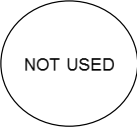
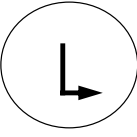
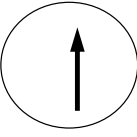
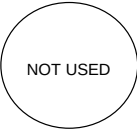
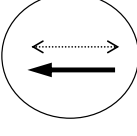


LOCATION: Hwy 11 (YR 1) & Sherwood Glen/ Dog Wood Blvd CTCS: 893 MODE/COMMENT: SA with APS PREPARED/CHECKED BY: MQL PREPARATION DATE: August 12, 2021 IMPLEMENTATION DATE: September 27, 2021		MUNICIPALITY: East Gwillimbury COMPUTER SYSTEM: Centrac CONTROLLER/CABINET TYPE: Econolite Cobalt / TS2T1 CONFLICT FLASH: Red & Red DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing at 1.2 m/s) CHANNEL/DROP:				
NEMA Phase (York)		AM 6:30-9:00 M-F	PM 15:30-19:30 M-F	Free 9:00-15:30, 19:30-6:30 M-F 24 hrs Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan	Pattern 1	Pattern 2	Pattern 99		
	System Plan	Plan 1	Plan 2	Plan 99		
1.		WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT				Emergency vehicle pre-emption 3: Serve NSG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction.
2. Southbound	 Hwy 11	WLK 7 FDW 16 MIN 40 EXT 0 MAX1 40 MAX2 0 AMB 5.0 ALR 2.5 SPLIT	88	78	0	EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG is 10 seconds. If ongoing vehicle demand exists on the stopbar loop, the EWG is capable of providing vehicle extensions up to the maximum green. If a pedestrian call is received, the pedestrian minimum will be served. The EWVK & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the NSG.
3.		WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT				During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
4. Eastbound	 Sherwood Glen	WLK 7 FDW 26 MIN 10 EXT 3 MAX1 19 MAX2 0 AMB 4.0 ALR 3.5 SPLIT	42	42	0	During free plan, signal rests in NSWK and does not cycle through NSFD unless there is side street vehicle or pedestrian demand. NSFD reverts to NSWK if there is no side street demand at the end of the NSFD. APS Extended Push Activation = 3 sec When activated, APS is on for 7 seconds.
5. S/B Left Turn Arrow		WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3.0 ALR 1.0 SPLIT	12	12	0	APS installed on 2018-04-11 Clearances changes due to speed limit revision.
6. Northbound	 Hwy 11	WLK 7 FDW 16 MIN 40 EXT 0 MAX1 40 MAX2 0 AMB 5.0 ALR 2.5 SPLIT	76	66	0	
7.		WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT				LEGEND: SA - Semi-Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR - All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWVK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
8. Westbound	 Dog Wood Blvd	WLK 7 FDW 26 MIN 10 EXT 3 MAX1 19 MAX2 0 AMB 4.0 ALR 3.5 SPLIT	42	42	0	
	CL OF VP	130 92 16	120 50 16	0 (FREE) 0 (FREE) 0 (FREE)		

NOTES:

LOCATION: Hwy 11 (YR 1) & Bathurst St (YR 38) CTCS: 305 MODE/COMMENT: SA PREPARED/CHECKED BY: MQL PREPARATION DATE: January 19, 2023 IMPLEMENTATION DATE: January 19, 2023		MUNICIPALITY: East Gwillimbury COMPUTER SYSTEM: Centrac CONTROLLER/CABINET TYPE: Econolite Cobalt / TS2 T1 CONFLICT FLASH: Red & Red DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing at 1.2 m/s) CHANNEL/DROP:		N 	
NEMA Phase (York)		AM & Pre-PM & Post-PM 7:00-10:00 & 15:00-16:00, 17:00-18:00 M-F	Free All Other Times	Phase Mode (Fixed/Callable)	Remarks
	Local Plan		Pattern 99		
	Action Plan	Plan 1	Plan 99		
1. N/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 20 AMB 3 ALR 1 SPLIT	20 0	0	Callable/Extendable by Setback Loop	Pedestrian Minimums: NSWK = 7 secs; NSFD = 27 secs EWWK = 7 secs; EWFD = 30 secs Emergency vehicle pre-emption 3: Serve NSG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction.
2. Southbound  Hwy 11 (YR 1)	WLK 7 FDW 27 MIN 20 EXT 5 MAX1 50 MAX2 50 AMB 5.0 ALR 2.5 SPLIT	50 0	0	Ped recall MAX VI = 26 S/A=2.0	Emergency vehicle pre-emption 4: Serve EWG/EWDW min 20 secs and up to 100 secs if there are continuous emergency calls in EW direction. EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG will be served. If ongoing vehicle demand exists on the stopbar loop, the EWG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or serve MAX1 during Free operation. If a pedestrian call is received, the pedestrian minimum will be served. The EWWK & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the NSG.
3. W/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 20 AMB 3 ALR 1 SPLIT	20 0	0	Callable/Extendable by Setback Loop	During free plan, signal rests in NSWK and does not cycle through NSFD unless there is side street vehicle or pedestrian demand. NSFD reverts to NSWK if there is no side street demand at the end of the NSFD.
4. Eastbound  Bathurst St (YR 38)	WLK 7 FDW 30 MIN 10 EXT 3 MAX1 20 MAX2 20 AMB 5.5 ALR 3.0 SPLIT	20 0	0	Callable by Stopbar Loop and/or Pushbutton; Extendable by Stopbar Loop	During free plan, signal rests in NSWK and does not cycle through NSFD unless there is side street vehicle or pedestrian demand. NSFD reverts to NSWK if there is no side street demand at the end of the NSFD.
5. S/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 20 MAX2 30 AMB 3 ALR 1 SPLIT	30 0	0	Callable/Extendable by Setback Loop WBRT installed	EBLT increased to address delay
6. Northbound  Hwy 11 (YR 1)	WLK 7 FDW 27 MIN 20 EXT 5 MAX1 50 MAX2 50 AMB 5.0 ALR 2.5 SPLIT	50 0	0	Ped recall MAX VI = 26 S/A=2.0	LEGEND: SA - Semi-Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR - All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWWK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
7. E/B Left Turn Arrow 	WLK FDW MIN 7 EXT 3 MAX1 25 MAX2 25 AMB 3 ALR 1 SPLIT	25 0	0	Callable/Extendable by Setback Loop	
8. Westbound  Bathurst St (YR 38)	WLK 7 FDW 30 MIN 10 EXT 3 MAX1 20 MAX2 20 AMB 5.5 ALR 3.0 SPLIT	20 0	0	Callable by Stopbar Loop and/or Pushbutton; Extendable by Stopbar Loop	
	CL OF VP	0 (FREE) 0 (FREE) 0 (FREE)	0 (FREE) 0 (FREE) 0 (FREE)		

NOTES:

LOCATION: Hwy 11 (YR 1) & Crimson King Way CTCS: 882 MODE/COMMENT: SA with APS PREPARED/CHECKED BY: MQL PREPARATION DATE: August 12, 2021 IMPLEMENTATION DATE: September 27, 2021		MUNICIPALITY: East Gwillimbury COMPUTER SYSTEM: Centraacs CONTROLLER/CABINET TYPE: Econolite Cobalt / TS2T1 CONFLICT FLASH: Red & Red DESIGN WALK SPEED: 1.0 m/s (FDW based on full crossing at 1.2 m/s) CHANNEL/DROP:				
NEMA Phase (York)		AM 6:30-9:00 M-F	PM 15:30-19:30 M-F	Free 9:00-15:30, 19:30-6:30 M-F 24 hrs Sat & Sun	Phase Mode (Fixed/Demanded/Callable)	Remarks
	Local Plan System Plan	Pattern 1 Plan 1	Pattern 2 Plan 2	Pattern 99 Plan 99		
1.	 WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT					Pedestrian Minimums: NSWK = 7 sec., NSFD = 14 sec. EWWK = 7 sec., EWFD = 21 sec. Emergency vehicle pre-emption 3: Serve NSG/NSDW min 20 secs and up to 100 secs if there are continuous emergency calls in NS direction.
2. Southbound	 Yonge St/Hwy 11 WLK 7 FDW 14 MIN 40 EXT 0 MAX1 40 MAX2 0 AMB 5.0 ALR 2.5 SPLIT				Fixed	EW phase is callable by vehicle or pedestrian actuation. If a vehicle call is received, the minimum EWG is 10 seconds. If ongoing vehicle demand exists on the stopbar loop, the EWG is capable of providing vehicle extensions up to the maximum green split during coordinated operation or 19 secs during Free operation. If a pedestrian call is received, the
3.	 WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT					pedestrian minimum will be served. The EWWK & EWFD are only displayed on the pedestrian signal heads if a pedestrian call is received. Extension time is based on vehicle demand. Unused extension time is given to the NSG.
4. Eastbound	 WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT				Callable by pushbutton	During coordinated operation, the signal constantly cycles through main street FDW to improve response time to side street vehicle and pedestrian demand.
5. S/B Left Turn Arrow	 WLK FDW MIN 7 EXT 3 MAX1 7 MAX2 0 AMB 3.0 ALR 1.0 SPLIT				Callable/Extendable by Setback Loop	NSFD reverts to NSWK if there is no side street demand at the end of the NSFD. APS Extended Push Activation = 3 sec When activated, APS is on for 7 seconds. APS installed on 2017-06-12 Clearances changes due to speed limit revision.
6. Northbound	 Yonge St/Hwy 11 WLK 7 FDW 14 MIN 40 EXT 0 MAX1 40 MAX2 0 AMB 5.0 ALR 2.5 SPLIT				Fixed	
7.	 WLK FDW MIN EXT MAX1 MAX2 AMB ALR SPLIT					LEGEND: SA - Semi-Actuated signal WLK - Walk time FDW - Flashing Don't Walk time MIN - Minimum green time EXT - Extension time MAX1 - Maximum green time 1 MAX2 - Maximum green time 2 AMB - Amber ALR - All Red CL - Cycle Length OF - Offset VP - Vehicle Permissive NSWK - North/South Walk EWWK - East/West Walk NSG - North/South Green EWG - East/West Green NSFD - North/South Flashing Don't Walk EWFD - East/West Flashing Don't Walk TSP - Transit Priority APS - Audible Pedestrian Signal RLC - Red Light Camera
8. Westbound	 Crimson King Way WLK 7 FDW 21 MIN 10 EXT 3 MAX1 19 MAX2 0 AMB 4.0 ALR 3.0 SPLIT				Callable by stopbar loop and/or pushbutton; Extendable by stopbar loop.	
	CL OF VP	130 0 14	120 0 14	0 (FREE) 0 (FREE) 0 (FREE)		

NOTES:

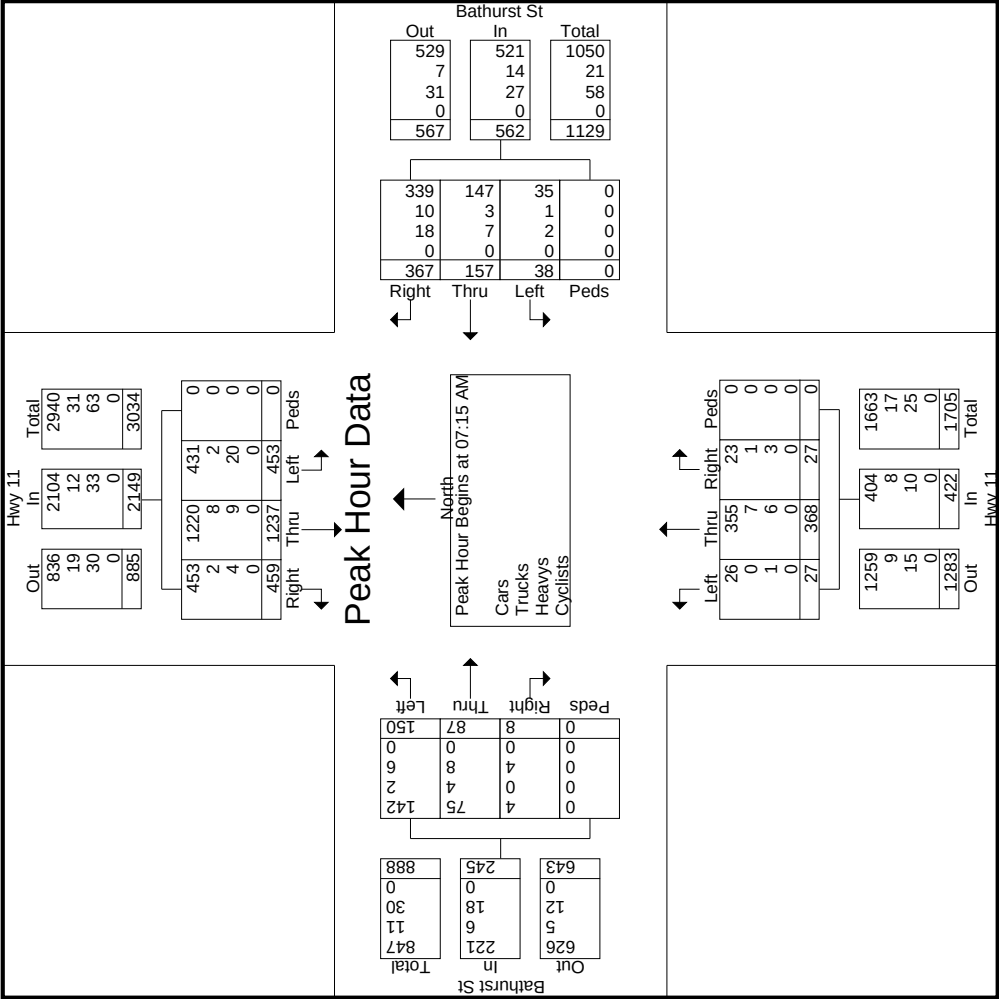
Horizon Data Services Ltd

Email: nhyree@gmail.com

Phone: (416) 840-6619 Fax: (416) 840-5297

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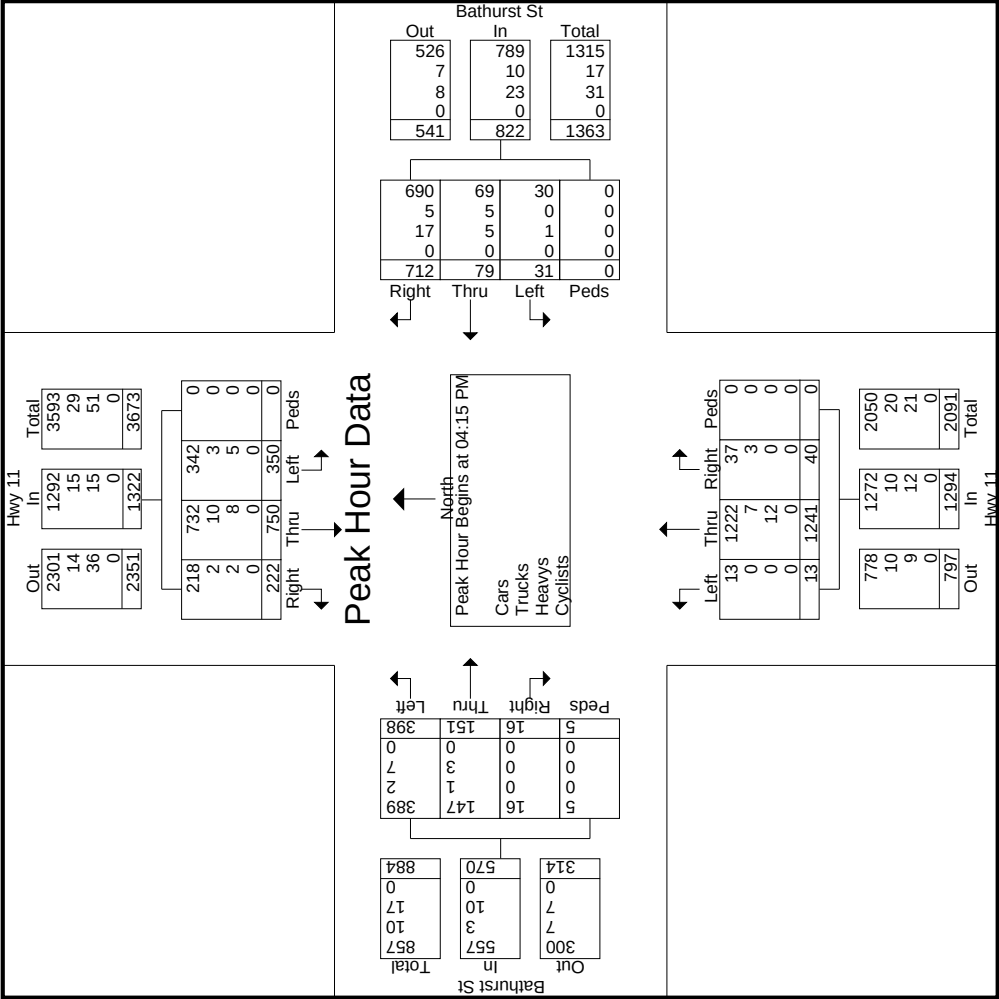
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Page No : 7



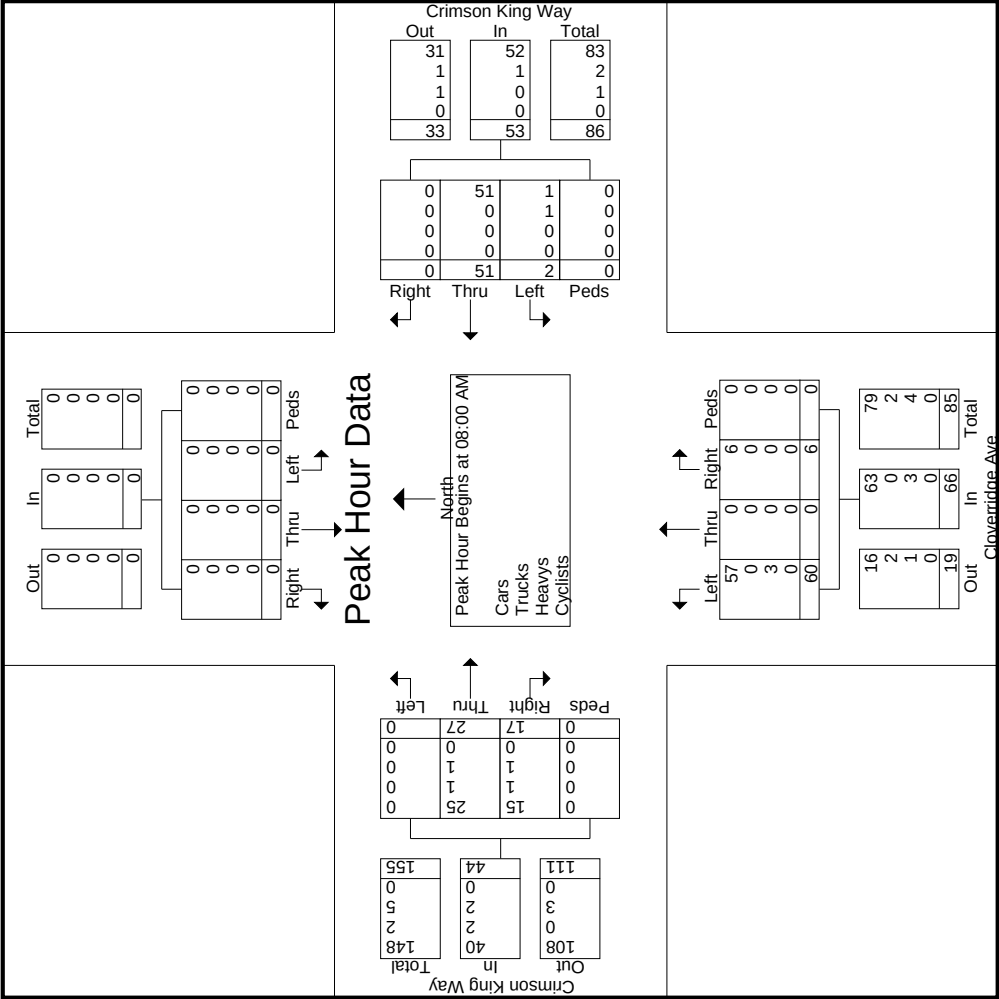
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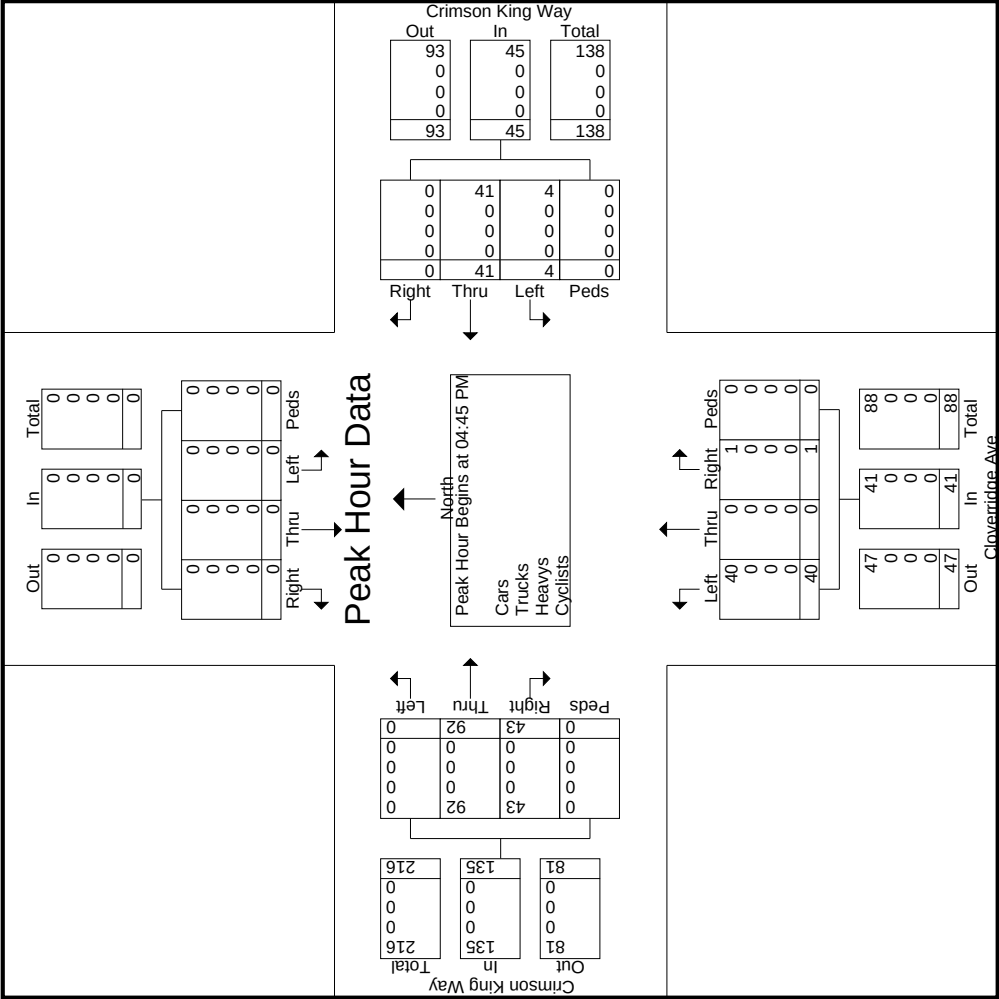
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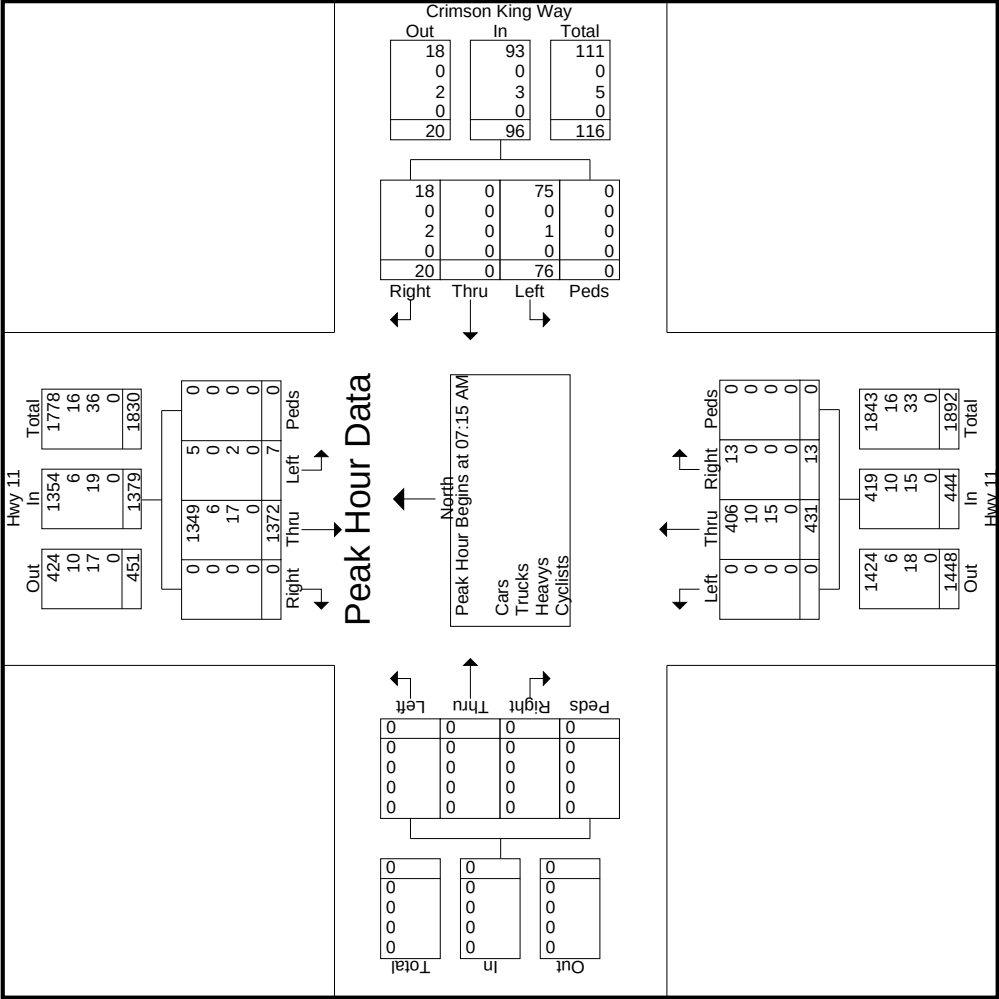
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Page No : 4



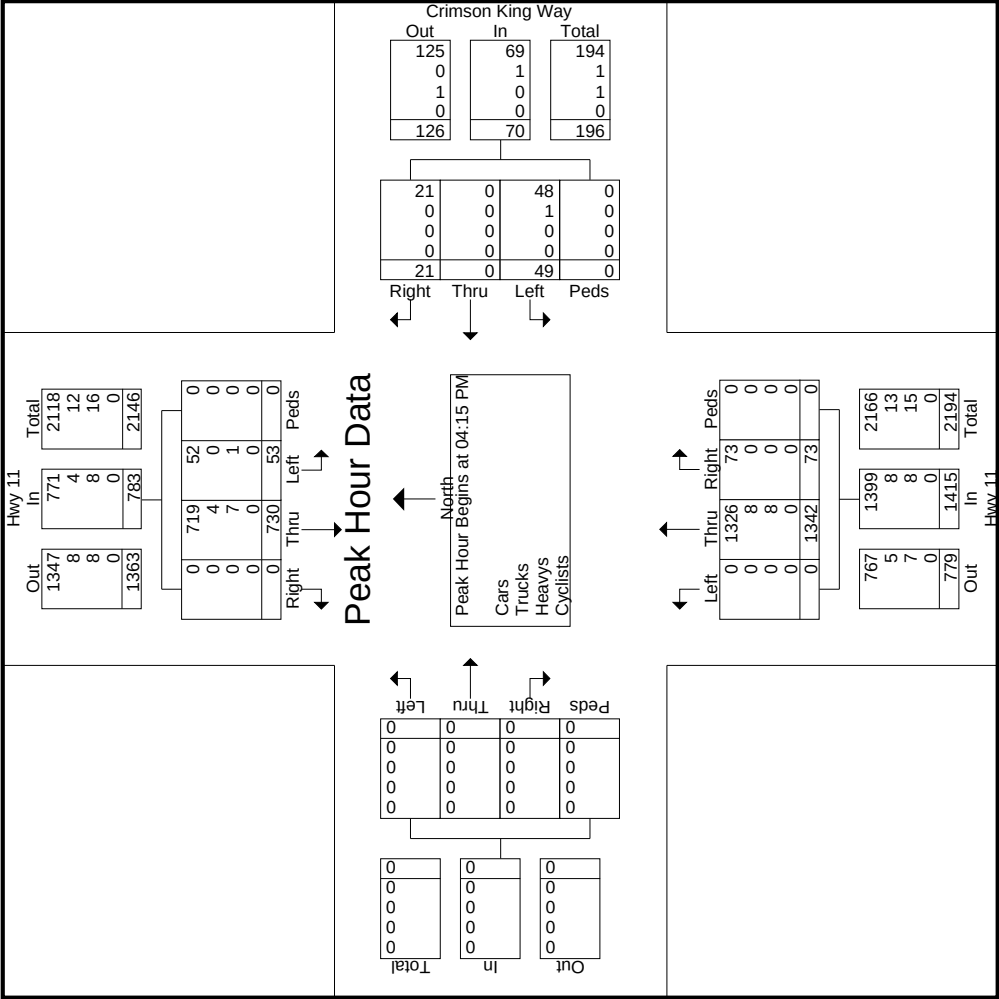
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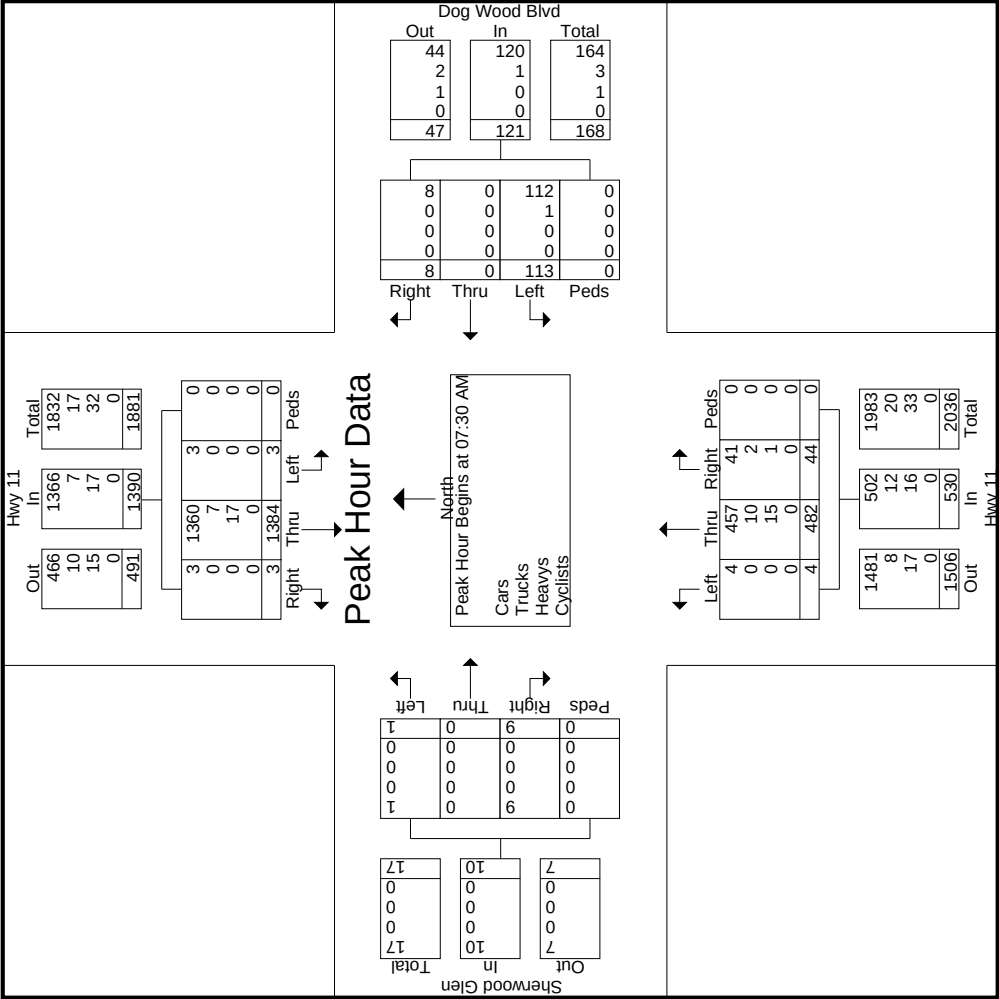
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Page No : 4



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APPENDIX

C LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS⁽¹⁾

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

Level of Service	Features	Control Delay per vehicle (sec)
A	LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	$> 10 \text{ and } \leq 20$
C	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	$> 20 \text{ and } \leq 35$
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	$> 35 \text{ and } \leq 55$
E	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$> 55 \text{ and } \leq 80$
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

(1) Highway Capacity Manual 2000

LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS⁽¹⁾

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Features	Average Total Delay (sec/veh)
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	> 10 and ≤ 15
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	> 15 and ≤ 25
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	> 25 and ≤ 35
E	Very long traffic delays occur. Operations approach the capacity of the intersection.	> 35 and ≤ 50
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50

(1) Highway Capacity Manual 2000.

APPENDIX

D EXISTING TRAFFIC CONDITIONS

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2023 Existing (AM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	88	23	431	29	15	1372
Future Volume (vph)	88	23	431	29	15	1372
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1863	1545	3585	1700	1473	3725
Flt Permitted	0.950				0.457	
Satd. Flow (perm)	1863	1545	3585	1700	709	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		26		33		
Link Speed (k/h)	40		70			70
Link Distance (m)	181.0		972.2			1205.7
Travel Time (s)	16.3		50.0			62.0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	10%	6%	0%	29%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	99	26	484	33	17	1542
Shared Lane Traffic (%)						
Lane Group Flow (vph)	99	26	484	33	17	1542
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2023 Existing (AM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	82.0	82.0	12.0	94.0
Total Split (%)	27.7%	27.7%	63.1%	63.1%	9.2%	72.3%
Maximum Green (s)	29.0	29.0	74.5	74.5	8.0	86.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	12.7	12.7	98.4	98.4	106.3	102.8
Actuated g/C Ratio	0.10	0.10	0.76	0.76	0.82	0.79
v/c Ratio	0.54	0.15	0.18	0.03	0.03	0.52
Control Delay	66.5	19.5	1.6	0.1	2.7	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	19.5	1.6	0.1	2.7	5.8
LOS	E	B	A	A	A	A
Approach Delay	56.8		1.5			5.8
Approach LOS	E		A			A

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.54

Intersection Signal Delay: 7.7

Intersection LOS: A

Intersection Capacity Utilization 56.4%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

2023 Existing (AM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	99	26	484	33	17	1542
v/c Ratio	0.54	0.15	0.18	0.03	0.03	0.52
Control Delay	66.5	19.5	1.6	0.1	2.7	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	19.5	1.6	0.1	2.7	5.8
Queue Length 50th (m)	26.0	0.0	3.5	0.0	0.7	64.1
Queue Length 95th (m)	43.1	8.8	4.6	0.0	2.4	90.6
Internal Link Dist (m)	157.0		948.2			1181.7
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	415	364	2712	1294	626	2944
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.07	0.18	0.03	0.03	0.52
Intersection Summary						

Lanes, Volumes, Timings

2023 Existing (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	9	113	0	8	4	482	44	3	1384	3
Future Volume (vph)	1	0	9	113	0	8	4	482	44	3	1384	3
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.877				0.850			0.850			0.850
Flt Protected		0.995			0.950		0.950			0.950		
Satd. Flow (prot)	0	1745	0	0	1881	1700	1900	3585	1589	1900	3725	1700
Flt Permitted		0.972			0.750		0.140			0.431		
Satd. Flow (perm)	0	1705	0	0	1485	1700	280	3585	1589	862	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		71				71			71			38
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	1%	2%	0%	0%	6%	7%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	1	0	10	127	0	9	4	542	49	3	1555	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	0	0	127	9	4	542	49	3	1555	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

2023 Existing (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	76.0	76.0	76.0	12.0	88.0	88.0
Total Split (%)	32.3%	32.3%		32.3%	32.3%	32.3%	58.5%	58.5%	58.5%	9.2%	67.7%	67.7%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	68.5	68.5	68.5	8.0	80.5	80.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effect Green (s)		16.5			16.5	16.5	96.3	96.3	96.3	102.0	98.5	98.5
Actuated g/C Ratio		0.13			0.13	0.13	0.74	0.74	0.74	0.78	0.76	0.76
v/c Ratio		0.04			0.68	0.03	0.02	0.20	0.04	0.00	0.55	0.00
Control Delay		0.3			70.9	0.2	7.5	6.3	1.0	7.7	13.5	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.3			70.9	0.2	7.5	6.3	1.0	7.7	13.5	0.0
LOS		A			E	A	A	A	A	A	B	A
Approach Delay		0.3			66.3			5.9			13.5	
Approach LOS		A			E			A			B	

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 92 (71%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 14.6

Intersection LOS: B

Intersection Capacity Utilization 93.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

2023 Existing (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	127	9	4	542	49	3	1555	3
v/c Ratio	0.04	0.68	0.03	0.02	0.20	0.04	0.00	0.55	0.00
Control Delay	0.3	70.9	0.2	7.5	6.3	1.0	7.7	13.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.3	70.9	0.2	7.5	6.3	1.0	7.7	13.5	0.0
Queue Length 50th (m)	0.0	33.2	0.0	0.2	19.0	0.0	0.2	110.4	0.0
Queue Length 95th (m)	0.0	51.8	0.0	2.0	41.0	2.7	m0.7	189.4	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	504	394	503	207	2654	1195	740	2821	1296
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.32	0.02	0.02	0.20	0.04	0.00	0.55	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
3: Cloverridge Avenue & Crimson King Way

2023 Existing (AM Peak Hour)

06-19-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↱	
Traffic Volume (vph)	27	17	2	51	60	6
Future Volume (vph)	27	17	2	51	60	6
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.948				0.987	
Flt Protected				0.998	0.957	
Satd. Flow (prot)	1731	0	0	1962	1807	0
Flt Permitted				0.998	0.957	
Satd. Flow (perm)	1731	0	0	1962	1807	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	181.0			280.7	206.8	
Travel Time (s)	16.3			25.3	18.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	8%	12%	50%	0%	5%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	30	19	2	56	66	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	49	0	0	58	73	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	14.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 3: Cloverridge Avenue & Crimson King Way

2023 Existing (AM Peak Hour)

06-19-2023

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	27	17	2	51	60	6
Future Volume (vph)	27	17	2	51	60	6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	30	19	2	56	66	7
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	49	58	73			
Volume Left (vph)	0	2	66			
Volume Right (vph)	19	0	7			
Hadj (s)	-0.07	0.04	0.20			
Departure Headway (s)	4.1	4.2	4.3			
Degree Utilization, x	0.06	0.07	0.09			
Capacity (veh/h)	864	846	803			
Control Delay (s)	7.3	7.5	7.7			
Approach Delay (s)	7.3	7.5	7.7			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.5			
Level of Service			A			
Intersection Capacity Utilization			14.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2023 Existing (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	87	8	38	157	367	27	368	27	453	1237	459
Future Volume (vph)	150	87	8	38	157	367	27	368	27	453	1237	459
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.987				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1792	3202	0	1759	1869	1574	1827	3654	1478	1810	3725	1667
Flt Permitted	0.443			0.686			0.140			0.454		
Satd. Flow (perm)	836	3202	0	1270	1869	1574	269	3654	1478	865	3725	1667
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				331			141			499
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			1205.7			393.8	
Travel Time (s)		5.9			6.3			62.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	14%	50%	8%	7%	8%	4%	4%	15%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	163	95	9	41	171	399	29	400	29	492	1345	499
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	104	0	41	171	399	29	400	29	492	1345	499
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2023 Existing (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	4.0	4.0	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effect Green (s)	40.5	26.5		28.8	15.9	45.0	60.8	50.2	50.2	77.8	67.8	67.8
Actuated g/C Ratio	0.32	0.21		0.23	0.13	0.36	0.48	0.40	0.40	0.62	0.54	0.54
v/c Ratio	0.42	0.15		0.13	0.73	0.52	0.13	0.28	0.04	0.72	0.67	0.44
Control Delay	35.0	39.6		30.5	72.1	8.7	14.1	27.5	0.1	21.8	25.7	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6		30.5	72.1	8.7	14.1	27.5	0.1	21.8	25.7	3.1
LOS	C	D		C	E	A	B	C	A	C	C	A
Approach Delay		36.8			27.9			24.9			20.0	
Approach LOS		D			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 126.3

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 23.2

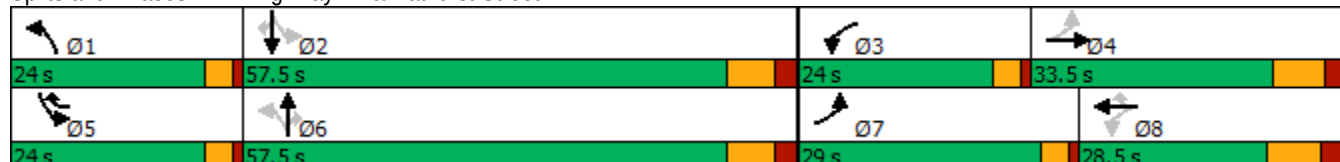
Intersection LOS: C

Intersection Capacity Utilization 77.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues
4: Highway 11 & Bathurst Street

2023 Existing (AM Peak Hour)

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	104	41	171	399	29	400	29	492	1345	499
v/c Ratio	0.42	0.15	0.13	0.73	0.52	0.13	0.28	0.04	0.72	0.67	0.44
Control Delay	35.0	39.6	30.5	72.1	8.7	14.1	27.5	0.1	21.8	25.7	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6	30.5	72.1	8.7	14.1	27.5	0.1	21.8	25.7	3.1
Queue Length 50th (m)	31.7	11.3	7.4	43.5	11.9	2.8	37.1	0.0	64.8	141.9	0.0
Queue Length 95th (m)	49.9	19.8	16.0	72.2	41.8	8.3	55.7	0.0	107.9	196.1	19.4
Internal Link Dist (m)		73.6		81.0			1181.7			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	458	700	469	289	773	404	1451	672	682	2000	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.15	0.09	0.59	0.52	0.07	0.28	0.04	0.72	0.67	0.44
Intersection Summary											

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2023 Existing (PM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	57	24	1342	78	57	730
Future Volume (vph)	57	24	1342	78	57	730
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1845	1700	3725	1700	1863	3725
Flt Permitted	0.950				0.155	
Satd. Flow (perm)	1845	1700	3725	1700	304	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		25		80		
Link Speed (k/h)	40		70			70
Link Distance (m)	181.0		972.2			1205.7
Travel Time (s)	16.3		50.0			62.0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	0%	2%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	59	25	1384	80	59	753
Shared Lane Traffic (%)						
Lane Group Flow (vph)	59	25	1384	80	59	753
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2023 Existing (PM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	72.0	72.0	12.0	84.0
Total Split (%)	30.0%	30.0%	60.0%	60.0%	10.0%	70.0%
Maximum Green (s)	29.0	29.0	64.5	64.5	8.0	76.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	10.7	10.7	90.9	90.9	101.7	99.7
Actuated g/C Ratio	0.09	0.09	0.76	0.76	0.85	0.83
v/c Ratio	0.36	0.14	0.49	0.06	0.17	0.24
Control Delay	57.7	19.7	16.6	5.0	3.2	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.7	19.7	16.6	5.0	3.2	3.1
LOS	E	B	B	A	A	A
Approach Delay	46.4		15.9			3.1
Approach LOS	D		B			A

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 12.6

Intersection LOS: B

Intersection Capacity Utilization 64.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

2023 Existing (PM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	59	25	1384	80	59	753
v/c Ratio	0.36	0.14	0.49	0.06	0.17	0.24
Control Delay	57.7	19.7	16.6	5.0	3.2	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.7	19.7	16.6	5.0	3.2	3.1
Queue Length 50th (m)	14.1	0.0	140.4	4.5	2.0	20.4
Queue Length 95th (m)	27.6	8.8	179.5	10.0	4.8	29.4
Internal Link Dist (m)	157.0		948.2			1181.7
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	445	429	2823	1307	361	3096
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.49	0.06	0.16	0.24
Intersection Summary						

Lanes, Volumes, Timings

2023 Existing (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	3	5	61	2	13	10	1404	82	8	761	1
Future Volume (vph)	2	3	5	61	2	13	10	1404	82	8	761	1
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.932				0.850			0.850			0.850
Flt Protected		0.990			0.954		0.950			0.950		
Satd. Flow (prot)	0	1845	0	0	1908	1466	1900	3762	1667	1900	3725	1700
Flt Permitted		0.920			0.726		0.349			0.141		
Satd. Flow (perm)	0	1715	0	0	1452	1466	698	3762	1667	282	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				77			77			41
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	16%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	2	3	5	64	2	14	11	1478	86	8	801	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	66	14	11	1478	86	8	801	1
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

2023 Existing (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	66.0	66.0	66.0	12.0	78.0	78.0
Total Split (%)	35.0%	35.0%		35.0%	35.0%	35.0%	55.0%	55.0%	55.0%	10.0%	65.0%	65.0%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	58.5	58.5	58.5	8.0	70.5	70.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effect Green (s)		11.7			11.7	11.7	96.1	96.1	96.1	100.3	98.3	98.3
Actuated g/C Ratio		0.10			0.10	0.10	0.80	0.80	0.80	0.84	0.82	0.82
v/c Ratio		0.06			0.46	0.07	0.02	0.49	0.06	0.02	0.26	0.00
Control Delay		35.8			61.5	0.6	5.4	6.6	1.7	1.5	2.1	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		35.8			61.5	0.6	5.4	6.6	1.7	1.5	2.1	0.0
LOS		D			E	A	A	A	A	A	A	A
Approach Delay		35.8			50.9			6.3			2.1	
Approach LOS		D			D			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 6.5

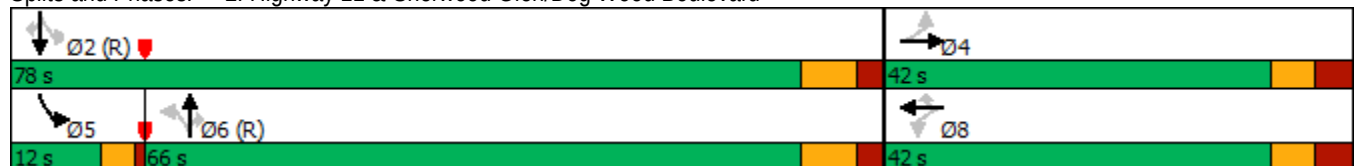
Intersection LOS: A

Intersection Capacity Utilization 93.8%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

2023 Existing (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	66	14	11	1478	86	8	801	1
v/c Ratio	0.06	0.46	0.07	0.02	0.49	0.06	0.02	0.26	0.00
Control Delay	35.8	61.5	0.6	5.4	6.6	1.7	1.5	2.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	61.5	0.6	5.4	6.6	1.7	1.5	2.1	0.0
Queue Length 50th (m)	1.2	15.9	0.0	0.5	56.2	0.4	0.2	13.4	0.0
Queue Length 95th (m)	6.5	30.0	0.0	3.1	120.6	6.3	0.7	16.0	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	496	417	476	558	3011	1349	343	3050	1399
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.16	0.03	0.02	0.49	0.06	0.02	0.26	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
3: Cloverridge Avenue & Crimson King Way

2023 Existing (PM Peak Hour)

06-19-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↱	
Traffic Volume (vph)	92	43	4	41	40	1
Future Volume (vph)	92	43	4	41	40	1
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.957				0.997	
Flt Protected				0.995	0.953	
Satd. Flow (prot)	1914	0	0	1990	1900	0
Flt Permitted				0.995	0.953	
Satd. Flow (perm)	1914	0	0	1990	1900	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	181.0			280.7	206.8	
Travel Time (s)	16.3			25.3	18.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	112	52	5	50	49	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	164	0	0	55	50	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 3: Cloverridge Avenue & Crimson King Way

2023 Existing (PM Peak Hour)
06-19-2023

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	92	43	4	41	40	1
Future Volume (vph)	92	43	4	41	40	1
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	112	52	5	50	49	1
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	164	55	50			
Volume Left (vph)	0	5	49			
Volume Right (vph)	52	0	1			
Hadj (s)	-0.19	0.02	0.18			
Departure Headway (s)	3.9	4.2	4.5			
Degree Utilization, x	0.18	0.06	0.06			
Capacity (veh/h)	908	839	751			
Control Delay (s)	7.7	7.5	7.8			
Approach Delay (s)	7.7	7.5	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.7			
Level of Service			A			
Intersection Capacity Utilization			17.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2023 Existing (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	442	170	14	30	82	708	22	1316	48	340	714	232
Future Volume (vph)	442	170	14	30	82	708	22	1316	48	340	714	232
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							1.00					0.97
Fr't		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1845	3686	0	1900	1818	1635	1900	3689	1504	1845	3689	1667
Flt Permitted	0.548			0.631			0.369			0.072		
Satd. Flow (perm)	1064	3686	0	1262	1818	1635	736	3689	1504	140	3689	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				*365			141			242
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			1205.7			393.8	
Travel Time (s)		5.9			6.3			62.0			20.3	
Confl. Peds. (#/hr)							5					5
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	1.00	0.96	0.96	0.96	1.00	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	0%	0%	10%	4%	0%	3%	13%	3%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	460	177	15	31	85	708	23	1371	50	340	744	242
Shared Lane Traffic (%)												
Lane Group Flow (vph)	460	192	0	31	85	708	23	1371	50	340	744	242
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2023 Existing (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	-2.0	0.0	0.0	0.0	-1.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	2.0	4.0	7.5	7.5	3.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			5	5		5	5
Act Effect Green (s)	46.1	34.6		24.5	12.1	43.1	60.5	50.0	50.0	78.5	67.5	67.5
Actuated g/C Ratio	0.35	0.26		0.19	0.09	0.33	0.46	0.38	0.38	0.60	0.51	0.51
v/c Ratio	0.88	0.20		0.11	0.51	0.91	0.06	0.98	0.08	0.96	0.39	0.26
Control Delay	57.4	38.4		30.8	67.8	36.7	13.4	59.9	0.2	76.4	21.4	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4		30.8	67.8	36.7	13.4	59.9	0.2	76.4	21.4	3.1
LOS	E	D		C	E	D	B	E	A	E	C	A
Approach Delay		51.8			39.7			57.0			32.2	
Approach LOS		D			D			E			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 131.6

Natural Cycle: 115

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 45.1

Intersection LOS: D

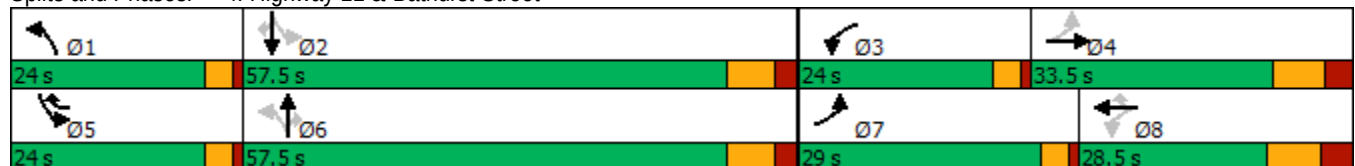
Intersection Capacity Utilization 112.4%

ICU Level of Service H

Analysis Period (min) 15

* User Entered Value

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues
4: Highway 11 & Bathurst Street

2023 Existing (PM Peak Hour)

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	460	192	31	85	708	23	1371	50	340	744	242
v/c Ratio	0.88	0.20	0.11	0.51	0.91	0.06	0.98	0.08	0.96	0.39	0.26
Control Delay	57.4	38.4	30.8	67.8	36.7	13.4	59.9	0.2	76.4	21.4	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4	30.8	67.8	36.7	13.4	59.9	0.2	76.4	21.4	3.1
Queue Length 50th (m)	108.3	21.7	5.6	22.5	102.5	2.5	191.2	0.0	74.3	67.4	0.0
Queue Length 95th (m)	#165.6	33.1	12.8	40.4	#184.8	6.9	#257.3	0.0	#142.8	89.6	14.9
Internal Link Dist (m)		73.6		81.0			1181.7			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	521	974	452	269	781	588	1401	658	355	1891	946
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.20	0.07	0.32	0.91	0.04	0.98	0.08	0.96	0.39	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

APPENDIX

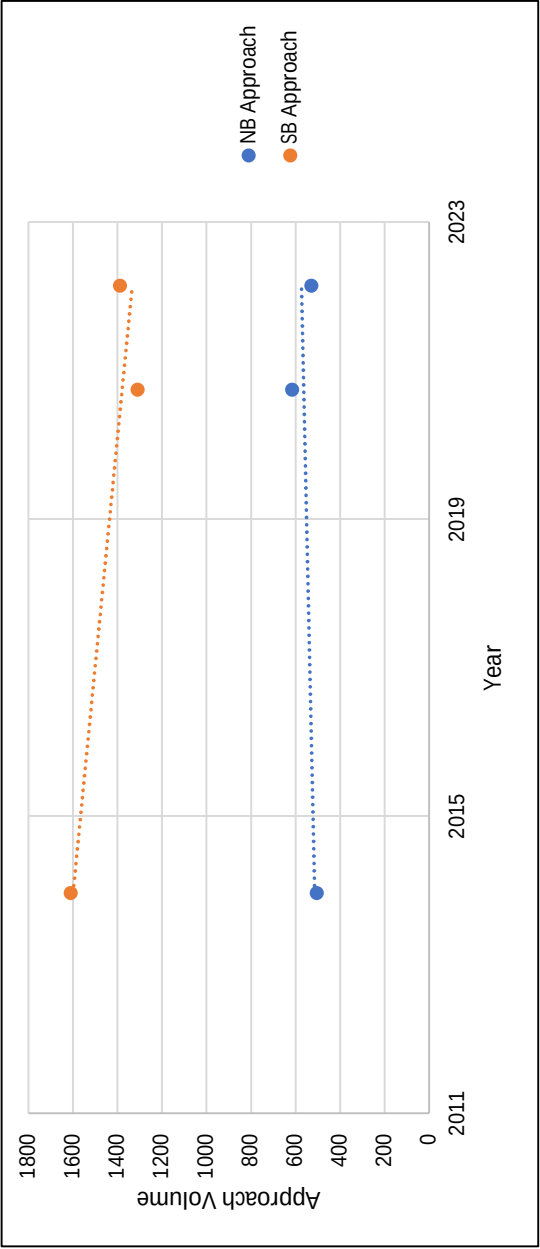
E BACKGROUND GROWTH RATE



Corridor Growth

Intersection Highway 11 and Dog Wood Boulevard / Sherwood Glen
Period AM Peak Hour

Date	NBL	NBT	NBR	SBL	SBT	SBR	NB Approach	SB Approach
2014-12-18	5	500	0	0	1606	5	505	1611
2021-09-28	5	571	40	6	1304	1	616	1311
2023-02-21	4	482	44	3	1384	3	530	1390
Slope							0.020	-0.089
Rate							1.38%	-2.34%

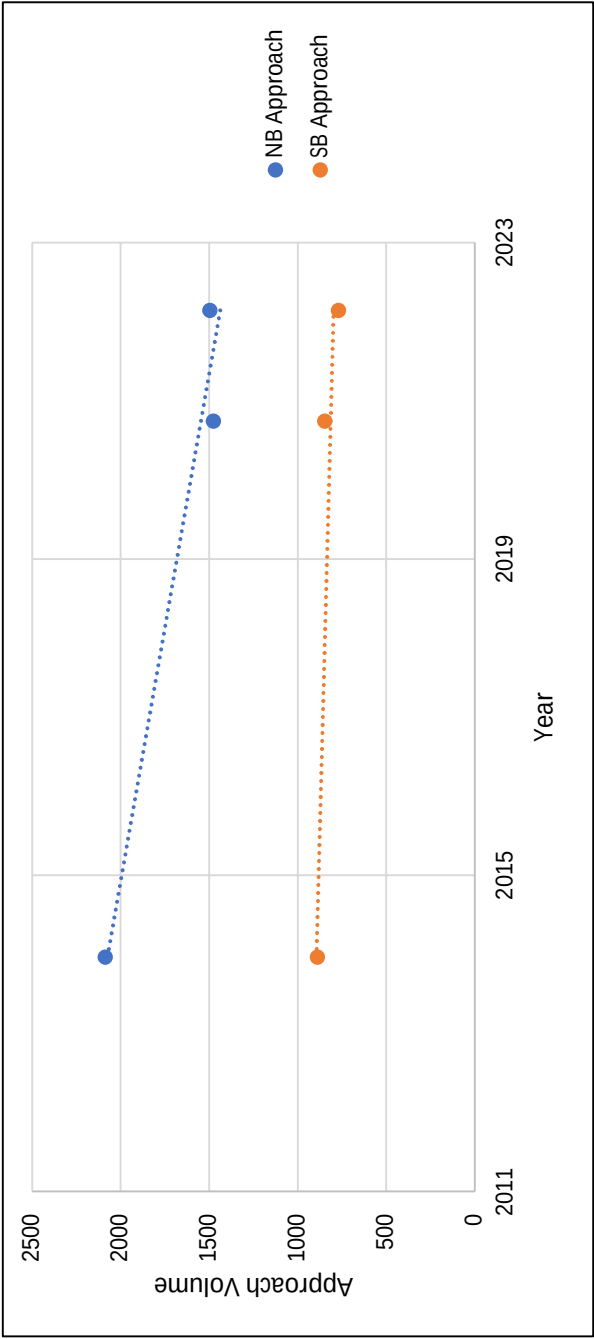




Corridor Growth

Intersection Highway 11 and Dog Wood Boulevard / Sherwood Glen
Period PM Peak Hour

Date	NBL	NBT	NBR	SBL	SBT	SBR	NB Approach	SB Approach
2014-12-18	10	2077	0	0	888	1	2087	889
2021-09-28	16	1387	74	12	834	2	1477	848
2023-02-21	10	1404	82	8	761	1	1496	770
Slope							-0.213	-0.032
Rate							-5.21%	-1.54%



Highway 11 & Bathurst Street

	Date	NBL	NBT	NBR	SBL	SBT	SBR	South Approach	North Approach
AM	2014-03-04	10	390	35	409	1610	18	435	834
	2023-03-07	27	368	27	453	1237	459	422	848
	<i>Growth Rates</i>							-0.34%	0.19%
PM								-0.08%	
	2014-11-06	22	1662	51	230	784	101	1735	1943
	2023-03-07	13	1241	40	350	750	222	1294	1631
	<i>Growth Rates</i>							-3.21%	-1.93%
							-2.57%		

APPENDIX

F

FUTURE

BACKGROUND

TRAFFIC

CONDITIONS

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

Future Background (AM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	88	23	470	29	15	1440
Future Volume (vph)	88	23	470	29	15	1440
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1863	1545	3585	1700	1473	3725
Flt Permitted	0.950				0.438	
Satd. Flow (perm)	1863	1545	3585	1700	679	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		26		33		
Link Speed (k/h)	40		70			70
Link Distance (m)	181.0		972.2			1205.7
Travel Time (s)	16.3		50.0			62.0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	10%	6%	0%	29%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	99	26	528	33	17	1618
Shared Lane Traffic (%)						
Lane Group Flow (vph)	99	26	528	33	17	1618
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

Future Background (AM Peak Hour)

06-19-2023

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	82.0	82.0	12.0	94.0
Total Split (%)	27.7%	27.7%	63.1%	63.1%	9.2%	72.3%
Maximum Green (s)	29.0	29.0	74.5	74.5	8.0	86.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	12.7	12.7	98.4	98.4	106.3	102.8
Actuated g/C Ratio	0.10	0.10	0.76	0.76	0.82	0.79
v/c Ratio	0.54	0.15	0.19	0.03	0.03	0.55
Control Delay	66.5	19.5	2.0	0.1	2.7	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	19.5	2.0	0.1	2.7	6.1
LOS	E	B	A	A	A	A
Approach Delay	56.8		1.9			6.1
Approach LOS	E		A			A

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 7.8

Intersection LOS: A

Intersection Capacity Utilization 58.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

Future Background (AM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	99	26	528	33	17	1618
v/c Ratio	0.54	0.15	0.19	0.03	0.03	0.55
Control Delay	66.5	19.5	2.0	0.1	2.7	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	19.5	2.0	0.1	2.7	6.1
Queue Length 50th (m)	26.0	0.0	4.5	0.0	0.7	69.5
Queue Length 95th (m)	43.1	8.8	8.2	0.3	2.4	98.1
Internal Link Dist (m)	157.0		948.2			1181.7
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	415	364	2712	1294	604	2944
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.07	0.19	0.03	0.03	0.55
Intersection Summary						

Lanes, Volumes, Timings

Future Background (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	9	281	0	47	4	505	141	47	1408	3
Future Volume (vph)	1	0	9	281	0	47	4	505	141	47	1408	3
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.877				0.850			0.850			0.850
Flt Protected		0.995			0.950		0.950			0.950		
Satd. Flow (prot)	0	1745	0	0	1881	1700	1900	3585	1589	1900	3725	1700
Flt Permitted		0.974			0.750		0.111			0.396		
Satd. Flow (perm)	0	1708	0	0	1485	1700	222	3585	1589	792	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		71				71			158			38
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	1%	2%	0%	0%	6%	7%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	1	0	10	316	0	53	4	567	158	53	1582	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	0	0	316	53	4	567	158	53	1582	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

Future Background (AM Peak Hour) 9:22 am 04-17-2023

Synchro 11 Report

Page 4

Lanes, Volumes, Timings

Future Background (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	76.0	76.0	76.0	12.0	88.0	88.0
Total Split (%)	32.3%	32.3%		32.3%	32.3%	32.3%	58.5%	58.5%	58.5%	9.2%	67.7%	67.7%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	68.5	68.5	68.5	8.0	80.5	80.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effect Green (s)		31.1			31.1	31.1	74.9	74.9	74.9	87.4	83.9	83.9
Actuated g/C Ratio		0.24			0.24	0.24	0.58	0.58	0.58	0.67	0.65	0.65
v/c Ratio		0.02			0.89	0.12	0.03	0.27	0.16	0.09	0.66	0.00
Control Delay		0.1			74.4	5.0	15.8	15.4	2.7	12.4	24.1	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.1			74.4	5.0	15.8	15.4	2.7	12.4	24.1	0.0
LOS		A			E	A	B	B	A	B	C	A
Approach Delay		0.1			64.4			12.7			23.7	
Approach LOS		A			E			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 92 (71%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 26.2

Intersection LOS: C

Intersection Capacity Utilization 100.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

Future Background (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	316	53	4	567	158	53	1582	3
v/c Ratio	0.02	0.89	0.12	0.03	0.27	0.16	0.09	0.66	0.00
Control Delay	0.1	74.4	5.0	15.8	15.4	2.7	12.4	24.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.1	74.4	5.0	15.8	15.4	2.7	12.4	24.1	0.0
Queue Length 50th (m)	0.0	80.7	0.0	0.5	42.1	0.0	5.6	166.6	0.0
Queue Length 95th (m)	0.0	#123.8	6.5	2.6	55.3	10.4	m13.5	228.5	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	505	394	503	127	2064	982	600	2404	1111
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.80	0.11	0.03	0.27	0.16	0.09	0.66	0.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
3: Cloverridge Avenue & Crimson King Way

Future Background (AM Peak Hour)

06-19-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↱	
Traffic Volume (vph)	27	17	2	51	60	6
Future Volume (vph)	27	17	2	51	60	6
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.948				0.987	
Flt Protected				0.998	0.957	
Satd. Flow (prot)	1731	0	0	1962	1807	0
Flt Permitted				0.998	0.957	
Satd. Flow (perm)	1731	0	0	1962	1807	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	181.0			280.7	206.8	
Travel Time (s)	16.3			25.3	18.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	8%	12%	50%	0%	5%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	30	19	2	56	66	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	49	0	0	58	73	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	14.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 3: Cloverridge Avenue & Crimson King Way

Future Background (AM Peak Hour)

06-19-2023

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	27	17	2	51	60	6
Future Volume (vph)	27	17	2	51	60	6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	30	19	2	56	66	7
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	49	58	73			
Volume Left (vph)	0	2	66			
Volume Right (vph)	19	0	7			
Hadj (s)	-0.07	0.04	0.20			
Departure Headway (s)	4.1	4.2	4.3			
Degree Utilization, x	0.06	0.07	0.09			
Capacity (veh/h)	864	846	803			
Control Delay (s)	7.3	7.5	7.7			
Approach Delay (s)	7.3	7.5	7.7			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.5			
Level of Service			A			
Intersection Capacity Utilization			14.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

Future Background (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	87	8	38	157	367	27	407	27	453	1305	459
Future Volume (vph)	150	87	8	38	157	367	27	407	27	453	1305	459
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.987				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1792	3202	0	1759	1869	1574	1827	3654	1478	1810	3725	1667
Flt Permitted	0.443			0.686			0.117			0.425		
Satd. Flow (perm)	836	3202	0	1270	1869	1574	225	3654	1478	810	3725	1667
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				305			141			499
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			1205.7			393.8	
Travel Time (s)		5.9			6.3			62.0			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	14%	50%	8%	7%	8%	4%	4%	15%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	163	95	9	41	171	399	29	442	29	492	1418	499
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	104	0	41	171	399	29	442	29	492	1418	499
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Future Background (AM Peak Hour) 9:22 am 04-17-2023

Synchro 11 Report
Page 9

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

Future Background (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	4.0	4.0	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effect Green (s)	40.5	26.5		28.8	15.9	45.0	60.8	50.2	50.2	77.8	67.8	67.8
Actuated g/C Ratio	0.32	0.21		0.23	0.13	0.36	0.48	0.40	0.40	0.62	0.54	0.54
v/c Ratio	0.42	0.15		0.13	0.73	0.53	0.15	0.30	0.04	0.75	0.71	0.44
Control Delay	35.0	39.6		30.5	72.1	10.6	14.4	27.9	0.1	23.2	26.8	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6		30.5	72.1	10.6	14.4	27.9	0.1	23.2	26.8	3.1
LOS	C	D		C	E	B	B	C	A	C	C	A
Approach Delay		36.8			29.1			25.5			21.1	
Approach LOS		D			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 126.3

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 24.1

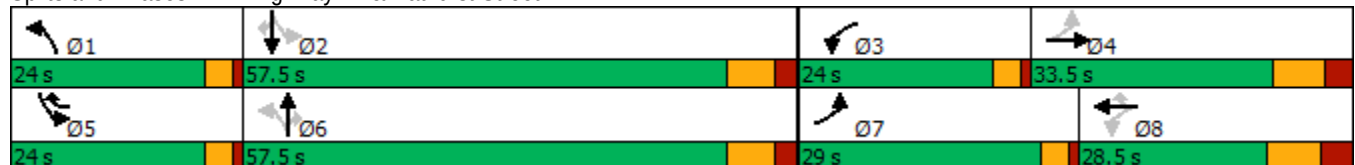
Intersection LOS: C

Intersection Capacity Utilization 77.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues

Future Background (AM Peak Hour)

4: Highway 11 & Bathurst Street

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	104	41	171	399	29	442	29	492	1418	499
v/c Ratio	0.42	0.15	0.13	0.73	0.53	0.15	0.30	0.04	0.75	0.71	0.44
Control Delay	35.0	39.6	30.5	72.1	10.6	14.4	27.9	0.1	23.2	26.8	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6	30.5	72.1	10.6	14.4	27.9	0.1	23.2	26.8	3.1
Queue Length 50th (m)	31.7	11.3	7.4	43.5	16.7	2.8	41.5	0.0	64.8	154.3	0.0
Queue Length 95th (m)	49.9	19.8	16.0	72.2	49.2	8.3	61.6	0.0	#109.2	212.6	19.4
Internal Link Dist (m)		73.6		81.0			1181.7			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	458	700	469	289	756	386	1451	672	657	2000	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.15	0.09	0.59	0.53	0.08	0.30	0.04	0.75	0.71	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

Future Background (PM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	57	24	1401	78	57	823
Future Volume (vph)	57	24	1401	78	57	823
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1845	1700	3725	1700	1863	3725
Flt Permitted	0.950				0.142	
Satd. Flow (perm)	1845	1700	3725	1700	278	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		25		80		
Link Speed (k/h)	40		70			70
Link Distance (m)	181.0		972.2			1205.7
Travel Time (s)	16.3		50.0			62.0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	0%	2%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	59	25	1444	80	59	848
Shared Lane Traffic (%)						
Lane Group Flow (vph)	59	25	1444	80	59	848
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

Future Background (PM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	72.0	72.0	12.0	84.0
Total Split (%)	30.0%	30.0%	60.0%	60.0%	10.0%	70.0%
Maximum Green (s)	29.0	29.0	64.5	64.5	8.0	76.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	10.7	10.7	90.9	90.9	101.7	99.7
Actuated g/C Ratio	0.09	0.09	0.76	0.76	0.85	0.83
v/c Ratio	0.36	0.14	0.51	0.06	0.18	0.27
Control Delay	57.7	19.7	4.8	0.4	3.3	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.7	19.7	4.8	0.4	3.3	3.3
LOS	E	B	A	A	A	A
Approach Delay	46.4		4.6			3.3
Approach LOS	D		A			A

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 5.5

Intersection LOS: A

Intersection Capacity Utilization 65.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

Future Background (PM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	59	25	1444	80	59	848
v/c Ratio	0.36	0.14	0.51	0.06	0.18	0.27
Control Delay	57.7	19.7	4.8	0.4	3.3	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.7	19.7	4.8	0.4	3.3	3.3
Queue Length 50th (m)	14.1	0.0	149.6	0.9	2.0	23.8
Queue Length 95th (m)	27.6	8.8	2.3	m0.0	4.8	33.8
Internal Link Dist (m)	157.0		948.2			1181.7
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	445	429	2823	1307	341	3096
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.51	0.06	0.17	0.27
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Lanes, Volumes, Timings

Future Background (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

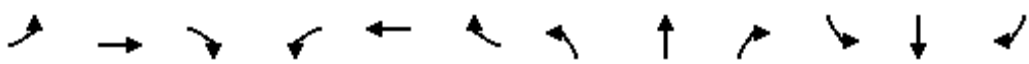
												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	3	5	236	2	72	10	1435	271	72	790	1
Future Volume (vph)	2	3	5	236	2	72	10	1435	271	72	790	1
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.932				0.850			0.850			0.850
Flt Protected		0.990			0.953		0.950			0.950		
Satd. Flow (prot)	0	1845	0	0	1906	1466	1900	3762	1667	1900	3725	1700
Flt Permitted		0.941			0.721		0.339			0.085		
Satd. Flow (perm)	0	1754	0	0	1442	1466	678	3762	1667	170	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				77			139			41
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	16%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	2	3	5	248	2	76	11	1511	285	76	832	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	250	76	11	1511	285	76	832	1
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings

Future Background (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	66.0	66.0	66.0	12.0	78.0	78.0
Total Split (%)	35.0%	35.0%		35.0%	35.0%	35.0%	55.0%	55.0%	55.0%	10.0%	65.0%	65.0%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	58.5	58.5	58.5	8.0	70.5	70.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effct Green (s)		25.9			25.9	25.9	69.9	69.9	69.9	82.6	79.1	79.1
Actuated g/C Ratio		0.22			0.22	0.22	0.58	0.58	0.58	0.69	0.66	0.66
v/c Ratio		0.03			0.80	0.20	0.03	0.69	0.28	0.34	0.34	0.00
Control Delay		24.3			63.2	8.4	14.9	21.6	8.4	9.7	9.1	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		24.3			63.2	8.4	14.9	21.6	8.4	9.7	9.1	0.0
LOS		C			E	A	B	C	A	A	A	A
Approach Delay		24.3			50.4			19.5			9.1	
Approach LOS		C			D			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 19.7

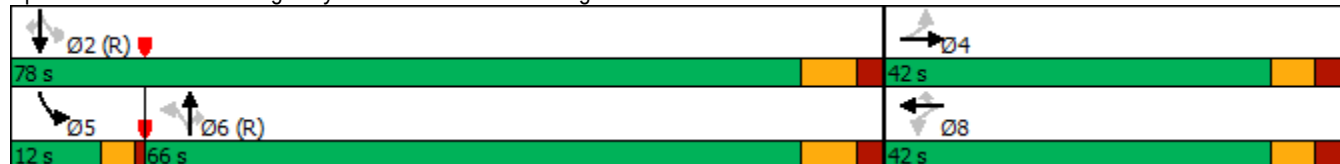
Intersection LOS: B

Intersection Capacity Utilization 97.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

Future Background (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	250	76	11	1511	285	76	832	1
v/c Ratio	0.03	0.80	0.20	0.03	0.69	0.28	0.34	0.34	0.00
Control Delay	24.3	63.2	8.4	14.9	21.6	8.4	9.7	9.1	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	63.2	8.4	14.9	21.6	8.4	9.7	9.1	0.0
Queue Length 50th (m)	1.0	59.1	0.0	1.2	136.1	16.4	5.8	50.0	0.0
Queue Length 95th (m)	5.2	82.6	11.6	4.8	196.0	38.6	15.1	74.1	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	507	414	476	394	2191	1029	232	2454	1134
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.60	0.16	0.03	0.69	0.28	0.33	0.34	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
3: Cloverridge Avenue & Crimson King Way

Future Background (PM Peak Hour)

06-19-2023

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	92	43	4	41	40	1
Future Volume (vph)	92	43	4	41	40	1
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.957				0.997	
Flt Protected				0.995	0.953	
Satd. Flow (prot)	1914	0	0	1990	1900	0
Flt Permitted				0.995	0.953	
Satd. Flow (perm)	1914	0	0	1990	1900	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	181.0			280.7	206.8	
Travel Time (s)	16.3			25.3	18.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	112	52	5	50	49	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	164	0	0	55	50	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	
Intersection Summary						
Area Type: Other						
Control Type: Unsignalized						
Intersection Capacity Utilization 17.1% ICU Level of Service A						
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis 3: Cloverridge Avenue & Crimson King Way

Future Background (PM Peak Hour)

06-19-2023

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	92	43	4	41	40	1
Future Volume (vph)	92	43	4	41	40	1
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	112	52	5	50	49	1
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	164	55	50			
Volume Left (vph)	0	5	49			
Volume Right (vph)	52	0	1			
Hadj (s)	-0.19	0.02	0.18			
Departure Headway (s)	3.9	4.2	4.5			
Degree Utilization, x	0.18	0.06	0.06			
Capacity (veh/h)	908	839	751			
Control Delay (s)	7.7	7.5	7.8			
Approach Delay (s)	7.7	7.5	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.7			
Level of Service			A			
Intersection Capacity Utilization			17.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

Future Background (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	442	170	14	30	82	708	22	1375	48	340	807	232
Future Volume (vph)	442	170	14	30	82	708	22	1375	48	340	807	232
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							1.00					0.97
Fr't		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1845	3686	0	1900	1818	1635	1900	3689	1504	1845	3689	1667
Flt Permitted	0.548			0.631			0.336			0.072		
Satd. Flow (perm)	1064	3686	0	1262	1818	1635	671	3689	1504	140	3689	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				*365			141			242
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			1205.7			393.8	
Travel Time (s)		5.9			6.3			62.0			20.3	
Confl. Peds. (#/hr)							5					5
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	1.00	0.96	0.96	0.96	1.00	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	0%	0%	10%	4%	0%	3%	13%	3%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	460	177	15	31	85	708	23	1432	50	340	841	242
Shared Lane Traffic (%)												
Lane Group Flow (vph)	460	192	0	31	85	708	23	1432	50	340	841	242
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

Future Background (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	-2.0	0.0	0.0	0.0	-1.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	2.0	4.0	7.5	7.5	3.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			5	5		5	5
Act Effct Green (s)	46.1	34.6		24.5	12.1	43.1	60.5	50.0	50.0	78.5	67.5	67.5
Actuated g/C Ratio	0.35	0.26		0.19	0.09	0.33	0.46	0.38	0.38	0.60	0.51	0.51
v/c Ratio	0.88	0.20		0.11	0.51	0.91	0.06	1.02	0.08	0.96	0.44	0.26
Control Delay	57.4	38.4		30.8	67.8	36.7	13.4	70.1	0.2	76.4	22.2	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4		30.8	67.8	36.7	13.4	70.1	0.2	76.4	22.2	3.1
LOS	E	D		C	E	D	B	E	A	E	C	A
Approach Delay		51.8			39.7			66.9			31.9	
Approach LOS		D			D			E			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 131.6

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 48.3

Intersection LOS: D

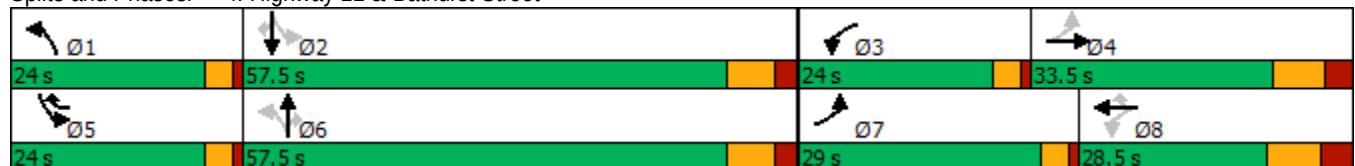
Intersection Capacity Utilization 113.9%

ICU Level of Service H

Analysis Period (min) 15

* User Entered Value

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues

Future Background (PM Peak Hour)

4: Highway 11 & Bathurst Street

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	460	192	31	85	708	23	1432	50	340	841	242
v/c Ratio	0.88	0.20	0.11	0.51	0.91	0.06	1.02	0.08	0.96	0.44	0.26
Control Delay	57.4	38.4	30.8	67.8	36.7	13.4	70.1	0.2	76.4	22.2	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4	30.8	67.8	36.7	13.4	70.1	0.2	76.4	22.2	3.1
Queue Length 50th (m)	108.3	21.7	5.6	22.5	102.5	2.5	~216.0	0.0	74.3	78.9	0.0
Queue Length 95th (m)	#165.6	33.1	12.8	40.4	#184.8	6.9	#276.1	0.0	#142.8	103.6	14.9
Internal Link Dist (m)		73.6		81.0			1181.7			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	521	974	452	269	781	561	1401	658	355	1891	946
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.20	0.07	0.32	0.91	0.04	1.02	0.08	0.96	0.44	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

APPENDIX

G WARRANT ANALYSES



APPENDIX

G-1 LEFT-TURN WARRANT

Southbound-Left Exclusive Lane Warrant

2038 Future Total PM

Highway 11 and Phase 1 Site Access

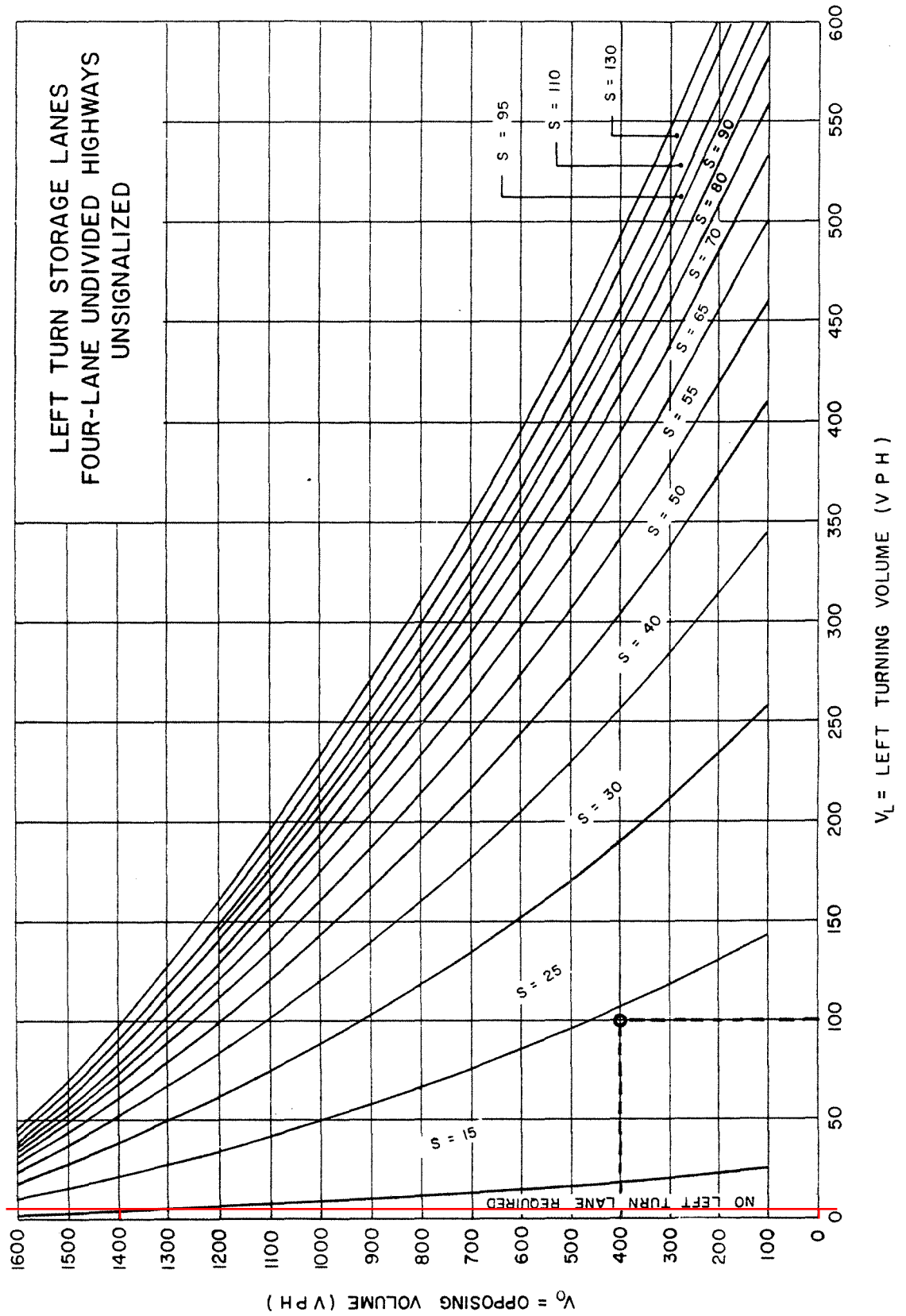


Figure EB-1

APPENDIX

G-2 SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

FUTURE WEEKDAY PEAK HOUR

Analyst	RCR	Jurisdiction	Town of East Gwillimbury
Agency or Company	WSP Canada Inc.	Date	April 13, 2023
Analysis Period	2038 Horizon Year	East-West Street	Phase 1 Site Access
		North-South Street	Highway 11
Flow Conditions	Free flow (rural) ▼	Major Street	North-South ▼
'T' Intersection	Yes ▼	Approach lanes per direction	2 ▼ Major Street
Existing Intersection	No ▼	Approach lanes per direction	1 ▼ Minor Street
Additional Comments			

TRAFFIC & PEDESTRIAN VOLUMES

Hour Ending	Main Road Approaches							Minor Road Approaches							Pedestrian Crossing Major Road	Pedestrian Crossing Minor Road
	Northbound			Southbound			Total	Eastbound			Westbound			Total		
	LT	TH	RT	LT	TH	RT		LT	TH	RT	LT	TH	RT			
AM Peak Hour	0	493	6	10	1461	0	1970	0	0	0	4	0	4	8	0	0
PM Peak Hour	0	1425	9	5	882	0	2321	0	0	0	10	0	11	21	0	0
Total	0	1918	15	15		0	1948	0	0	0	14	0	15	29	0	0

Parameter	AM	PM	Average Hourly Volume (AHV)
Vehicle volume, all approaches	1978	2342	1080
Vehicle volume, along minor street	8	21	7
Vehicle volume, along major street	1970	2321	1073
Combined vehicle and pedestrian volume crossing from minor streets	4	10	4

NOTES

1. The traffic control signal justification was done as per criteria defined in Ontario Traffic Manual, Book: 12 (March 2012) Justification 7 - Projected Volumes.

2. Traffic crossing MAJOR street defined as:

- a. Left turns from both minor street approaches
- b. The heaviest through volume from the minor street
- c. 50% of the heavier left turn movement from the major street when both of the following are met:
 1. the left turn volume > 120
 2. the left turn volume + opposing volume > 720
- d. Pedestrians crossing the major street

3. Justifications 1 and 2 are required to be met to 120% in the case of an existing intersection and 150% in the case of a new intersection

4. For 'T' intersection, the threshold values to be increased by 50%

	AM	PM
a.	4	10
b.	0	0
c.	0	0
1.	No	No
2.	No	Yes
d.	0	0

TRAFFIC SIGNAL WARRANTS - JUSTIFICATION 7 (PROJECTED VOLUMES)

GENERAL INFORMATION

FUTURE WEEKDAY PEAK HOUR

Analyst	RCR	Jurisdiction	Town of East Gwillimbury
Agency or Company	WSP Canada Inc.	Date	April 13, 2023
Analysis Period	2038 Horizon Year	East-West Street	Phase 1 Site Access
		North-South Street	Highway 11
Flow Conditions	Free flow (rural)	Major Street	North-South
'T' Intersection	Yes	Approach lanes per direction	2 Major Street
Existing Intersection	No	Approach lanes per direction	1 Minor Street
Additional Comments			

Justification 1: Minimum Vehicle Volumes

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, all approaches			600		1080	120%	120%	No
B. Vehicle volume, along minor streets								
			120		7	4%	4%	No

Justification 2: Delay To Cross Traffic

JUSTIFIED

No

Justification	Guidance Approach Lanes				Compliance			150% Satisfied
	1 Lanes		2 or More Lanes ¹		Sectional		Entire %	
Flow Conditions	Free Flow	Restricted Flow	Free Flow	Restricted Flow	Average Hourly Volumes	%		
A. Vehicle volume, major street			600		1073	119%	119%	No
B. Combined vehicle and pedestrian volume crossing artery from minor streets			50		4	5%	5%	No

CONCLUSION

The results of the calculations show that justifications are **not met**.

Therefore traffic control signal is **not justified at this intersection for the horizon year 2038 Horizon Year**

Note: 1. The minimum volumes were corrected from 120 vehicles and 170 vehicles in OTM, March 2012 to 50 vehicles and 70 vehicles to match Justification 2B.

APPENDIX

H FUTURE TOTAL TRAFFIC CONDITIONS

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2028 Future Total (AM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	88	23	475	29	15	1443
Future Volume (vph)	88	23	475	29	15	1443
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1863	1545	3585	1700	1473	3725
Flt Permitted	0.950				0.435	
Satd. Flow (perm)	1863	1545	3585	1700	674	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		26		33		
Link Speed (k/h)	40		70			70
Link Distance (m)	181.0		972.2			424.8
Travel Time (s)	16.3		50.0			21.8
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	10%	6%	0%	29%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	99	26	534	33	17	1621
Shared Lane Traffic (%)						
Lane Group Flow (vph)	99	26	534	33	17	1621
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2028 Future Total (AM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	82.0	82.0	12.0	94.0
Total Split (%)	27.7%	27.7%	63.1%	63.1%	9.2%	72.3%
Maximum Green (s)	29.0	29.0	74.5	74.5	8.0	86.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	12.7	12.7	98.4	98.4	106.3	102.8
Actuated g/C Ratio	0.10	0.10	0.76	0.76	0.82	0.79
v/c Ratio	0.54	0.15	0.20	0.03	0.03	0.55
Control Delay	66.5	19.5	2.0	0.1	2.8	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	19.5	2.0	0.1	2.8	5.7
LOS	E	B	A	A	A	A
Approach Delay	56.8		1.9			5.7
Approach LOS	E		A			A

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 7.5

Intersection LOS: A

Intersection Capacity Utilization 58.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

2028 Future Total (AM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	99	26	534	33	17	1621
v/c Ratio	0.54	0.15	0.20	0.03	0.03	0.55
Control Delay	66.5	19.5	2.0	0.1	2.8	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	66.5	19.5	2.0	0.1	2.8	5.7
Queue Length 50th (m)	26.0	0.0	4.6	0.0	0.7	69.8
Queue Length 95th (m)	43.1	8.8	8.3	0.3	m2.0	69.8
Internal Link Dist (m)	157.0		948.2			400.8
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	415	364	2712	1294	600	2944
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.07	0.20	0.03	0.03	0.55
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Lanes, Volumes, Timings

2028 Future Total (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	9	281	0	47	4	510	141	47	1411	3
Future Volume (vph)	1	0	9	281	0	47	4	510	141	47	1411	3
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.877				0.850			0.850			0.850
Flt Protected		0.995			0.950		0.950			0.950		
Satd. Flow (prot)	0	1745	0	0	1881	1700	1900	3585	1589	1900	3725	1700
Flt Permitted		0.974			0.750		0.111			0.393		
Satd. Flow (perm)	0	1708	0	0	1485	1700	222	3585	1589	786	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		71				71			158			38
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	1%	2%	0%	0%	6%	7%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	1	0	10	316	0	53	4	573	158	53	1585	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	0	0	316	53	4	573	158	53	1585	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings

2028 Future Total (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	76.0	76.0	76.0	12.0	88.0	88.0
Total Split (%)	32.3%	32.3%		32.3%	32.3%	32.3%	58.5%	58.5%	58.5%	9.2%	67.7%	67.7%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	68.5	68.5	68.5	8.0	80.5	80.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effect Green (s)		31.1			31.1	31.1	74.9	74.9	74.9	87.4	83.9	83.9
Actuated g/C Ratio		0.24			0.24	0.24	0.58	0.58	0.58	0.67	0.65	0.65
v/c Ratio		0.02			0.89	0.12	0.03	0.28	0.16	0.09	0.66	0.00
Control Delay		0.1			74.4	5.0	15.8	15.5	2.7	11.4	23.6	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.1			74.4	5.0	15.8	15.5	2.7	11.4	23.6	0.0
LOS		A			E	A	B	B	A	B	C	A
Approach Delay		0.1			64.4			12.7			23.1	
Approach LOS		A			E			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 92 (71%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 25.8

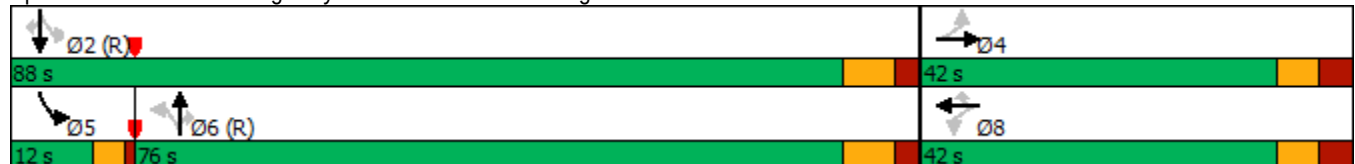
Intersection LOS: C

Intersection Capacity Utilization 100.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

2028 Future Total (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	316	53	4	573	158	53	1585	3
v/c Ratio	0.02	0.89	0.12	0.03	0.28	0.16	0.09	0.66	0.00
Control Delay	0.1	74.4	5.0	15.8	15.5	2.7	11.4	23.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.1	74.4	5.0	15.8	15.5	2.7	11.4	23.6	0.0
Queue Length 50th (m)	0.0	80.7	0.0	0.5	42.7	0.0	5.6	167.4	0.0
Queue Length 95th (m)	0.0	#123.8	6.5	2.6	55.8	10.4	m13.6	229.1	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	505	394	503	127	2064	982	597	2404	1111
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.80	0.11	0.03	0.28	0.16	0.09	0.66	0.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
3: Cloverridge Avenue & Crimson King Way

2028 Future Total (AM Peak Hour)

06-19-2023

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↰			↱	↘↙	
Traffic Volume (vph)	27	17	2	51	60	6
Future Volume (vph)	27	17	2	51	60	6
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.948				0.987	
Flt Protected				0.998	0.957	
Satd. Flow (prot)	1731	0	0	1962	1807	0
Flt Permitted				0.998	0.957	
Satd. Flow (perm)	1731	0	0	1962	1807	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	181.0			280.7	206.8	
Travel Time (s)	16.3			25.3	18.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	8%	12%	50%	0%	5%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	30	19	2	56	66	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	49	0	0	58	73	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	14.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 3: Cloverridge Avenue & Crimson King Way

2028 Future Total (AM Peak Hour)

06-19-2023

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	27	17	2	51	60	6
Future Volume (vph)	27	17	2	51	60	6
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	30	19	2	56	66	7
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	49	58	73			
Volume Left (vph)	0	2	66			
Volume Right (vph)	19	0	7			
Hadj (s)	-0.07	0.04	0.20			
Departure Headway (s)	4.1	4.2	4.3			
Degree Utilization, x	0.06	0.07	0.09			
Capacity (veh/h)	864	846	803			
Control Delay (s)	7.3	7.5	7.7			
Approach Delay (s)	7.3	7.5	7.7			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.5			
Level of Service			A			
Intersection Capacity Utilization			14.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2028 Future Total (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	87	8	38	157	367	27	408	27	453	1307	459
Future Volume (vph)	150	87	8	38	157	367	27	408	27	453	1307	459
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.987				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1792	3202	0	1759	1869	1574	1827	3654	1478	1810	3725	1667
Flt Permitted	0.443			0.686			0.116			0.425		
Satd. Flow (perm)	836	3202	0	1270	1869	1574	223	3654	1478	810	3725	1667
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				304			141			499
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			780.9			393.8	
Travel Time (s)		5.9			6.3			40.2			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	14%	50%	8%	7%	8%	4%	4%	15%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	163	95	9	41	171	399	29	443	29	492	1421	499
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	104	0	41	171	399	29	443	29	492	1421	499
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2028 Future Total (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	4.0	4.0	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effect Green (s)	40.5	26.5		28.8	15.9	45.0	60.8	50.2	50.2	77.8	67.8	67.8
Actuated g/C Ratio	0.32	0.21		0.23	0.13	0.36	0.48	0.40	0.40	0.62	0.54	0.54
v/c Ratio	0.42	0.15		0.13	0.73	0.53	0.15	0.31	0.04	0.75	0.71	0.44
Control Delay	35.0	39.6		30.5	72.1	10.7	14.4	27.9	0.1	23.2	26.8	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6		30.5	72.1	10.7	14.4	27.9	0.1	23.2	26.8	3.1
LOS	C	D		C	E	B	B	C	A	C	C	A
Approach Delay		36.8			29.2			25.5			21.2	
Approach LOS		D			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 126.3

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 24.1

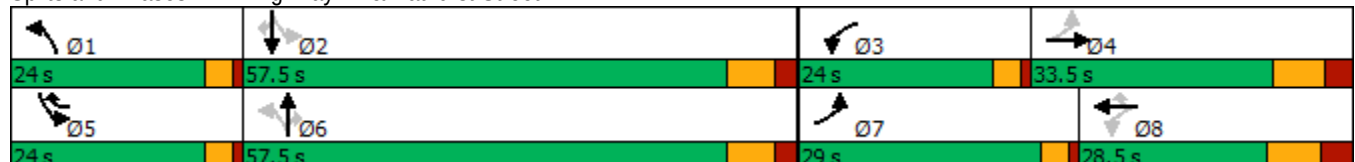
Intersection LOS: C

Intersection Capacity Utilization 77.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues

2028 Future Total (AM Peak Hour)

4: Highway 11 & Bathurst Street

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	104	41	171	399	29	443	29	492	1421	499
v/c Ratio	0.42	0.15	0.13	0.73	0.53	0.15	0.31	0.04	0.75	0.71	0.44
Control Delay	35.0	39.6	30.5	72.1	10.7	14.4	27.9	0.1	23.2	26.8	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6	30.5	72.1	10.7	14.4	27.9	0.1	23.2	26.8	3.1
Queue Length 50th (m)	31.7	11.3	7.4	43.5	16.9	2.8	41.6	0.0	64.8	155.0	0.0
Queue Length 95th (m)	49.9	19.8	16.0	72.2	49.5	8.3	61.7	0.0	#109.2	213.4	19.4
Internal Link Dist (m)		73.6		81.0			756.9			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	458	700	469	289	756	385	1451	672	657	2000	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.15	0.09	0.59	0.53	0.08	0.31	0.04	0.75	0.71	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2028 Future Total (AM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	3	1	493	5	2	1455
Future Volume (vph)	3	1	493	5	2	1455
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		30.0	15.0	
Storage Lanes	1	0		1	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt	0.966			0.850		
Flt Protected	0.964				0.950	
Satd. Flow (prot)	1826	0	3725	1667	1863	3725
Flt Permitted	0.964				0.453	
Satd. Flow (perm)	1826	0	3725	1667	888	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	1			5		
Link Speed (k/h)	50		50			50
Link Distance (m)	139.7		424.8			780.9
Travel Time (s)	10.1		30.6			56.2
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	3	1	536	5	2	1582
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	536	5	2	1582
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	100	100		100	100	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (m)	2.0		10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		6			2
Permitted Phases				6	2	
Detector Phase	8		6	6	2	2
Switch Phase						

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2028 Future Total (AM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0		40.0	40.0	40.0	40.0
Minimum Split (s)	35.0		47.5	47.5	47.5	47.5
Total Split (s)	36.0		94.0	94.0	94.0	94.0
Total Split (%)	27.7%		72.3%	72.3%	72.3%	72.3%
Maximum Green (s)	29.0		86.5	86.5	86.5	86.5
Yellow Time (s)	4.0		5.0	5.0	5.0	5.0
All-Red Time (s)	3.0		2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0		7.5	7.5	7.5	7.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0		3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0		0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0		0.0	0.0	0.0	0.0
Recall Mode	None		C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	21.0		14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effect Green (s)	10.0		125.1	125.1	125.1	125.1
Actuated g/C Ratio	0.08		0.96	0.96	0.96	0.96
v/c Ratio	0.03		0.15	0.00	0.00	0.44
Control Delay	50.8		0.7	1.0	1.5	1.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	50.8		0.7	1.0	1.5	1.5
LOS	D		A	A	A	A
Approach Delay	50.8		0.7			1.5
Approach LOS	D		A			A

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 1.4

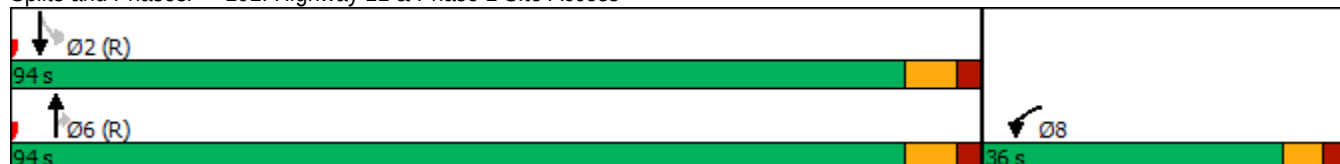
Intersection LOS: A

Intersection Capacity Utilization 79.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 101: Highway 11 & Phase 1 Site Access



Queues

2028 Future Total (AM Peak Hour)

101: Highway 11 & Phase 1 Site Access

06-19-2023

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	4	536	5	2	1582
v/c Ratio	0.03	0.15	0.00	0.00	0.44
Control Delay	50.8	0.7	1.0	1.5	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	0.7	1.0	1.5	1.5
Queue Length 50th (m)	0.8	0.0	0.0	0.0	0.0
Queue Length 95th (m)	4.6	13.7	0.5	0.6	70.2
Internal Link Dist (m)	115.7	400.8			756.9
Turn Bay Length (m)			30.0	15.0	
Base Capacity (vph)	408	3584	1604	854	3584
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.01	0.15	0.00	0.00	0.44
Intersection Summary					

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2028 Future Total (PM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	57	24	1407	78	57	830
Future Volume (vph)	57	24	1407	78	57	830
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1845	1700	3725	1700	1863	3725
Flt Permitted	0.950				0.141	
Satd. Flow (perm)	1845	1700	3725	1700	276	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		25		80		
Link Speed (k/h)	40		70			70
Link Distance (m)	181.0		972.2			424.8
Travel Time (s)	16.3		50.0			21.8
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	0%	2%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	59	25	1451	80	59	856
Shared Lane Traffic (%)						
Lane Group Flow (vph)	59	25	1451	80	59	856
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2028 Future Total (PM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	72.0	72.0	12.0	84.0
Total Split (%)	30.0%	30.0%	60.0%	60.0%	10.0%	70.0%
Maximum Green (s)	29.0	29.0	64.5	64.5	8.0	76.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	10.7	10.7	90.9	90.9	101.7	99.7
Actuated g/C Ratio	0.09	0.09	0.76	0.76	0.85	0.83
v/c Ratio	0.36	0.14	0.51	0.06	0.18	0.28
Control Delay	57.7	19.7	4.8	0.4	3.5	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.7	19.7	4.8	0.4	3.5	3.3
LOS	E	B	A	A	A	A
Approach Delay	46.4		4.6			3.3
Approach LOS	D		A			A

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 5.5

Intersection LOS: A

Intersection Capacity Utilization 65.4%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

2028 Future Total (PM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	59	25	1451	80	59	856
v/c Ratio	0.36	0.14	0.51	0.06	0.18	0.28
Control Delay	57.7	19.7	4.8	0.4	3.5	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.7	19.7	4.8	0.4	3.5	3.3
Queue Length 50th (m)	14.1	0.0	150.9	0.9	2.0	24.1
Queue Length 95th (m)	27.6	8.8	2.3	m0.0	4.8	34.2
Internal Link Dist (m)	157.0		948.2			400.8
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	445	429	2823	1307	339	3096
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.06	0.51	0.06	0.17	0.28
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Lanes, Volumes, Timings

2028 Future Total (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	3	5	236	2	72	10	1441	271	72	797	1
Future Volume (vph)	2	3	5	236	2	72	10	1441	271	72	797	1
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.932				0.850			0.850			0.850
Flt Protected		0.990			0.953		0.950			0.950		
Satd. Flow (prot)	0	1845	0	0	1906	1466	1900	3762	1667	1900	3725	1700
Flt Permitted		0.941			0.721		0.336			0.084		
Satd. Flow (perm)	0	1754	0	0	1442	1466	672	3762	1667	168	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				77			139			41
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	16%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	2	3	5	248	2	76	11	1517	285	76	839	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	250	76	11	1517	285	76	839	1
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings

2028 Future Total (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	66.0	66.0	66.0	12.0	78.0	78.0
Total Split (%)	35.0%	35.0%		35.0%	35.0%	35.0%	55.0%	55.0%	55.0%	10.0%	65.0%	65.0%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	58.5	58.5	58.5	8.0	70.5	70.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effct Green (s)		25.9			25.9	25.9	69.9	69.9	69.9	82.6	79.1	79.1
Actuated g/C Ratio		0.22			0.22	0.22	0.58	0.58	0.58	0.69	0.66	0.66
v/c Ratio		0.03			0.80	0.20	0.03	0.69	0.28	0.34	0.34	0.00
Control Delay		24.3			63.2	8.4	14.9	21.7	8.4	12.4	8.5	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		24.3			63.2	8.4	14.9	21.7	8.4	12.4	8.5	0.0
LOS		C			E	A	B	C	A	B	A	A
Approach Delay		24.3			50.4			19.5			8.8	
Approach LOS		C			D			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 19.6

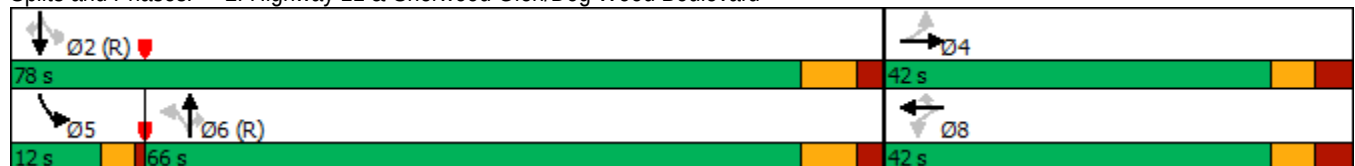
Intersection LOS: B

Intersection Capacity Utilization 97.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

2028 Future Total (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	250	76	11	1517	285	76	839	1
v/c Ratio	0.03	0.80	0.20	0.03	0.69	0.28	0.34	0.34	0.00
Control Delay	24.3	63.2	8.4	14.9	21.7	8.4	12.4	8.5	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	63.2	8.4	14.9	21.7	8.4	12.4	8.5	0.0
Queue Length 50th (m)	1.0	59.1	0.0	1.2	137.2	16.4	5.8	50.5	0.0
Queue Length 95th (m)	5.2	82.6	11.6	4.8	197.3	38.6	15.2	52.2	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	507	414	476	391	2191	1029	231	2454	1134
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.60	0.16	0.03	0.69	0.28	0.33	0.34	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
3: Cloverridge Avenue & Crimson King Way

2028 Future Total (PM Peak Hour)

06-19-2023

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	92	43	4	41	40	1
Future Volume (vph)	92	43	4	41	40	1
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	0.0		0.0	0.0
Storage Lanes		0	0		1	0
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.957				0.997	
Flt Protected				0.995	0.953	
Satd. Flow (prot)	1914	0	0	1990	1900	0
Flt Permitted				0.995	0.953	
Satd. Flow (perm)	1914	0	0	1990	1900	0
Link Speed (k/h)	40			40	40	
Link Distance (m)	181.0			280.7	206.8	
Travel Time (s)	16.3			25.3	18.6	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	112	52	5	50	49	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	164	0	0	55	50	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)		15	25		25	15
Sign Control	Stop			Stop	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	17.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 3: Cloverrick Avenue & Crimson King Way

2028 Future Total (PM Peak Hour)

06-19-2023

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	92	43	4	41	40	1
Future Volume (vph)	92	43	4	41	40	1
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	112	52	5	50	49	1
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total (vph)	164	55	50			
Volume Left (vph)	0	5	49			
Volume Right (vph)	52	0	1			
Hadj (s)	-0.19	0.02	0.18			
Departure Headway (s)	3.9	4.2	4.5			
Degree Utilization, x	0.18	0.06	0.06			
Capacity (veh/h)	908	839	751			
Control Delay (s)	7.7	7.5	7.8			
Approach Delay (s)	7.7	7.5	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.7			
Level of Service			A			
Intersection Capacity Utilization			17.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2028 Future Total (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	442	170	14	30	82	708	22	1378	48	340	809	232
Future Volume (vph)	442	170	14	30	82	708	22	1378	48	340	809	232
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							1.00					0.97
Fr't		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1845	3686	0	1900	1818	1635	1900	3689	1504	1845	3689	1667
Flt Permitted	0.548			0.631			0.335			0.072		
Satd. Flow (perm)	1064	3686	0	1262	1818	1635	669	3689	1504	140	3689	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				*365			141			242
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			780.9			393.8	
Travel Time (s)		5.9			6.3			40.2			20.3	
Confl. Peds. (#/hr)							5					5
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	1.00	0.96	0.96	0.96	1.00	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	0%	0%	10%	4%	0%	3%	13%	3%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	460	177	15	31	85	708	23	1435	50	340	843	242
Shared Lane Traffic (%)												
Lane Group Flow (vph)	460	192	0	31	85	708	23	1435	50	340	843	242
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2028 Future Total (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	-2.0	0.0	0.0	0.0	-1.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	2.0	4.0	7.5	7.5	3.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			5	5		5	5
Act Effct Green (s)	46.1	34.6		24.5	12.1	43.1	60.5	50.0	50.0	78.5	67.5	67.5
Actuated g/C Ratio	0.35	0.26		0.19	0.09	0.33	0.46	0.38	0.38	0.60	0.51	0.51
v/c Ratio	0.88	0.20		0.11	0.51	0.91	0.06	1.02	0.08	0.96	0.45	0.26
Control Delay	57.4	38.4		30.8	67.8	36.7	13.4	70.6	0.2	76.4	22.3	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4		30.8	67.8	36.7	13.4	70.6	0.2	76.4	22.3	3.1
LOS	E	D		C	E	D	B	E	A	E	C	A
Approach Delay		51.8			39.7			67.4			31.9	
Approach LOS		D			D			E			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 131.6

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 48.5

Intersection LOS: D

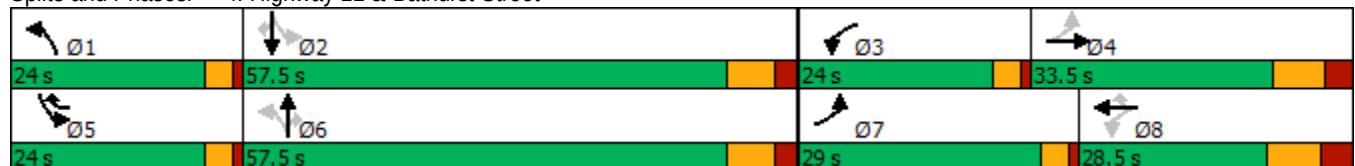
Intersection Capacity Utilization 114.0%

ICU Level of Service H

Analysis Period (min) 15

* User Entered Value

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues

2028 Future Total (PM Peak Hour)

4: Highway 11 & Bathurst Street

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	460	192	31	85	708	23	1435	50	340	843	242
v/c Ratio	0.88	0.20	0.11	0.51	0.91	0.06	1.02	0.08	0.96	0.45	0.26
Control Delay	57.4	38.4	30.8	67.8	36.7	13.4	70.6	0.2	76.4	22.3	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4	30.8	67.8	36.7	13.4	70.6	0.2	76.4	22.3	3.1
Queue Length 50th (m)	108.3	21.7	5.6	22.5	102.5	2.5	~216.8	0.0	74.3	79.2	0.0
Queue Length 95th (m)	#165.6	33.1	12.8	40.4	#184.8	6.9	#276.7	0.0	#142.8	104.0	14.9
Internal Link Dist (m)		73.6		81.0			756.9			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	521	974	452	269	781	560	1401	658	355	1891	946
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.20	0.07	0.32	0.91	0.04	1.02	0.08	0.96	0.45	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2028 Future Total (PM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	7	3	1425	6	2	880
Future Volume (vph)	7	3	1425	6	2	880
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		30.0	15.0	
Storage Lanes	1	0		1	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt	0.963			0.850		
Flt Protected	0.965				0.950	
Satd. Flow (prot)	1822	0	3725	1667	1863	3725
Flt Permitted	0.965				0.155	
Satd. Flow (perm)	1822	0	3725	1667	304	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	3			3		
Link Speed (k/h)	30		70			70
Link Distance (m)	139.7		424.8			780.9
Travel Time (s)	16.8		21.8			40.2
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	8	3	1549	7	2	957
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	0	1549	7	2	957
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (m)	2.0		10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		6			2
Permitted Phases				6	2	
Detector Phase	8		6	6	2	2
Switch Phase						

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2028 Future Total (PM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0		40.0	40.0	40.0	40.0
Minimum Split (s)	35.0		47.5	47.5	47.5	47.5
Total Split (s)	36.0		84.0	84.0	84.0	84.0
Total Split (%)	30.0%		70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	29.0		76.5	76.5	76.5	76.5
Yellow Time (s)	4.0		5.0	5.0	5.0	5.0
All-Red Time (s)	3.0		2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0		7.5	7.5	7.5	7.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0		3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0		0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0		0.0	0.0	0.0	0.0
Recall Mode	None		C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	21.0		14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effect Green (s)	10.0		115.1	115.1	115.1	115.1
Actuated g/C Ratio	0.08		0.96	0.96	0.96	0.96
v/c Ratio	0.07		0.43	0.00	0.01	0.27
Control Delay	44.3		0.7	0.0	1.5	1.1
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	44.3		0.7	0.0	1.5	1.1
LOS	D		A	A	A	A
Approach Delay	44.3		0.7			1.1
Approach LOS	D		A			A

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.43

Intersection Signal Delay: 1.1

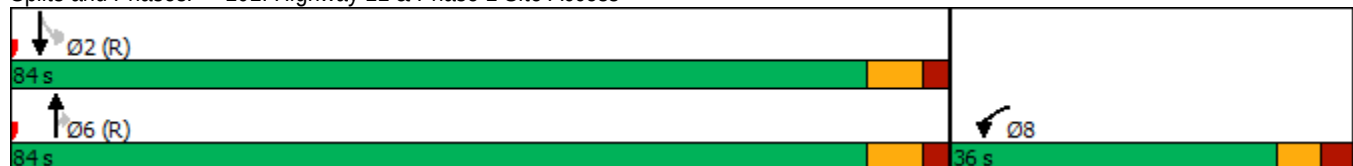
Intersection LOS: A

Intersection Capacity Utilization 79.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 101: Highway 11 & Phase 1 Site Access



Queues

2028 Future Total (PM Peak Hour)

101: Highway 11 & Phase 1 Site Access

06-19-2023

					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	11	1549	7	2	957
v/c Ratio	0.07	0.43	0.00	0.01	0.27
Control Delay	44.3	0.7	0.0	1.5	1.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.3	0.7	0.0	1.5	1.1
Queue Length 50th (m)	1.9	3.5	0.0	0.0	0.0
Queue Length 95th (m)	8.0	5.2	m0.0	0.6	34.4
Internal Link Dist (m)	115.7	400.8			756.9
Turn Bay Length (m)			30.0	15.0	
Base Capacity (vph)	442	3573	1599	291	3573
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.02	0.43	0.00	0.01	0.27
Intersection Summary					
m Volume for 95th percentile queue is metered by upstream signal.					

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2033 / 2038 Future Total (AM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	97	23	476	62	21	1444
Future Volume (vph)	97	23	476	62	21	1444
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1863	1545	3585	1700	1473	3725
Flt Permitted	0.950				0.434	
Satd. Flow (perm)	1863	1545	3585	1700	673	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		26		70		
Link Speed (k/h)	40		70			70
Link Distance (m)	86.2		972.2			424.8
Travel Time (s)	7.8		50.0			21.8
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	10%	6%	0%	29%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	109	26	535	70	24	1622
Shared Lane Traffic (%)						
Lane Group Flow (vph)	109	26	535	70	24	1622
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2033 / 2038 Future Total (AM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	82.0	82.0	12.0	94.0
Total Split (%)	27.7%	27.7%	63.1%	63.1%	9.2%	72.3%
Maximum Green (s)	29.0	29.0	74.5	74.5	8.0	86.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	13.3	13.3	95.6	95.6	105.7	102.2
Actuated g/C Ratio	0.10	0.10	0.74	0.74	0.81	0.79
v/c Ratio	0.57	0.14	0.20	0.06	0.04	0.55
Control Delay	67.0	19.0	2.2	0.1	3.0	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.0	19.0	2.2	0.1	3.0	5.9
LOS	E	B	A	A	A	A
Approach Delay	57.8		1.9			5.9
Approach LOS	E		A			A

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.57

Intersection Signal Delay: 7.8

Intersection LOS: A

Intersection Capacity Utilization 58.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

2033 / 2038 Future Total (AM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	109	26	535	70	24	1622
v/c Ratio	0.57	0.14	0.20	0.06	0.04	0.55
Control Delay	67.0	19.0	2.2	0.1	3.0	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	67.0	19.0	2.2	0.1	3.0	5.9
Queue Length 50th (m)	28.6	0.0	5.2	0.0	1.0	72.0
Queue Length 95th (m)	46.2	8.7	8.2	0.0	m2.8	70.0
Internal Link Dist (m)	62.2		948.2			400.8
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	415	364	2635	1268	596	2927
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.07	0.20	0.06	0.04	0.55
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Lanes, Volumes, Timings

2033 / 2038 Future Total (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	9	281	0	47	4	544	141	47	1421	3
Future Volume (vph)	1	0	9	281	0	47	4	544	141	47	1421	3
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.877				0.850			0.850			0.850
Flt Protected		0.995			0.950		0.950			0.950		
Satd. Flow (prot)	0	1745	0	0	1881	1700	1900	3585	1589	1900	3725	1700
Flt Permitted		0.974			0.750		0.108			0.374		
Satd. Flow (perm)	0	1708	0	0	1485	1700	216	3585	1589	748	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		71				71			158			38
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	1%	2%	0%	0%	6%	7%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	1	0	10	316	0	53	4	611	158	53	1597	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	11	0	0	316	53	4	611	158	53	1597	3
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	76.0	76.0	76.0	12.0	88.0	88.0
Total Split (%)	32.3%	32.3%		32.3%	32.3%	32.3%	58.5%	58.5%	58.5%	9.2%	67.7%	67.7%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	68.5	68.5	68.5	8.0	80.5	80.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effect Green (s)		31.1			31.1	31.1	74.9	74.9	74.9	87.4	83.9	83.9
Actuated g/C Ratio		0.24			0.24	0.24	0.58	0.58	0.58	0.67	0.65	0.65
v/c Ratio		0.02			0.89	0.12	0.03	0.30	0.16	0.09	0.66	0.00
Control Delay		0.1			74.4	5.0	15.8	15.7	2.7	11.9	24.3	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		0.1			74.4	5.0	15.8	15.7	2.7	11.9	24.3	0.0
LOS		A			E	A	B	B	A	B	C	A
Approach Delay		0.1			64.4			13.0			23.9	
Approach LOS		A			E			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 92 (71%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 26.1

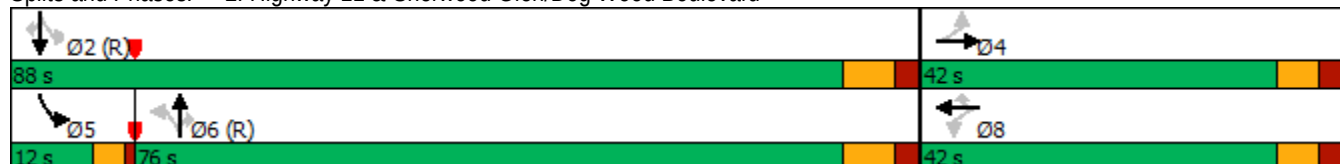
Intersection LOS: C

Intersection Capacity Utilization 100.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

2033 / 2038 Future Total (AM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	11	316	53	4	611	158	53	1597	3
v/c Ratio	0.02	0.89	0.12	0.03	0.30	0.16	0.09	0.66	0.00
Control Delay	0.1	74.4	5.0	15.8	15.7	2.7	11.9	24.3	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	0.1	74.4	5.0	15.8	15.7	2.7	11.9	24.3	0.0
Queue Length 50th (m)	0.0	80.7	0.0	0.5	46.1	0.0	5.8	171.8	0.0
Queue Length 95th (m)	0.0	#123.8	6.5	2.6	60.0	10.4	m13.7	232.5	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	505	394	503	124	2064	982	573	2404	1111
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.80	0.11	0.03	0.30	0.16	0.09	0.66	0.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	27	17	2	51	0	60	0	6	0	0	6
Future Volume (vph)	23	27	17	2	51	0	60	0	6	0	0	6
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.965						0.987			0.865	
Flt Protected		0.983			0.998			0.957				
Satd. Flow (prot)	0	1773	0	0	1962	0	0	1807	0	0	1696	0
Flt Permitted		0.983			0.998			0.957				
Satd. Flow (perm)	0	1773	0	0	1962	0	0	1807	0	0	1696	0
Link Speed (k/h)		40			40			40			30	
Link Distance (m)		94.8			280.7			206.8			73.1	
Travel Time (s)		8.5			25.3			18.6			8.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.91	0.91	0.91	0.91	0.92	0.91	0.92	0.91	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	8%	12%	50%	0%	2%	5%	2%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	25	30	19	2	56	0	66	0	7	0	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	74	0	0	58	0	0	73	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 27.0%	ICU Level of Service A											
Analysis Period (min) 15												

HCM Unsignalized Intersection Capacity Analysis 2033 / 2038 Future Total (AM Peak Hour)
 3: Cloverridge Avenue/Phase 2 Eastern Site Access & Crimson King Way 06-19-2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	27	17	2	51	0	60	0	6	0	0	6
Future Volume (vph)	23	27	17	2	51	0	60	0	6	0	0	6
Peak Hour Factor	0.92	0.91	0.91	0.91	0.91	0.92	0.91	0.92	0.91	0.92	0.92	0.92
Hourly flow rate (vph)	25	30	19	2	56	0	66	0	7	0	0	7
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	74	58	73	7								
Volume Left (vph)	25	2	66	0								
Volume Right (vph)	19	0	7	7								
Hadj (s)	0.03	0.04	0.20	-0.57								
Departure Headway (s)	4.2	4.2	4.4	3.7								
Degree Utilization, x	0.09	0.07	0.09	0.01								
Capacity (veh/h)	840	836	788	928								
Control Delay (s)	7.6	7.5	7.8	6.7								
Approach Delay (s)	7.6	7.5	7.8	6.7								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			7.6									
Level of Service			A									
Intersection Capacity Utilization			27.0%		ICU Level of Service				A			
Analysis Period (min)			15									

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2033 / 2038 Future Total (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	87	8	38	157	367	27	412	27	453	1321	459
Future Volume (vph)	150	87	8	38	157	367	27	412	27	453	1321	459
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.987				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1792	3202	0	1759	1869	1574	1827	3654	1478	1810	3725	1667
Flt Permitted	0.443			0.686			0.111			0.421		
Satd. Flow (perm)	836	3202	0	1270	1869	1574	213	3654	1478	802	3725	1667
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				302			141			499
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			780.9			393.8	
Travel Time (s)		5.9			6.3			40.2			20.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	14%	50%	8%	7%	8%	4%	4%	15%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	163	95	9	41	171	399	29	448	29	492	1436	499
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	104	0	41	171	399	29	448	29	492	1436	499
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2033 / 2038 Future Total (AM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	4.0	4.0	7.5	7.5	4.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			0	0		0	0
Act Effct Green (s)	40.5	26.5		28.8	15.9	45.0	60.8	50.2	50.2	77.8	67.8	67.8
Actuated g/C Ratio	0.32	0.21		0.23	0.13	0.36	0.48	0.40	0.40	0.62	0.54	0.54
v/c Ratio	0.42	0.15		0.13	0.73	0.53	0.15	0.31	0.04	0.75	0.72	0.44
Control Delay	35.0	39.6		30.5	72.1	10.8	14.5	27.9	0.1	23.4	27.1	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6		30.5	72.1	10.8	14.5	27.9	0.1	23.4	27.1	3.1
LOS	C	D		C	E	B	B	C	A	C	C	A
Approach Delay		36.8			29.3			25.5			21.4	
Approach LOS		D			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 126.3

Natural Cycle: 95

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 24.3

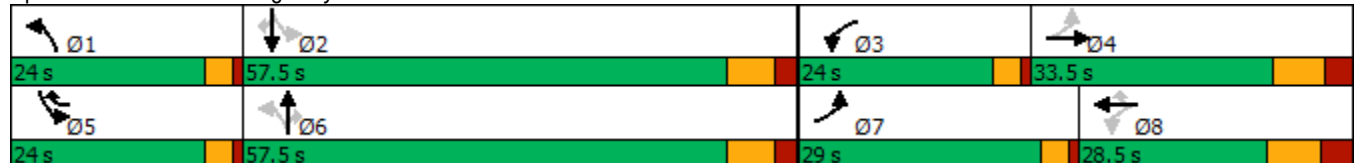
Intersection LOS: C

Intersection Capacity Utilization 77.2%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues

2033 / 2038 Future Total (AM Peak Hour)

4: Highway 11 & Bathurst Street

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	163	104	41	171	399	29	448	29	492	1436	499
v/c Ratio	0.42	0.15	0.13	0.73	0.53	0.15	0.31	0.04	0.75	0.72	0.44
Control Delay	35.0	39.6	30.5	72.1	10.8	14.5	27.9	0.1	23.4	27.1	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	39.6	30.5	72.1	10.8	14.5	27.9	0.1	23.4	27.1	3.1
Queue Length 50th (m)	31.7	11.3	7.4	43.5	17.2	2.8	42.2	0.0	64.8	157.2	0.0
Queue Length 95th (m)	49.9	19.8	16.0	72.2	50.1	8.3	62.3	0.0	#110.7	216.7	19.4
Internal Link Dist (m)		73.6		81.0			756.9			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	458	700	469	289	755	380	1451	672	654	2000	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.15	0.09	0.59	0.53	0.08	0.31	0.04	0.75	0.72	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2033 / 2038 Future Total (AM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	4	493	6	10	1461
Future Volume (vph)	4	4	493	6	10	1461
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		30.0	15.0	
Storage Lanes	1	0		1	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt	0.932			0.850		
Flt Protected	0.976				0.950	
Satd. Flow (prot)	1784	0	3725	1667	1863	3725
Flt Permitted	0.976				0.453	
Satd. Flow (perm)	1784	0	3725	1667	888	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	4			7		
Link Speed (k/h)	30		50			50
Link Distance (m)	139.7		424.8			780.9
Travel Time (s)	16.8		30.6			56.2
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	4	4	536	7	11	1588
Shared Lane Traffic (%)						
Lane Group Flow (vph)	8	0	536	7	11	1588
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	100	100		100	100	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (m)	2.0		10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		6			2
Permitted Phases				6	2	
Detector Phase	8		6	6	2	2
Switch Phase						

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2033 / 2038 Future Total (AM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0		40.0	40.0	40.0	40.0
Minimum Split (s)	35.0		47.5	47.5	47.5	47.5
Total Split (s)	36.0		94.0	94.0	94.0	94.0
Total Split (%)	27.7%		72.3%	72.3%	72.3%	72.3%
Maximum Green (s)	29.0		86.5	86.5	86.5	86.5
Yellow Time (s)	4.0		5.0	5.0	5.0	5.0
All-Red Time (s)	3.0		2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0		7.5	7.5	7.5	7.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0		3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0		0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0		0.0	0.0	0.0	0.0
Recall Mode	None		C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	21.0		14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effect Green (s)	10.0		125.1	125.1	125.1	125.1
Actuated g/C Ratio	0.08		0.96	0.96	0.96	0.96
v/c Ratio	0.06		0.15	0.00	0.01	0.44
Control Delay	43.6		0.7	0.8	1.2	1.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	43.6		0.7	0.8	1.2	1.5
LOS	D		A	A	A	A
Approach Delay	43.6		0.7			1.5
Approach LOS	D		A			A

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 1.4

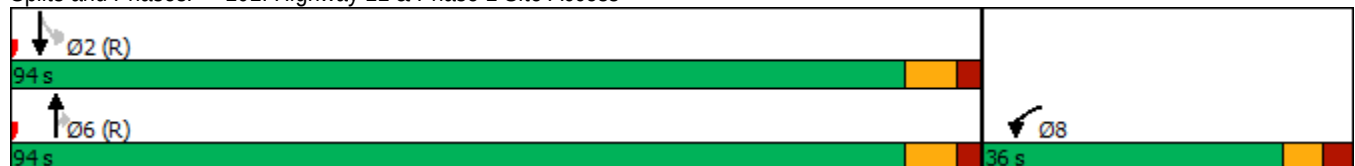
Intersection LOS: A

Intersection Capacity Utilization 79.2%

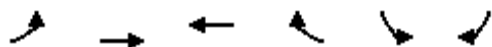
ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 101: Highway 11 & Phase 1 Site Access



					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	8	536	7	11	1588
v/c Ratio	0.06	0.15	0.00	0.01	0.44
Control Delay	43.6	0.7	0.8	1.2	1.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	43.6	0.7	0.8	1.2	1.5
Queue Length 50th (m)	1.0	0.0	0.0	0.0	0.0
Queue Length 95th (m)	6.4	13.8	0.5	1.6	70.7
Internal Link Dist (m)	115.7	400.8			756.9
Turn Bay Length (m)			30.0	15.0	
Base Capacity (vph)	401	3584	1604	854	3584
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.02	0.15	0.00	0.01	0.44
Intersection Summary					

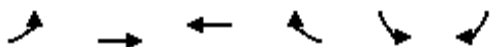


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↰		↰	
Traffic Volume (vph)	16	51	112	0	0	4
Future Volume (vph)	16	51	112	0	0	4
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected		0.988				
Satd. Flow (prot)	0	1937	1961	0	1696	0
Flt Permitted		0.988				
Satd. Flow (perm)	0	1937	1961	0	1696	0
Link Speed (k/h)		40	40		30	
Link Distance (m)		86.2	94.8		111.9	
Travel Time (s)		7.8	8.5		13.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	17	55	122	0	0	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	72	122	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25			15	25	15
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type: Other						
Control Type: Unsignalized						
Intersection Capacity Utilization 20.1% ICU Level of Service A						
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis 2033 / 2038 Future Total (AM Peak Hour)

102: Crimson King Way & Phase 2 Western Site Access

06-19-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	51	112	0	0	4
Future Volume (Veh/h)	16	51	112	0	0	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	55	122	0	0	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		86				
pX, platoon unblocked						
vC, conflicting volume	122				211	122
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	122				211	122
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	100
cM capacity (veh/h)	1465				768	929
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	72	122	4			
Volume Left	17	0	0			
Volume Right	0	0	4			
cSH	1465	1700	929			
Volume to Capacity	0.01	0.07	0.00			
Queue Length 95th (m)	0.3	0.0	0.1			
Control Delay (s)	1.8	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	1.8	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			20.1%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2033 / 2038 Future Total (PM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	87	24	1410	88	59	833
Future Volume (vph)	87	24	1410	88	59	833
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	45.0		92.0	84.0	
Storage Lanes	1	1		1	1	
Taper Length (m)	7.5				50.0	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1845	1700	3725	1700	1863	3725
Flt Permitted	0.950				0.134	
Satd. Flow (perm)	1845	1700	3725	1700	263	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		25		91		
Link Speed (k/h)	40		70			70
Link Distance (m)	86.2		972.2			424.8
Travel Time (s)	7.8		50.0			21.8
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	0%	2%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	90	25	1454	91	61	859
Shared Lane Traffic (%)						
Lane Group Flow (vph)	90	25	1454	91	61	859
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (m)	2.0	2.0	10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Prot	Perm	NA	Perm	pm+pt	NA
Protected Phases	8		6		5	2
Permitted Phases		8		6	2	
Detector Phase	8	8	6	6	5	2
Switch Phase						

Lanes, Volumes, Timings
1: Highway 11 & Crimson King Way

2033 / 2038 Future Total (PM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0	10.0	40.0	40.0	7.0	40.0
Minimum Split (s)	35.0	35.0	47.5	47.5	11.0	47.5
Total Split (s)	36.0	36.0	72.0	72.0	12.0	84.0
Total Split (%)	30.0%	30.0%	60.0%	60.0%	10.0%	70.0%
Maximum Green (s)	29.0	29.0	64.5	64.5	8.0	76.5
Yellow Time (s)	4.0	4.0	5.0	5.0	3.0	5.0
All-Red Time (s)	3.0	3.0	2.5	2.5	1.0	2.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.5	7.5	4.0	7.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0	0.2	0.2	3.0	0.2
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	C-Max	C-Max	None	C-Max
Walk Time (s)	7.0	7.0	7.0	7.0		7.0
Flash Dont Walk (s)	21.0	21.0	14.0	14.0		14.0
Pedestrian Calls (#/hr)	0	0	0	0		0
Act Effct Green (s)	11.9	11.9	84.7	84.7	97.1	93.6
Actuated g/C Ratio	0.10	0.10	0.71	0.71	0.81	0.78
v/c Ratio	0.49	0.13	0.55	0.07	0.20	0.30
Control Delay	60.1	18.5	7.6	0.5	4.3	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	18.5	7.6	0.5	4.3	4.1
LOS	E	B	A	A	A	A
Approach Delay	51.0		7.2			4.2
Approach LOS	D		A			A

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 8.1

Intersection LOS: A

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Highway 11 & Crimson King Way



Queues

2033 / 2038 Future Total (PM Peak Hour)

1: Highway 11 & Crimson King Way

06-19-2023

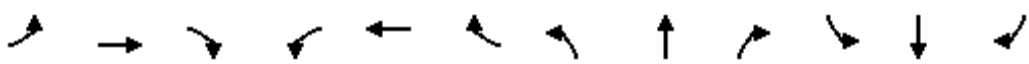
						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	90	25	1454	91	61	859
v/c Ratio	0.49	0.13	0.55	0.07	0.20	0.30
Control Delay	60.1	18.5	7.6	0.5	4.3	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	18.5	7.6	0.5	4.3	4.1
Queue Length 50th (m)	21.6	0.0	154.7	1.4	2.3	25.6
Queue Length 95th (m)	37.9	8.5	12.5	m0.0	5.7	38.3
Internal Link Dist (m)	62.2		948.2			400.8
Turn Bay Length (m)		45.0		92.0	84.0	
Base Capacity (vph)	445	429	2630	1227	319	2904
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.06	0.55	0.07	0.19	0.30
Intersection Summary						
m Volume for 95th percentile queue is metered by upstream signal.						

Lanes, Volumes, Timings

2033 / 2038 Future Total (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	2	3	5	236	2	72	10	1454	271	72	830	1
Future Volume (vph)	2	3	5	236	2	72	10	1454	271	72	830	1
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		65.0	71.0		45.0	70.0		90.0
Storage Lanes	0		0	0		1	1		1	1		1
Taper Length (m)	7.5			7.5			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.932				0.850			0.850			0.850
Flt Protected		0.990			0.953		0.950			0.950		
Satd. Flow (prot)	0	1845	0	0	1906	1466	1900	3762	1667	1900	3725	1700
Flt Permitted		0.941			0.721		0.325			0.081		
Satd. Flow (perm)	0	1754	0	0	1442	1466	650	3762	1667	162	3725	1700
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5				77			137			41
Link Speed (k/h)		50			40			70			70	
Link Distance (m)		288.1			294.1			681.3			972.2	
Travel Time (s)		20.7			26.5			35.0			50.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	0%	0%	16%	0%	1%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	2	3	5	248	2	76	11	1531	285	76	874	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	0	0	250	76	11	1531	285	76	874	1
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	4	4		8	8	8	6	6	6	5	2	2
Switch Phase												

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	40.0	40.0	40.0	7.0	40.0	40.0
Minimum Split (s)	40.5	40.5		40.5	40.5	40.5	47.5	47.5	47.5	11.0	47.5	47.5
Total Split (s)	42.0	42.0		42.0	42.0	42.0	66.0	66.0	66.0	12.0	78.0	78.0
Total Split (%)	35.0%	35.0%		35.0%	35.0%	35.0%	55.0%	55.0%	55.0%	10.0%	65.0%	65.0%
Maximum Green (s)	34.5	34.5		34.5	34.5	34.5	58.5	58.5	58.5	8.0	70.5	70.5
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	3.5	3.5		3.5	3.5	3.5	2.5	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5	7.5	7.5	7.5	7.5	4.0	7.5	7.5
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	0.2	0.2	0.2	3.0	0.2	0.2
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
Walk Time (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	26.0	26.0		26.0	26.0	26.0	16.0	16.0	16.0		16.0	16.0
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0	0		0	0
Act Effect Green (s)		25.9			25.9	25.9	69.9	69.9	69.9	82.6	79.1	79.1
Actuated g/C Ratio		0.22			0.22	0.22	0.58	0.58	0.58	0.69	0.66	0.66
v/c Ratio		0.03			0.80	0.20	0.03	0.70	0.28	0.35	0.36	0.00
Control Delay		24.3			63.2	8.4	14.9	21.8	8.5	13.2	8.2	0.0
Queue Delay		0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		24.3			63.2	8.4	14.9	21.8	8.5	13.2	8.2	0.0
LOS		C			E	A	B	C	A	B	A	A
Approach Delay		24.3			50.4			19.7			8.6	
Approach LOS		C			D			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2:SBTL and 6:NBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 19.5

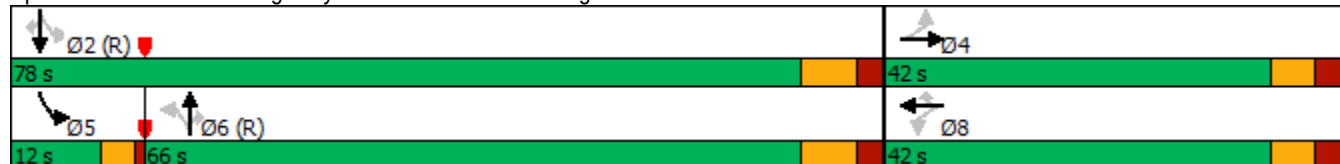
Intersection LOS: B

Intersection Capacity Utilization 97.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 2: Highway 11 & Sherwood Glen/Dog Wood Boulevard



Queues

2033 / 2038 Future Total (PM Peak Hour)

2: Highway 11 & Sherwood Glen/Dog Wood Boulevard

06-19-2023



Lane Group	EBT	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	10	250	76	11	1531	285	76	874	1
v/c Ratio	0.03	0.80	0.20	0.03	0.70	0.28	0.35	0.36	0.00
Control Delay	24.3	63.2	8.4	14.9	21.8	8.5	13.2	8.2	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	63.2	8.4	14.9	21.8	8.5	13.2	8.2	0.0
Queue Length 50th (m)	1.0	59.1	0.0	1.2	139.2	16.6	5.4	48.3	0.0
Queue Length 95th (m)	5.2	82.6	11.6	4.8	200.4	39.0	15.4	57.5	m0.0
Internal Link Dist (m)	264.1	270.1			657.3			948.2	
Turn Bay Length (m)			65.0	71.0		45.0	70.0		90.0
Base Capacity (vph)	507	414	476	378	2191	1028	227	2454	1134
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.60	0.16	0.03	0.70	0.28	0.33	0.36	0.00

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	92	43	4	41	0	40	0	1	0	0	21
Future Volume (vph)	7	92	43	4	41	0	40	0	1	0	0	21
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.959						0.997			0.865	
Flt Protected		0.998			0.995			0.953				
Satd. Flow (prot)	0	1912	0	0	1990	0	0	1900	0	0	1696	0
Flt Permitted		0.998			0.995			0.953				
Satd. Flow (perm)	0	1912	0	0	1990	0	0	1900	0	0	1696	0
Link Speed (k/h)		40			40			40			30	
Link Distance (m)		94.8			280.7			206.8			73.1	
Travel Time (s)		8.5			25.3			18.6			8.8	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	0%	0%	0%	0%	2%	0%	2%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	8	112	52	5	50	0	49	0	1	0	0	23
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	172	0	0	55	0	0	50	0	0	23	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	100		15	25		100	25		15	100		100
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	24.2%											
Analysis Period (min)	15											
ICU Level of Service A												

HCM Unsignalized Intersection Capacity Analysis 2033 / 2038 Future Total (PM Peak Hour)
 3: Cloverridge Avenue/Phase 2 Eastern Site Access & Crimson King Way 06-19-2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	92	43	4	41	0	40	0	1	0	0	21
Future Volume (vph)	7	92	43	4	41	0	40	0	1	0	0	21
Peak Hour Factor	0.92	0.82	0.82	0.82	0.82	0.92	0.82	0.92	0.82	0.92	0.92	0.92
Hourly flow rate (vph)	8	112	52	5	50	0	49	0	1	0	0	23
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	172	55	50	23								
Volume Left (vph)	8	5	49	0								
Volume Right (vph)	52	0	1	23								
Hadj (s)	-0.17	0.02	0.18	-0.57								
Departure Headway (s)	4.0	4.3	4.6	3.9								
Degree Utilization, x	0.19	0.06	0.06	0.02								
Capacity (veh/h)	889	823	740	870								
Control Delay (s)	7.9	7.5	7.9	7.0								
Approach Delay (s)	7.9	7.5	7.9	7.0								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				7.8								
Level of Service				A								
Intersection Capacity Utilization				24.2%	ICU Level of Service	A						
Analysis Period (min)				15								

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2033 / 2038 Future Total (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	442	170	14	30	82	708	22	1392	48	340	814	232
Future Volume (vph)	442	170	14	30	82	708	22	1392	48	340	814	232
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	67.0		0.0	44.0		42.0	137.0		162.0	148.0		154.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	35.0			27.0			48.0			72.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor							1.00					0.97
Fr't		0.988				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1845	3686	0	1900	1818	1635	1900	3689	1504	1845	3689	1667
Flt Permitted	0.548			0.631			0.333			0.072		
Satd. Flow (perm)	1064	3686	0	1262	1818	1635	665	3689	1504	140	3689	1617
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6				*365			141			242
Link Speed (k/h)		60			60			70			70	
Link Distance (m)		97.6			105.0			780.9			393.8	
Travel Time (s)		5.9			6.3			40.2			20.3	
Confl. Peds. (#/hr)							5					5
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	1.00	0.96	0.96	0.96	1.00	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	2%	0%	0%	10%	4%	0%	3%	13%	3%	3%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	460	177	15	31	85	708	23	1450	50	340	848	242
Shared Lane Traffic (%)												
Lane Group Flow (vph)	460	192	0	31	85	708	23	1450	50	340	848	242
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8	5	1	6		5	2	
Permitted Phases	4			8		8	6		6	2		2
Detector Phase	7	4		3	8	5	1	6	6	5	2	2
Switch Phase												

Lanes, Volumes, Timings
4: Highway 11 & Bathurst Street

2033 / 2038 Future Total (PM Peak Hour)

06-19-2023

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	7.0	10.0		7.0	10.0	7.0	7.0	20.0	20.0	7.0	20.0	20.0
Minimum Split (s)	11.0	28.5		11.0	28.5	11.0	11.0	41.5	41.5	11.0	41.5	41.5
Total Split (s)	29.0	33.5		24.0	28.5	24.0	24.0	57.5	57.5	24.0	57.5	57.5
Total Split (%)	20.9%	24.1%		17.3%	20.5%	17.3%	17.3%	41.4%	41.4%	17.3%	41.4%	41.4%
Maximum Green (s)	25.0	25.0		20.0	19.5	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Yellow Time (s)	3.0	5.5		3.0	5.5	3.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	1.0	3.0		1.0	3.5	1.0	1.0	2.5	2.5	1.0	2.5	2.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	-2.0	0.0	0.0	0.0	-1.0	0.0	0.0
Total Lost Time (s)	4.0	8.5		4.0	9.0	2.0	4.0	7.5	7.5	3.0	7.5	7.5
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	5.0	5.0	3.0	5.0	5.0
Minimum Gap (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)		7.0			7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)		30.0			30.0			27.0	27.0		27.0	27.0
Pedestrian Calls (#/hr)		0			0			5	5		5	5
Act Effect Green (s)	46.1	34.6		24.5	12.1	43.1	60.5	50.0	50.0	78.5	67.5	67.5
Actuated g/C Ratio	0.35	0.26		0.19	0.09	0.33	0.46	0.38	0.38	0.60	0.51	0.51
v/c Ratio	0.88	0.20		0.11	0.51	0.91	0.06	1.03	0.08	0.96	0.45	0.26
Control Delay	57.4	38.4		30.8	67.8	36.7	13.4	73.5	0.2	76.4	22.3	3.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4		30.8	67.8	36.7	13.4	73.5	0.2	76.4	22.3	3.1
LOS	E	D		C	E	D	B	E	A	E	C	A
Approach Delay		51.8			39.7			70.2			31.9	
Approach LOS		D			D			E			C	

Intersection Summary

Area Type: Other

Cycle Length: 139

Actuated Cycle Length: 131.6

Natural Cycle: 125

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 49.5

Intersection LOS: D

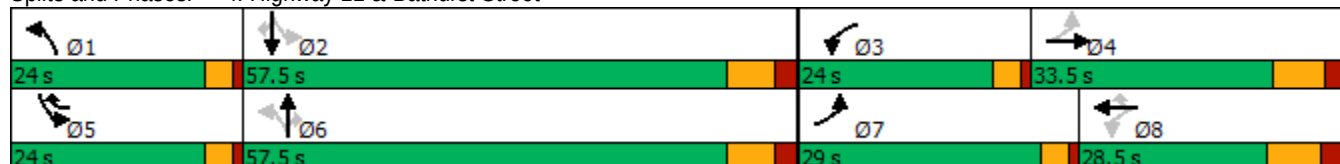
Intersection Capacity Utilization 114.4%

ICU Level of Service H

Analysis Period (min) 15

* User Entered Value

Splits and Phases: 4: Highway 11 & Bathurst Street



Queues

2033 / 2038 Future Total (PM Peak Hour)

4: Highway 11 & Bathurst Street

06-19-2023

											
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	460	192	31	85	708	23	1450	50	340	848	242
v/c Ratio	0.88	0.20	0.11	0.51	0.91	0.06	1.03	0.08	0.96	0.45	0.26
Control Delay	57.4	38.4	30.8	67.8	36.7	13.4	73.5	0.2	76.4	22.3	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.4	38.4	30.8	67.8	36.7	13.4	73.5	0.2	76.4	22.3	3.1
Queue Length 50th (m)	108.3	21.7	5.6	22.5	102.5	2.5	~221.3	0.0	74.3	79.6	0.0
Queue Length 95th (m)	#165.6	33.1	12.8	40.4	#184.8	6.9	#281.6	0.0	#142.8	104.7	14.9
Internal Link Dist (m)		73.6		81.0			756.9			369.8	
Turn Bay Length (m)	67.0		44.0		42.0	137.0		162.0	148.0		154.0
Base Capacity (vph)	521	974	452	269	781	559	1401	658	355	1891	946
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.20	0.07	0.32	0.91	0.04	1.03	0.08	0.96	0.45	0.26

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2033 / 2038 Future Total (PM Peak Hour)

06-19-2023

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	11	1425	9	5	882
Future Volume (vph)	10	11	1425	9	5	882
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		30.0	15.0	
Storage Lanes	1	0		1	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Ped Bike Factor						
Frt	0.930			0.850		
Flt Protected	0.977				0.950	
Satd. Flow (prot)	1782	0	3725	1667	1863	3725
Flt Permitted	0.977				0.149	
Satd. Flow (perm)	1782	0	3725	1667	292	3725
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)	12			5		
Link Speed (k/h)	30		70			70
Link Distance (m)	139.7		424.8			780.9
Travel Time (s)	16.8		21.8			40.2
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Adj. Flow (vph)	11	12	1549	10	5	959
Shared Lane Traffic (%)						
Lane Group Flow (vph)	23	0	1549	10	5	959
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	25	15		15	25	
Number of Detectors	1		2	1	1	2
Detector Template	Left		Thru	Right	Left	Thru
Leading Detector (m)	2.0		10.0	2.0	2.0	10.0
Trailing Detector (m)	0.0		0.0	0.0	0.0	0.0
Turn Type	Prot		NA	Perm	Perm	NA
Protected Phases	8		6			2
Permitted Phases				6	2	
Detector Phase	8		6	6	2	2
Switch Phase						

Lanes, Volumes, Timings
101: Highway 11 & Phase 1 Site Access

2033 / 2038 Future Total (PM Peak Hour)

06-19-2023

	↖	↗	↑	↘	↙	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Minimum Initial (s)	10.0		40.0	40.0	40.0	40.0
Minimum Split (s)	35.0		47.5	47.5	47.5	47.5
Total Split (s)	36.0		84.0	84.0	84.0	84.0
Total Split (%)	30.0%		70.0%	70.0%	70.0%	70.0%
Maximum Green (s)	29.0		76.5	76.5	76.5	76.5
Yellow Time (s)	4.0		5.0	5.0	5.0	5.0
All-Red Time (s)	3.0		2.5	2.5	2.5	2.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0		7.5	7.5	7.5	7.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0		3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0		0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0		0.0	0.0	0.0	0.0
Recall Mode	None		C-Max	C-Max	C-Max	C-Max
Walk Time (s)	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)	21.0		14.0	14.0	14.0	14.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effect Green (s)	10.0		105.3	105.3	105.3	105.3
Actuated g/C Ratio	0.08		0.88	0.88	0.88	0.88
v/c Ratio	0.14		0.47	0.01	0.02	0.29
Control Delay	35.0		1.0	0.0	2.8	2.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	35.0		1.0	0.0	2.8	2.6
LOS	C		A	A	A	A
Approach Delay	35.0		0.9			2.6
Approach LOS	C		A			A

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 1.9

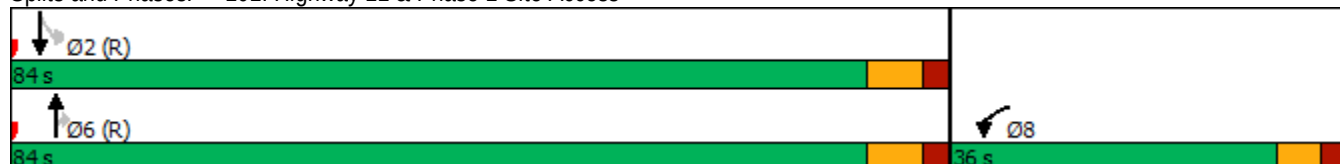
Intersection LOS: A

Intersection Capacity Utilization 79.2%

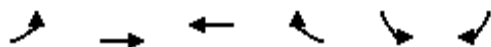
ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 101: Highway 11 & Phase 1 Site Access



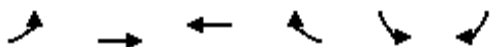
					
Lane Group	WBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	23	1549	10	5	959
v/c Ratio	0.14	0.47	0.01	0.02	0.29
Control Delay	35.0	1.0	0.0	2.8	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	1.0	0.0	2.8	2.6
Queue Length 50th (m)	2.6	3.3	0.0	0.2	28.0
Queue Length 95th (m)	11.2	5.2	m0.0	1.0	34.4
Internal Link Dist (m)	115.7	400.8			756.9
Turn Bay Length (m)			30.0	15.0	
Base Capacity (vph)	439	3268	1463	256	3268
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.05	0.47	0.01	0.02	0.29
Intersection Summary					
m Volume for 95th percentile queue is metered by upstream signal.					



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↰		↰	
Traffic Volume (vph)	5	138	82	0	0	15
Future Volume (vph)	5	138	82	0	0	15
Ideal Flow (vphpl)	2000	2000	2000	2000	2000	2000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	0
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt					0.865	
Flt Protected		0.998				
Satd. Flow (prot)	0	1957	1961	0	1696	0
Flt Permitted		0.998				
Satd. Flow (perm)	0	1957	1961	0	1696	0
Link Speed (k/h)		50	50		30	
Link Distance (m)		86.2	94.8		111.9	
Travel Time (s)		6.2	6.8		13.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	5	150	89	0	0	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	155	89	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	0.94	0.94	0.94	0.94	0.94	0.94
Turning Speed (k/h)	100			100	100	100
Sign Control		Free	Free		Stop	
Intersection Summary						
Area Type: Other						
Control Type: Unsignalized						
Intersection Capacity Utilization 20.7% ICU Level of Service A						
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis 2033 / 2038 Future Total (PM Peak Hour) 102: Crimson King Way & Phase 2 Western Site Access

06-19-2023



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	138	82	0	0	15
Future Volume (Veh/h)	5	138	82	0	0	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	150	89	0	0	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		86				
pX, platoon unblocked						
vC, conflicting volume	89				249	89
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	89				249	89
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	98
cM capacity (veh/h)	1506				737	969
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	155	89	16			
Volume Left	5	0	0			
Volume Right	0	0	16			
cSH	1506	1700	969			
Volume to Capacity	0.00	0.05	0.02			
Queue Length 95th (m)	0.1	0.0	0.4			
Control Delay (s)	0.3	0.0	8.8			
Lane LOS	A		A			
Approach Delay (s)	0.3	0.0	8.8			
Approach LOS			A			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			20.7%	ICU Level of Service		A
Analysis Period (min)			15			

APPENDIX



MULTIMODAL ANALYSIS BACKGROUND INFORMATION

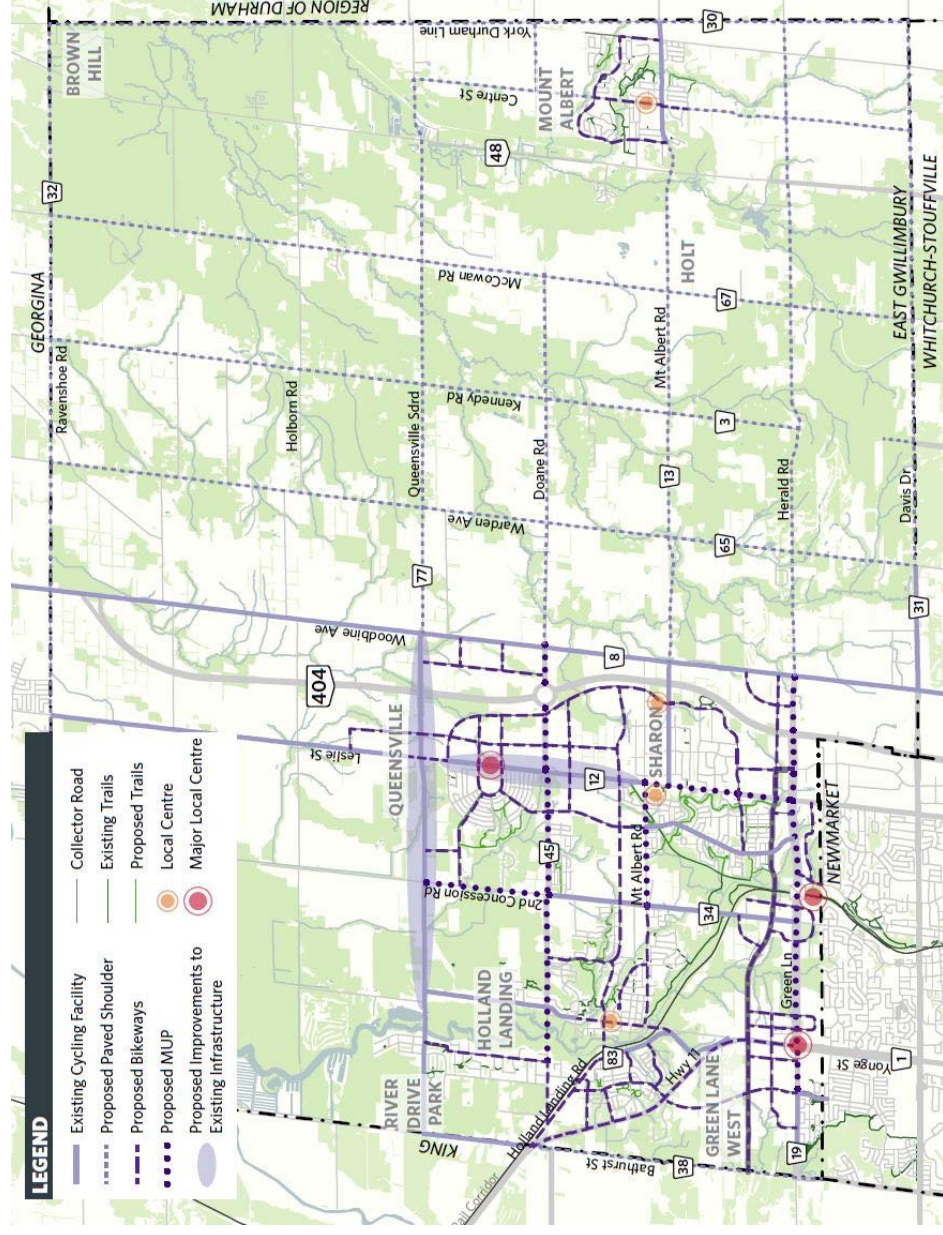
October 8, 2019

Proposed Cycling Network (within ROW)

- Paved shoulders
- Bikeways
 - (i.e. bike lanes, bike routes, etc.)*
- Multi-use pathways

*Refer to ATTMP for off road facilities

**Coordination with ATTMP (currently underway) required



October 8, 2019

Proposed Sidewalk Network

- Multi-use pathways
- New and wider sidewalks

