

COLAND DEVELOPMENT CORPORATION

# PROPOSED MIXED-USE DEVELOPMENT - 16928 HERITAGE DRIVE (HIGHWAY 12), TOWN OF MIDLAND

## TRAFFIC IMPACT STUDY UPDATE

SEPTEMBER 29, 2021

FINAL







PROPOSED MIXED-USE  
DEVELOPMENT - 16928  
HERITAGE DRIVE  
(HIGHWAY 12), TOWN OF  
MIDLAND

TRAFFIC IMPACT STUDY  
UPDATE

COLAND DEVELOPMENT CORPORATION

FINAL

PROJECT NO.: 18M-01620-00  
DATE: SEPTEMBER 2021

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September 29, 2021

Mr. David Colagiacomio  
Executive Director, Environment & Infrastructure  
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575 Dominion Avenue  
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Dear Mr. Colagiacomio:

**Subject: 16928 Highway 12, Midland –Traffic Impact Study Update**

WSP Canada Inc. (WSP) is pleased to submit this Traffic Impact Study (TIS) update in support of Zoning By-law Amendment and Site Plan Approval applications to the Town of Midland (the Town) for the construction of a mixed-use development located at 16928 Highway 12 (Heritage Drive). This TIS update is based on upon comments received:

- from the Ministry of Transportation Ontario (MTO) via e-mail on May 26, 2021;
- from the Town via e-mail on June 25, 2021; and
- at a conference call with both the Town and MTO on July 7, 2021.

We thank you for the opportunity to complete this Traffic Impact Study update. Please do not hesitate to contact me if you have any questions.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Irfan Akram', written in a cursive style.

Irfan Akram B.Sc. (Hons), DIS  
Project Manager  
Transportation Planning & Science  
WSP Canada Inc.

WSP ref.: 18M-01620-00





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# EXECUTIVE SUMMARY

**Development Applications** - Zoning By-law Amendment and Site Plan Approval.

**Site Location** - southeast corner of the Beamish Road and Highway 12 intersection in the Town of Midland.

## **Development Proposal**

### **Phase One** -

- Five-storey hotel with 93 guest rooms;
- 33,817 ft<sup>2</sup> conference centre with an 852-person seating capacity;
- 331 at-grade vehicle parking spaces;
- two loading spaces; and
- two full-moves site driveways via Beamish Road constructed to permanent standards. The north site driveway will have two outbound lanes and south driveway will have one outbound lane.

### **Phase Two** -

- 82,541 ft<sup>2</sup> of retail GFA across 53 units, including one restaurant and one drive-thru coffee shop;
- 450 at-grade vehicle parking spaces;
- eight loading spaces;
- vehicular access via northern site driveway constructed to permanent standards in Phase One; and
- the construction of a southbound-right lane at the northern site driveway and a northbound left lane at the Beamish Road, Hanson Road and Highway 12 intersection.

### **Total** -

- Five-storey hotel;
- 33,817 ft<sup>2</sup> conference centre;
- 82,541 ft<sup>2</sup> of retail/commercial GFA;
- 781 at-grade vehicle parking spaces including 18 barrier-free spaces;
- 10 loading spaces; and
- two full-moves site driveways.

## **Trip Generation**

### **Phase One** -

- 80 and 169 gross two-way vehicle trips during the AM and PM peak hours, respectively.
- Some internal capture between the convention centre and hotel is expected to occur when convention centre guests make use of hotel facilities.

### **Phase Two** -

- Net trip generation is 122 and 258 two-way vehicle trips during the AM and PM peak hours, respectively.

### Total -

- Total net site trip generation for both phases is 194 and 416 two-way vehicle trips during the AM and PM peak hours, respectively.

### Study Area

- Highway 12/The Angela Schmidt Foster Road and Highway 93;
- Highway 12 and Beamish Road;
- Highway 12 and Jones Road;
- Highway 12 and King Street;
- Prospect Boulevard and Beamish Road; and
- Site driveways.

### Assessment Scenarios

- 2020 - Existing
- 2023 - Phase One opening year
- 2026 - Phase Two opening year
- 2031 - 5 years post full build-out
- 2036 - 10 years post full build-out

**Growth factor** - 1.25% per annum applied all through movements

### Hanson Background Development

- Phases 1A & 1B: 254 units & 1,918 m<sup>2</sup> retail space - assumed to be complete by 2023 (Phase One Opening)
- Phase 1C-1E: 690 units & 3,252 m<sup>2</sup> retail space - assumed to be complete by 2026 (Phase Two Opening)
- Phases 2 and 3: 1,013 units - assumed to be complete by 2031

### Traffic Operations

#### 1. Existing conditions:

- a. analysis indicates that all study area intersections operate within capacity during both the weekday a.m. and p.m. peak hours
- b. exception is northbound and southbound left turn movements at the Beamish Road, Hanson Road and Highway 12 intersection which operate at LOS F during the p.m. peak hour

#### 2. Future background conditions

- a. analysis indicates that all study area intersections operate within capacity during both the peak hours
- b. under 2023 future background conditions, without site traffic, the northbound and southbound left turn movements at the Beamish Road, Hanson Road and Highway 12 intersection operate at LOS F during the p.m. peak hour;
- c. to mitigate the level of delay experienced at the left-out movements, and in anticipation of future traffic growth in the area, it is recommended that this intersection be signalized by 2023

- d. under 2036 future background conditions, without site traffic, a dual southbound left lane is recommended at Highway 93, Penetanguishene Road and Highway 12

3. **Future total conditions**

- a. With signal optimization at select intersections, site traffic volumes for both development phases can be accommodated within the study area network for all horizon years

**Site Plan Review**

A site circulation assessment confirms that the anticipated passenger vehicle, garbage, delivery and fire truck movements can be readily accommodated throughout the site.

**Transportation Demand Management**

A Transportation Demand Management (TDM) strategy is recommended to ensure awareness of the many alternative transportation opportunities which will help encourage non-single occupant vehicle modes of transportation.

In summary, the findings of this study indicate that the projected traffic increases associated with the proposed development can be readily accommodated by the existing boundary road network, and that the proposed parking and loading facilities can easily accommodate the anticipated parking and loading needs. Mitigation in the form of the signalization of Beamish Road, Hanson Road and Highway 12 and a southbound dual left lane at Highway 93, Penetanguishene Road and Highway 12 is precipitated by future background traffic conditions and not as a result of traffic volumes associated with the site.

# 1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by Coland Development Corporation to prepare a Traffic Impact Study for a proposed mixed-use development of a 14.51-acre site at the southwest corner of Heritage Drive (Highway 12) and Beamish Road in the Town of Midland (the site).

The site location is illustrated in **Figure 1.1**

Phase One of the proposal involves the development of the southern portion of the site with a five-storey hotel offering 93 guest rooms, a conference centre with a Gross Floor Area (GFA) of 33,782 square foot (ft<sup>2</sup>) and a surface parking lot with 331 spaces. Phase One also involves the construction of two site driveways via the west side of Beamish Road. The north driveway will be located just south of the existing OPP driveway and the south driveway will be located just north of Prospect Boulevard. At the request of the Town, both driveways will be constructed to permanent design standards during Phase One and will be open to users of the hotel and conference centre. The northern driveway will eventually become the primary access for Phase Two when this phase is complete. However, both phases will have access to either driveway with the use of an internal site connection.

Phase Two of the proposal involves the development of the northern portion of the site with approximately 76,169 ft<sup>2</sup> of retail/commercial GFA, a 4,152 ft<sup>2</sup> restaurant, a 2,220 ft<sup>2</sup> drive-thru coffee shop and 450 surface parking spaces.

Site statistics for Phase Two have been updated since the last submission report dated April 22, 2021. These changes are discussed in further detail below.

The updated site plan is illustrated in **Figure 1.2**.

A TIS report was submitted to the Town and to the Ministry of Transportation Ontario (MTO) in January 2019 in support of Zoning By-law Amendment (ZBA) and Site Plan Approval (SPA) applications for Phase One. Phase One received ZBA approval on October 2, 2019 with a new Zoning By-law No. 2019-65.

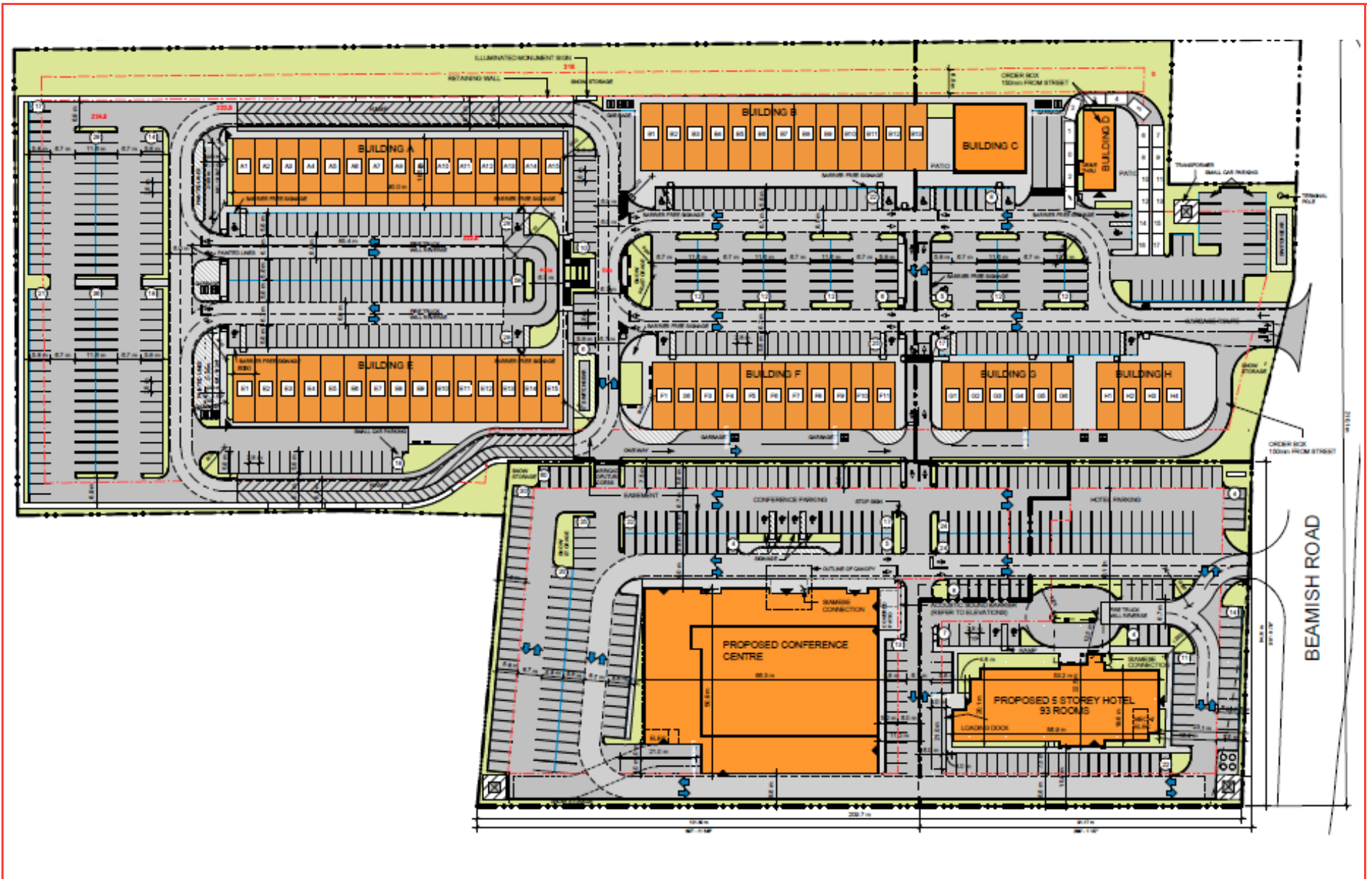
This report has been prepared in accordance with the MTO Traffic Impact Study Guidelines dated February 2021. This report also represents an update to the previous submission dated April 22, 2021 based upon municipal comments received:

- from the Ministry of Transportation Ontario (MTO) via e-mail on May 26, 2021;
- from the Town via e-mail on June 25, 2021; and
- at a conference call with both the Town and MTO on July 7, 2021.

Following the conference call on July 7, 2021, changes were made to the previous site statistics which involved the replacement of two 3,780 ft<sup>2</sup> drive-thru fast-food restaurants with 11,948 ft<sup>2</sup> of general retail GFA. This change has been reflected in this report update.

All municipal comments are attached as **Appendix A**.





**Figure 1.2**

Proposed Site Plan  
16928 Highway 12



## 2 EXISTING CONDITIONS

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### 2.1 ROAD NETWORK

**Ontario Highway 12**, also known as **Heritage Drive**, runs east-west through the study area. It is part of the upper-tier road network as described in the Town of Midland Transportation Master Plan (TMP), and is under the jurisdiction of the Ministry of Transportation of Ontario. The Ontario Highway 12 denomination ends at Highway 93, after which it continues west as a collector road identified as The Angela Schmidt Foster Road. Highway 12 serves rural agricultural, commercial/retail, industrial and institutional land uses. Within the study area, the road has a two-lane cross section between Highway 93/Penetanguishene Road and Jones Road, and a four-lane cross section between Jones Road and King Street. It also has exclusive right and left-turn lanes at the intersections with Beamish Road, Jones Road and King Street. There are also exclusive right-turn slip lanes at the intersection of Highway 12 and Highway 93. Six roads intersect with Highway 12 within the study area, three of which are signalized. There are also three private driveway accesses fronting onto Highway 12. The road has a posted speed limit of 80 km/h between Highway 93 and Jones Road and 60 km/h between Jones Road and King Street.

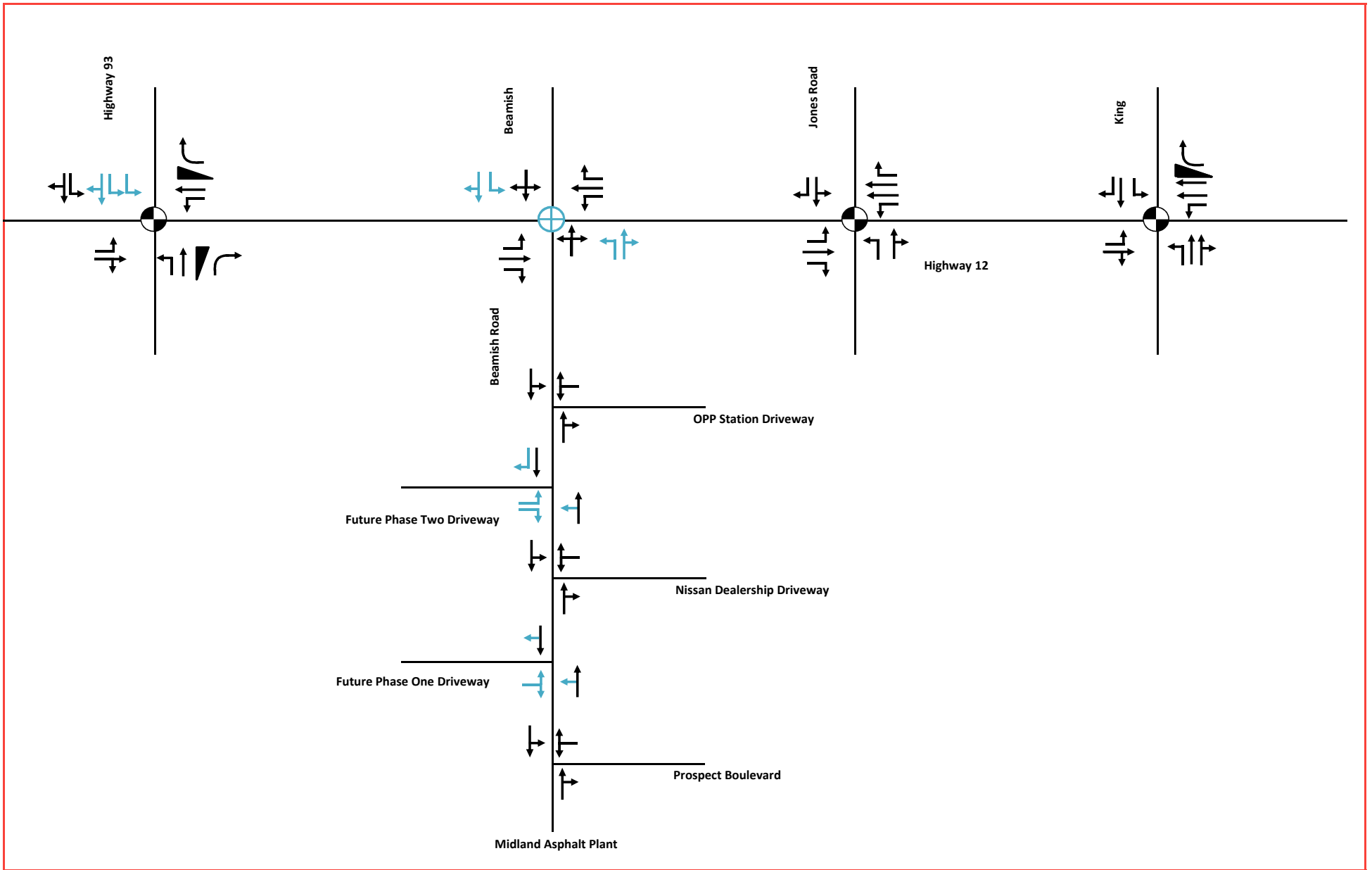
**County Road/Highway 93**, named **Penetanguishene Road**, runs north-south through the study area. It is part of the upper-tier road network as described in the Town of Midland TMP, and is under the jurisdiction of the County of Simcoe north of Highway 12 and the MTO south of Highway 12. The road primarily serves rural agricultural land uses. Within the study area, the road has a two-lane cross section and has exclusive left turn lanes at the intersection with Highway 12/Heritage Drive and The Angela Schmidt Foster Road, the latter of which also has exclusive right-turn slip lanes. There are numerous private driveways fronting onto Highway 93, and the road has a posted speed limit of 80 km/h south and 60 km/h north of Highway 12.

**King Street** runs north-south through the study area. It is part of the arterial road network as described in the Town of Midland TMP, and is under the jurisdiction of the Town of Midland. The road has a dead-end located just south of Cranston Crescent, and serves commercial/retail, industrial and institutional land uses. Within the study area, the road has a four-lane cross section north and a two-lane cross section south of Highway 12, where it has exclusive right and left-turn lanes as well as an exclusive right-turn slip lane. Three roads intersect with King Street within the study area, of which the intersection with Highway 12 is signalized. There are several private driveway accesses fronting onto King Street. The road has a posted speed limit of 50 km/h north of Highway 12.

**Jones Road** runs north-south within the study area. It is a local road under the jurisdiction of the Town of Midland and primarily serves local commercial/retail land uses. The road has a two-lane cross section north and a three-lane cross section (with a centre left turn lane) south of Highway 12, where it has exclusive right and left-turn lanes. The road intersects with Highway 12 and ends at Prospect Boulevard to the south, with its northern terminus at a pair of surface parking lots in a retail plaza.

**Beamish Road** runs north-south within the study area. It is a local road under the jurisdiction of the Town of Midland and primarily serves institutional land uses. The road has a two-lane cross section and has a northern terminus at Highway 12.

The existing and future/proposed lane configuration and signal control is illustrated in **Figure 2.1**.



**Legend**



Existing Lane Configurations



Signalized Intersection



Future Proposed Lane Configurations



Potential Signalized Intersection



Channelized Turn Lane



**Figure 2.1**  
Existing & Future Lane Configuration  
and Signal Control  
16928 Highway 12

## 2.2 PUBLIC TRANSIT

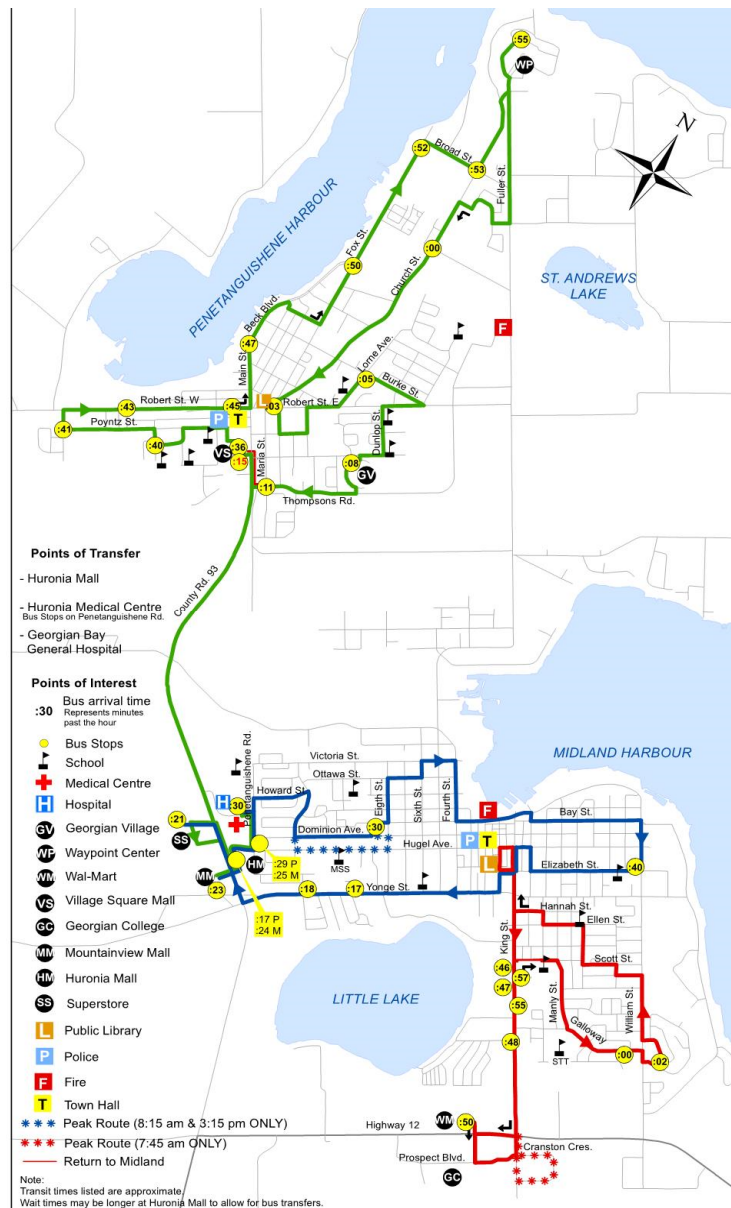
The Town’s public transit bus service, Midland Penetanguishene Transit, provides local bus service in the study area. There are three bus routes within the town that provide transit services to several key locations such as the public library, Huronia Mall, Mountainview Mall, Georgian Bay General Hospital, Wal-Mart and several schools that are near bus routes.

### 2.2.1 REGULAR TRANSIT SERVICE

**Table 2-1** summarizes the above-noted transit routes, along with their approximate frequencies throughout the service period. **Figure 2.2** illustrates the Midland Penetanguishene Transit route map within the study area.

**Table 2-1 Existing Transit Services within the Study Area**

Route	Transit Service Operating Frequencies					
	A.M. Peak	Weekday Midday	P.M. Peak	Weekday Evening	Saturday Midday	Sunday/Holiday Midday
Penetanguishene (Leaving GBG Hospital)	Hourly (First bus: 6:30 a.m.)	Hourly	Hourly (Last bus: 5:30 p.m.)	-	Hourly	No Sunday or Holiday service
Midland South (Leaving Midland Library)	Hourly (First bus: 6:45 a.m.)	Hourly	Hourly (Last bus: 5:45 p.m.)	-	Hourly	No Sunday or Holiday service
Midland North (Leaving Midland Library)	Hourly (First bus: 7:15 a.m.)	Hourly	Hourly (Last bus: 5:15 p.m.)	-	Hourly	No Sunday or Holiday service



**Figure 2.2**  
Existing Transit Services  
16928 Highway 12

---

## 2.3 ACTIVE TRANSPORTATION INFRASTRUCTURE

There is a sidewalk on the north side of Highway 12/Heritage Drive between Jones Road and King Street, continuing along the west side of King Street running north and south from Highway 12. Sidewalks are provided on the east side of Jones Road, terminating north and south of Highway 12 to access retail plazas. At the intersection of Jones Road and Highway 12, there are dedicated pedestrian crosswalks running across Jones Road and Highway 12. All four legs of the intersection of Highway 12 and King Street have dedicated pedestrian crosswalks. There are no dedicated cycling facilities within the study area, though there are unpaved shoulders running the length of Highway 12 and Highway 93.

---

## 2.4 DATA COLLECTION

Data was collected through Turning Movement Counts (TMC) on a typical weekday during the morning (7:00 a.m. to 9:00 a.m.) and afternoon (4:00 p.m. to 6:00 p.m.) peak periods on Thursday, November 22, 2018. The TMCs were undertaken by Accu-Traffic Inc. on behalf of WSP and are located in **Appendix B**. Signal timing plans (STP) were acquired from the Ministry of Transportation Ontario (MTO) and are also located in **Appendix B**. Data was collected from the following study area intersections:

- Highway 12/The Angela Schmidt Foster Road and Highway 93 (signalized);
- Highway 12 and Beamish Road (unsignalized);
- Highway 12 and Jones Road (signalized); and
- Highway 12 and King Street (signalized).

The study area intersections identified above were selected in consultation with technical staff at the Town and MTO and were included in the original study Terms of Reference (TOR) dated October 2018 and submitted to all reviewing agencies. The TOR are located in **Appendix C**.

Given that over two years have passed since TMC surveys were conducted at the study area intersections, a growth factor of 1.25% per annum was applied to all through movements observed in the 2018 counts to reflect 2020 conditions. New TMCs were not collected as they would not reflect typical peak periods conditions due to the current COVID-19 pandemic.

---

## 2.5 EXISTING TRAFFIC DATA

During the 2018 TMC survey at Highway 12 and Beamish Road, the following influencing factors were present:

1. the segment of Beamish Road from the Ontario Provincial Police (OPP) station driveway to Prospect Boulevard was temporarily closed due to construction;
2. the Hanson residential development to the north, including Hanson Road, was yet to be constructed. Today, Hanson Road forms a new four-arm intersection at Highway 12 and Beamish Road;
3. the Nissan car dealership located to the south of the OPP station today had yet to be constructed;
4. the Midland Asphalt Mixing Plant had no access to Highway 12 via Beamish Road; and
5. access to Beamish Road from Prospect Boulevard was closed.

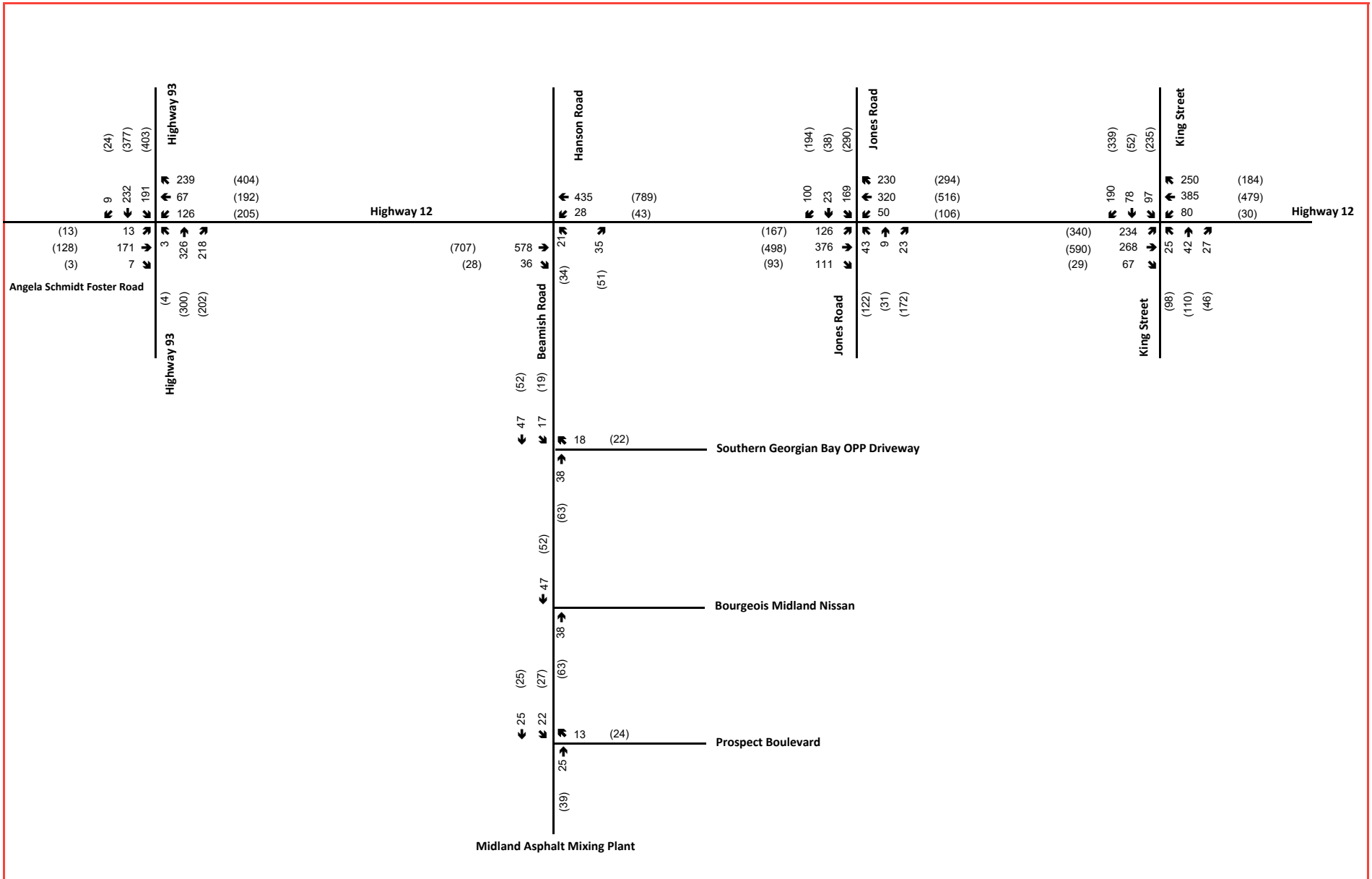
As a result of these factors, volumes at Highway 12 and Beamish Road were not reflective of typical traffic conditions today. To ensure that the intersection includes volumes from both the Nissan dealership and asphalt plant, the 10<sup>th</sup> Edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE) was used to estimate the volume of two-way trips during the weekday peak periods. The trip generation was calculated using an approximate GFA of 20,000 ft<sup>2</sup> for the dealership and an approximate site area of 70 hectares for the asphalt plant. The turning proportions observed during the 2018 TMC survey at Highway 12 and Beamish Road were used to assign volumes associated with the dealership and asphalt plant.

For the Hanson residential development to the north, only part of Phase 1A appears to have been constructed through site visit observations. It is unclear as to whether the constructed units are currently occupied. Notwithstanding, existing peak hour volume assumptions were made for trips entering and existing Hanson Road.

Based upon assumptions contained in the TIS report by TMIG dated September 2017 in support of a proposed asphalt plant at 12415 Coleraine Drive in the Town of Caledon, the percentage of two-way heavy vehicle trips at the Midland asphalt plant access were estimated to be 100% and 63% during the morning and afternoon peak hours, respectively. It was also assumed that 80% of all asphalt plant related traffic travels to and from Highway 12 via Beamish Road with the remaining 20% travelling via Prospect Boulevard.

The method set out above adopts a robust and conservative approach to calculating/estimating the gap in volumes at the Highway 12 and Beamish Road intersection during the 2018 TMC.

Existing adjusted traffic volumes at the study intersections are illustrated in **Figure 2.3**.



Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

➔ Movement

Figure 2.3  
Existing Traffic Volumes  
(Adjusted)

## 2.6 EXISTING TRAFFIC OPERATIONS

### 2.6.1 INPUTS AND PARAMETERS

The Synchro 10 software was used to analyze the intersections for this study using the Highway Capacity Manual (HCM) 2000 methodology.

Heavy vehicle percentages, pedestrian volumes and overall intersection Peak Hour Factors (PHFs) observed during the 2018 TMCs were included in the model. To better reflect the effective green interval (or inter-green time) for left turning vehicles at signalized intersections with both a permissive and protected left-turn phase, a Lost Time Adjustment factor of -1.0 was applied to all signalized intersections.

The formula used to calculate this adjustment factor is as follows:

Lost Time Adj. = Start Up Lost Time minus (-) Extension of Effective Green, where:

- Start Up Lost Time is two seconds; and
- Extension of Effective Green is three seconds for peak conditions.

All other Synchro parameters remained at default. These parameters were carried forward to the analyses of future conditions. Existing signal timing phases were also used.

### 2.6.2 ANALYSIS RESULTS

The existing intersection operations were analyzed based on the roadway weekday morning and afternoon peak hour traffic volumes illustrated in Figure 2.3.

**Table 2-2** sets out the results of the Synchro analysis under existing conditions. Detailed Synchro analysis worksheets are provided in **Appendix D**.

**Table 2-2 Synchro Analysis Results Summary - Existing Conditions**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S)	LOS	95th % Queue (m)	V/C	Delay (S)	LOS	95th % Queue (m)
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.07	22	C	6	0.08	24	C	6
EBTR	0.60	28	C	44	0.44	26	C	32
WBL	0.42	18	B	23	0.51	19	B	35
WBT	0.14	16	B	15	0.33	18	B	36
WBR	0.19	17	B	12	0.27	17	B	18
NBL	0.02	16	B	2	0.01	16	B	2
NBT	0.67	23	C	70	0.55	21	C	60
NBR	0.17	17	B	13	0.14	17	B	14
SBL	0.48	11	B	25	0.80	21	C	58
SBTR	0.33	11	B	36	0.47	12	B	59
<b>Overall</b>	<b>0.57</b>	<b>18</b>	<b>B</b>	<b>-</b>	<b>0.55</b>	<b>18</b>	<b>B</b>	<b>-</b>
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.22	7	A	15	0.34	11	B	30



EBT	0.29	11	B	31	0.42	17	B	56
EBR	0.09	10	A	10	0.06	15	B	11
WBL	0.11	9	A	7	0.23	13	B	20
WBT	0.28	13	B	28	0.46	19	B	57
WBR	0.17	13	B	14	0.19	17	B	18
NBL	0.20	18	B	12	0.33	18	B	27
NBTR	0.04	17	B	6	0.16	16	B	16
SBL	0.57	22	C	36	0.72	26	C	66
SBTR	0.14	18	B	13	0.19	16	B	17
<b>Overall</b>	<b>0.38</b>	<b>13</b>	<b>B</b>	<b>-</b>	<b>0.55</b>	<b>18</b>	<b>B</b>	<b>-</b>
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL	0.41	6	A	23	0.63	11	B	52
EBTR	0.17	5	A	16	0.33	9	A	48
WBL	0.18	10	A	16	0.09	13	B	10
WBT	0.26	10	B	29	0.33	15	B	46
WBR	0.18	10	A	11	0.12	13	B	13
NBL	0.12	25	C	10	0.27	23	C	25
NBT	0.15	25	C	14	0.23	23	C	27
NBR	0.02	24	C	1	0.03	22	C	3
SBL	0.46	27	C	27	0.72	34	C	60
SBT	0.27	25	C	22	0.11	22	C	14
SBR	0.14	25	C	15	0.22	23	C	18
<b>Overall</b>	<b>0.32</b>	<b>13</b>	<b>B</b>	<b>-</b>	<b>0.51</b>	<b>17</b>	<b>B</b>	<b>-</b>
<b>Beamish Road/Hanson Road &amp; Highway 12 (unsignalized)</b>								
EBL	-	8	A	0	-	10	A	0
EBT	-	10	A	0	-	10	A	0
NBL	-	35	D	4	-	108	F	17
NBTR	-	14	B	2	-	16	C	4
SBL	-	30	D	1	-	70	F	2
SBTR	-	11	B	0	-	15	B	0
<b>Overall</b>	<b>-</b>	<b>2</b>	<b>A</b>	<b>-</b>	<b>-</b>	<b>3</b>	<b>B</b>	<b>-</b>
<b>Beamish Road &amp; Prospect Boulevard (unsignalized)</b>								
WBLR	-	10	B	0	-	10	A	0

The results in the table above demonstrate that all intersections within the study area operate well within capacity with minimum vehicle delay and queuing during both peak hours with the exception of the northbound and southbound left movements at the Beamish Road, Hanson Road and Highway 12 intersection during the weekday afternoon peak hour. These movements operate at LOS F due to the through volumes along Highway 12. The delay to the southbound left movement demonstrates the operational sensitivity at this intersection since only five vehicles have been assigned to this movement.

# 3 SITE GENERATED TRAFFIC

## 3.1 PHASE ONE

For Phase One, Land Use Code (LUC) 310 (Hotel) in the ITE Manual defines a hotel as a place of lodging that provides sleeping accommodations and supporting facilities such as restaurants and convention facilities.

The Town of Midland’s Zoning By-Law 2004-90 also defines a Hotel as one or more buildings used mainly for the purposes of catering to the needs of the travelling public by supplying an eating establishment, conference & athletic facilities and furnished overnight accommodations.

LUC 312 (Business Hotel) in the ITE Manual defines a business hotel as a place of lodging aimed toward the business traveler that provides sleeping accommodations and limited other facilities such as a breakfast bar. Business hotels provide very few or none of the supporting facilities such as conference centers and restaurants that are typically provided at hotels and are usually smaller in size.

As the LUC 310 is applicable for a hotel with conference centre, and LUC 312 is for a hotel without a conference centre, the difference between the two LUC trip rates has been assumed to provide an appropriate estimate for the trip rates of a conference centre for the purposes of analysis.

As the trip rates for the hotel land uses are provided per unit (room) and the conference centre trip rates should be calculated per GFA, the respective trip rate per GFA for the hotel land uses was calculated using proportionate ratios. The methodology is shown in **Table 3-1**.

**Table 3-1 Conference Centre Trip Generation Rate**

Land Use (Land Use Code)	A.M. Peak Hour	P.M. Peak Hour
<b>Trip Rates per room:</b>		
<b>310</b>	0.47	0.60
<b>312</b>	0.39	0.32
Proposed Hotel: 93 rooms, 12,042 ft <sup>2</sup>		
<b>Proposed Hotel Trips:</b>		
<b>310</b>	44	56
<b>312</b>	36	30
<b>Trip Rates per 1000 ft<sup>2</sup>:</b>		
<b>310</b>	5.70	7.25
<b>312</b>	4.66	3.89
Proposed Conference Centre: 33,817 ft <sup>2</sup>		

Conference Centre Trip Rate per 1000 ft <sup>2</sup> :		
<b>310-312</b>	1.04	3.37

Using the 310 Hotel Land Use Code, the rates and directional split percentages used in this analysis are detailed in **Table 3-2**, and the total vehicle trips generated for Phase One are illustrated in **Table 3-3**.

**Table 3-2 Phase One Trip Generation Rates**

LUC	ITE Average Trip Generation Rate			
	A.M. Inbound	A.M. Outbound	P.M. Inbound	P.M. Outbound
310 (Hotel)	0.40 per Unit		0.60 per Unit	
	59%	41%	51%	49%
Conference Centre (310 minus 312)	1.04 per 1000 ft <sup>2</sup>		3.37 per 1000 ft <sup>2</sup>	
	59%	41%	51%	49%

**Table 3-3 Phase One Site Generated Vehicle Trips**

Land Use (Units)	Basis/Parameter	Vehicle Trips			
		Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Hotel 93 rooms	ITE LUC 310	26	18	28	27
Conference Centre	ITE LUC 310 minus 312	21	15	58	56
<b>Total</b>		<b>47</b>	<b>33</b>	<b>86</b>	<b>83</b>

As shown in **Table 3-3**, Phase One is expected to generate **80** and **169** two-way trips during the weekday morning and afternoon peak hours, respectively, combined between the hotel and conference centre. Phase One site volumes are illustrated in **Figure 3.1**.

Some internal capture between the convention centre and hotel is expected to occur when convention centre guests make use of hotel facilities. However, this is expected to be accounted for in the trip generation methodology and has therefore not been applied separately. This represents a conservative approach for the purposes of analysis.

## 3.2 PHASE TWO

For Phase Two, the following LUCs were selected from the ITE Manual:

- 820 (shopping center);
- 931 (Quality Restaurant); and
- 937 (Coffee/Donut Shop with Drive-Through Window).

**Table 3-4** sets out the calculated trip generation for each land use on site for Phase Two. Given the nature of the land uses being proposed for Phase Two, pass-by and internal linked trips were calculated using the relevant tables and figures contained in the ITE Trip Generation Handbook 3<sup>rd</sup> Edition. These tables, and the worksheet used to calculate internal trips, are contained in **Appendix E**.

**Table 3-4 Phase Two Site Generated Vehicle Trips**

LUC	GFA/GLA	Trip Type	Vehicle Trips					
			Weekday A.M. Peak Hour			Weekday P.M. Peak Hour		
			In	Out	2-way	In	Out	2-way
<b>820 (Shopping Center)</b>	76,169 ft <sup>2</sup>	Gross	115	71	186	197	214	411
		Pass-by (34% <sup>1</sup> )	32	32	64	70	70	140
		Linked (AM-13%, PM-23% <sup>2</sup> )	-	9	9	-	49	49
		Net	84	30	114	127	95	222
<b>937 (Coffee/Donut Shop with Drive-Through Window)</b>	2,220 ft <sup>2</sup>	Gross	101	97	198	48	48	96
		Pass-by (89% <sup>3</sup> )	88	88	176	43	43	86
		Linked <sup>2</sup> (AM-14%, PM-8%)	-	14	14	-	4	4
		Net	13	-5	8	5	2	7
<b>931 (Quality Restaurant)</b>	4,152 ft <sup>2</sup>	Gross	0	0	0	20	10	30
<b>Phase Two Totals</b>		Gross	216	168	384	265	272	536
		Pass-by	120	120	240	113	113	226
		Linked	-	23	23	-	53	53
		<b>Net new</b>	<b>97</b>	<b>25</b>	<b>122</b>	<b>152</b>	<b>106</b>	<b>258</b>

Notes:

1. Calculated using Table E-9 in Appendix E of the ITE Trip Generation Handbook 3<sup>rd</sup> Edition. Formula only available for PM ∴ PM % used for AM.
2. Calculated using Figure F.1 NCHRP 684 Trip Capture Estimation Tool in Appendix F of the ITE Trip Generation Handbook 3<sup>rd</sup> Edition.
3. Calculated using Table E-34 in Appendix E of the ITE Trip Generation Handbook 3<sup>rd</sup> Edition. Formula only available for AM ∴ AM % used for PM.
4. Calculated using Table E-31 in Appendix E of the ITE Trip Generation Handbook 3<sup>rd</sup> Edition.
5. Calculated using Table E-32 in Appendix E of the ITE Trip Generation Handbook 3<sup>rd</sup> Edition.

The net trip generation for Phase Two is **122** and **258** two-way vehicle trips during the weekday morning and afternoon peak hours, respectively. Phase Two pass-by site volumes are illustrated in **Figure 3.2**. Phase Two total site volumes are illustrated in **Figure 3.3**.

The total net site trip generation for both phases is **194** and **416** two-way vehicle trips during the weekday morning and afternoon peak hours, respectively. Total net site volumes are illustrated in **Figure 3.4**.

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### 3.3 MODAL SPLIT

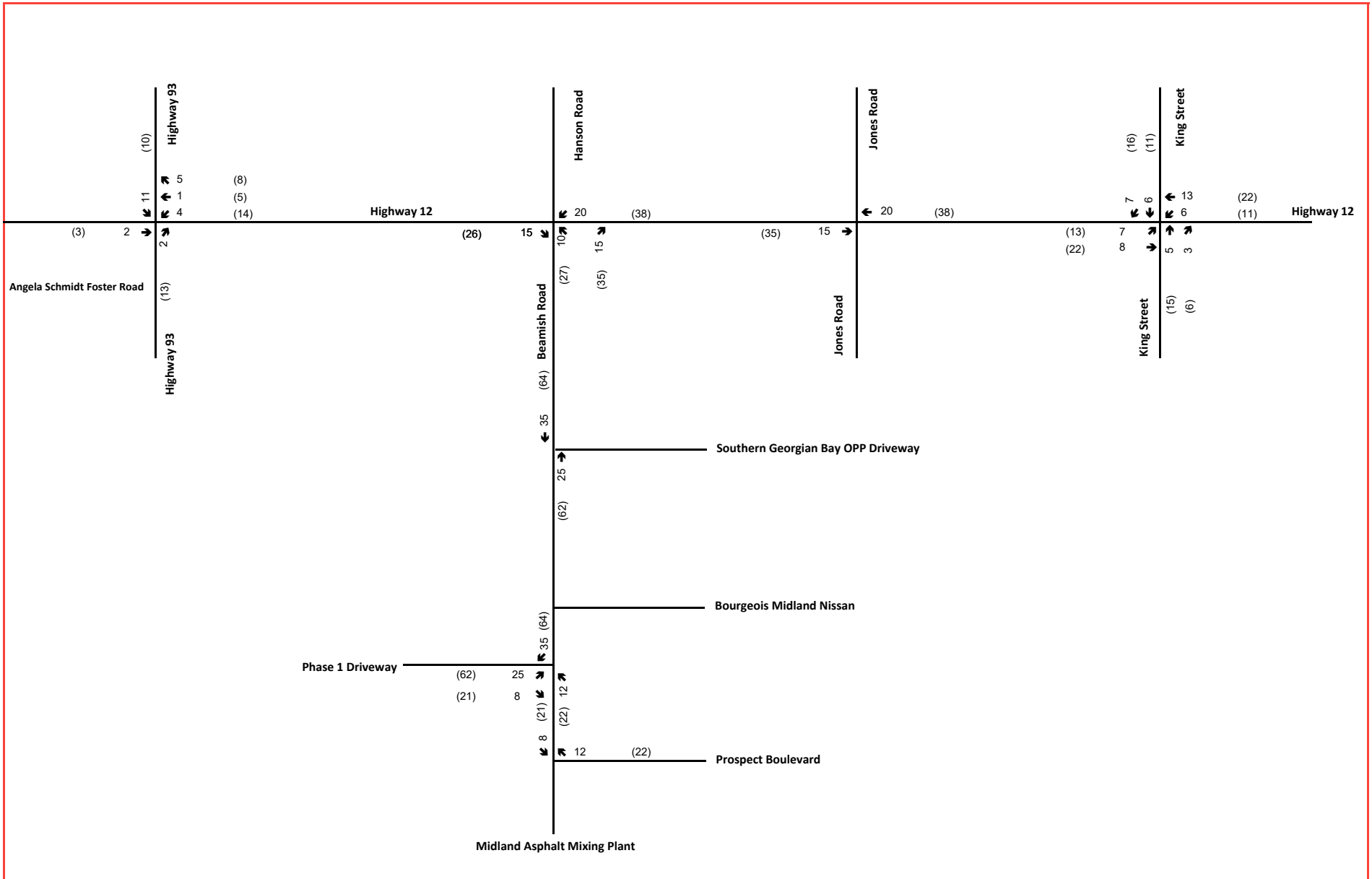
Modal split data for the study area was obtained using the 2016 Transportation Tomorrow Survey (TTS) database for GTA Zone 8576. A non-auto modal split of less than 3% was observed based on the TTS data. Therefore, as a conservative approach, a non-auto modal split was not applied.

---

### 3.4 TRIP DISTRIBUTION

The 2016 Transportation Tomorrow Survey (TTS) database was reviewed to derive site trip distribution. Existing intersection turning proportions were used to assign site traffic to the study area network.

At the site driveways, approximately 75% of all trips associated with Phase One were assigned to/from Highway 12. For Phase Two trips, approximately 90% of all trips were assigned to/from Highway 12. This is considered to be a reasonable assumption given that the fact that Prospect Boulevard ends at King Street and vehicles wanting access to/from Highway 12 would use the shortest route to/from the site which is via Beamish Road.



**Legend**

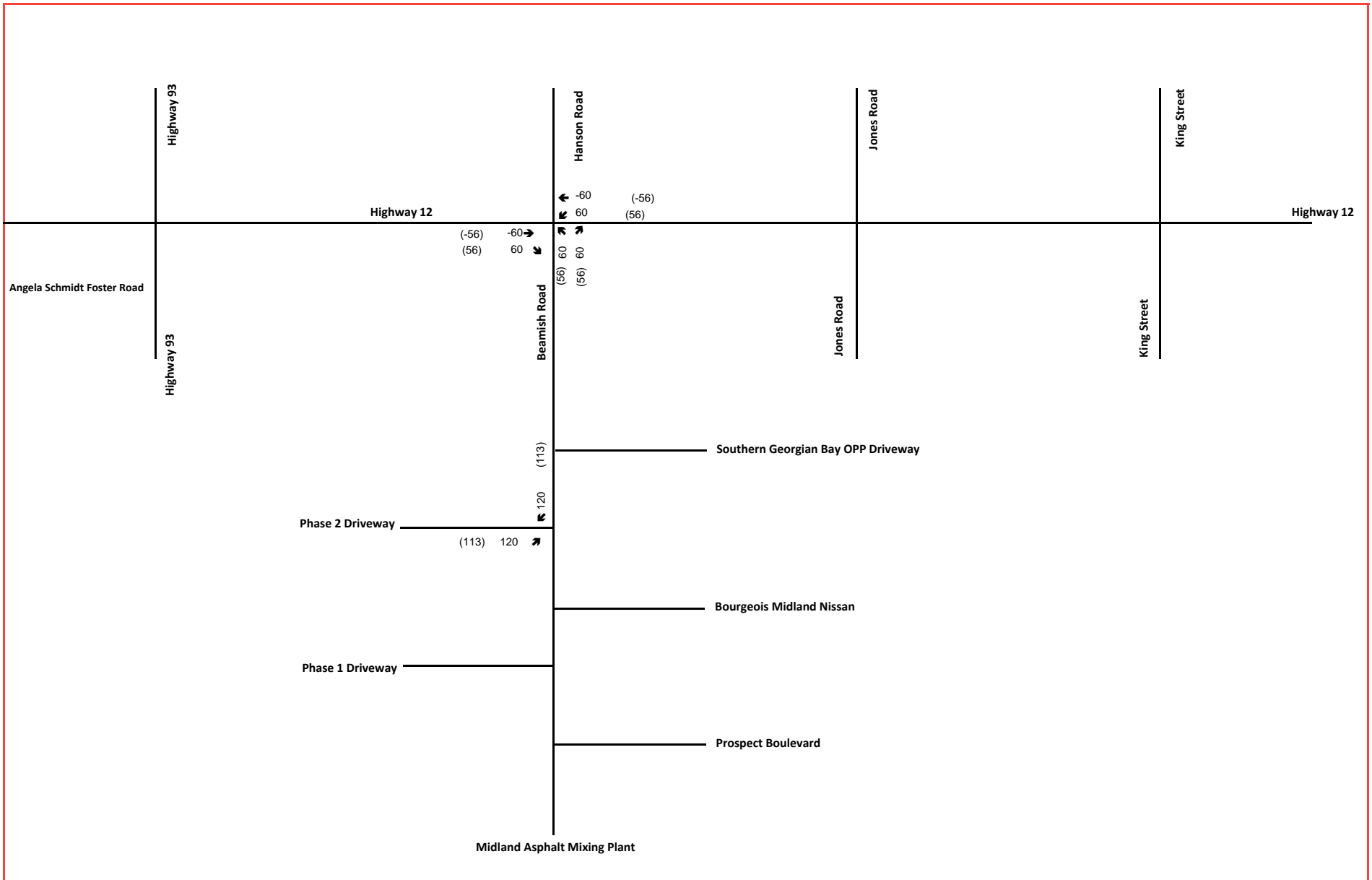
xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

→ Movement

**Figure 3.1**

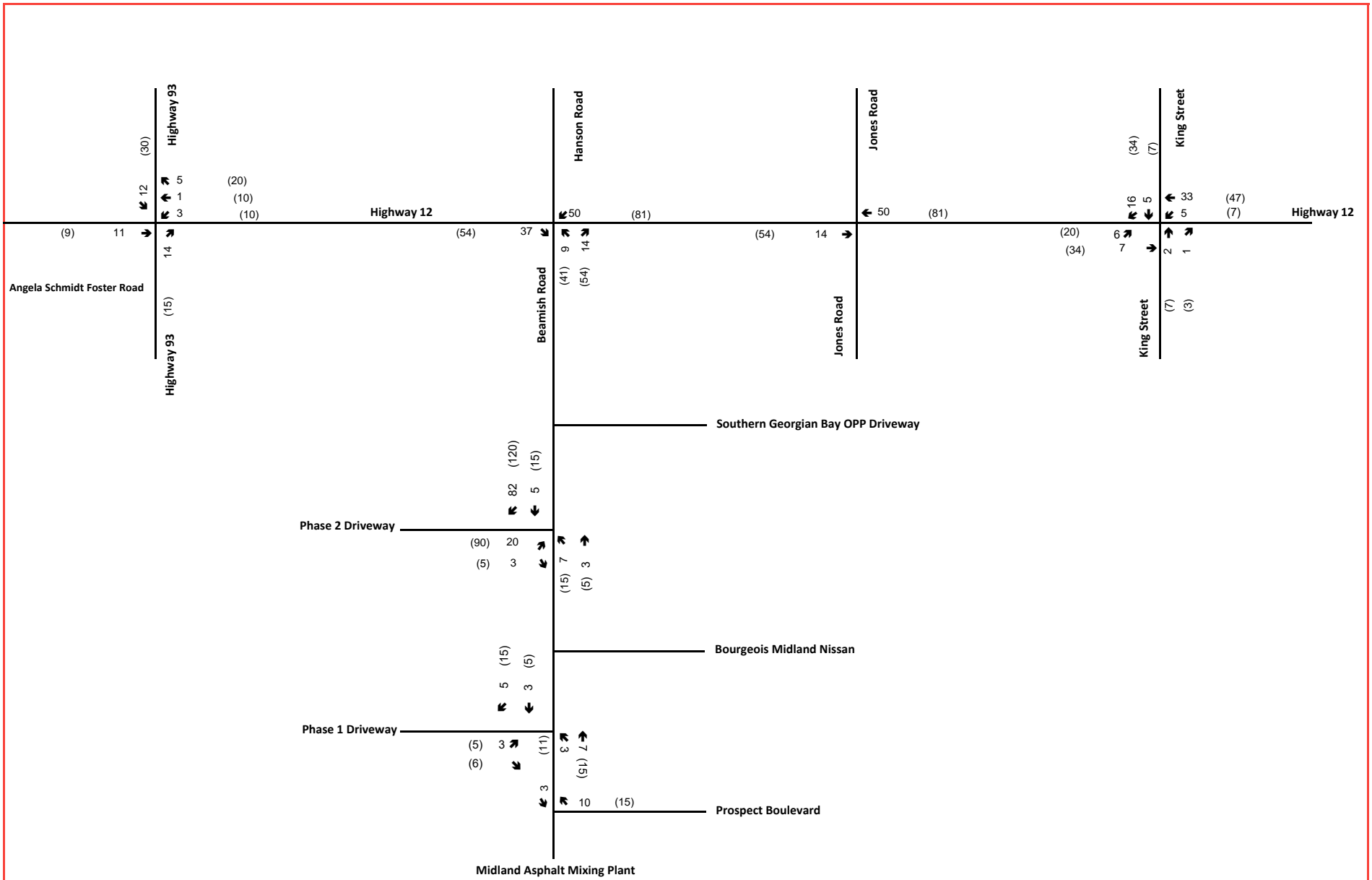
Phase One Site Traffic Volumes



Legend

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

**Figure 3.2**  
Phase Two Pass-by Site  
Traffic Volumes

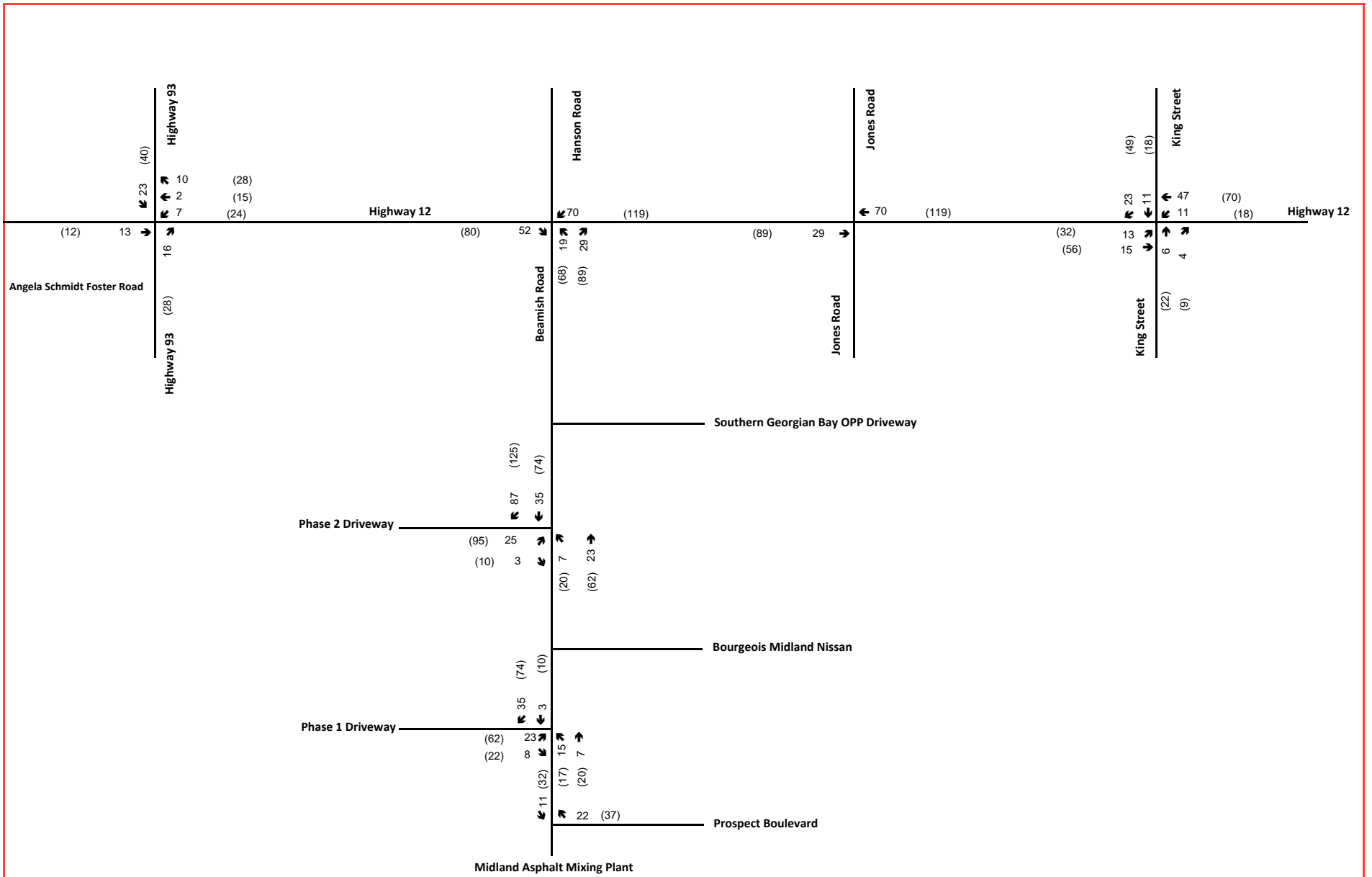


Legend

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

**Figure 3.3**  
Phase Two Net Site  
Traffic Volumes





**Legend**

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

**Figure 3.4**  
Total Net Site  
Traffic Volumes

# 4 FUTURE BACKGROUND CONDITIONS

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## 4.1 HORIZON YEARS

As per MTO guidelines, the following horizon years were selected for the project which form the basis of the assessment scenarios for the future traffic operation analyses:

- 2023 - Phase One opening year
  - 2026 - Phase Two opening year
  - 2031 - 5 years post full build-out
  - 2036 - 10 years post full build-out
- 

## 4.2 BACKGROUND CORRIDOR GROWTH RATE

A growth rate of 1.25% per annum was applied to all through movements. No growth rates were applied to the turning movements as they have already been accounted for in the background development discussed below. Background corridor growth volumes are illustrated in **Figure 4.1** to **Figure 4.4**.

---

## 4.3 BACKGROUND DEVELOPMENT

WSP conducted a TIS report dated July 2017 in support of the Hanson development on the north side of Highway 12 in between Highway 93 and King Street and south of Little Lake (hereon referred to as the Hanson TIS). The site boundary for the Hanson development is illustrated in **Figure 4.5**. The phasing plan map is illustrated in **Figure 4.6**. A copy of the Hanson TIS report is attached as **Appendix G**.

The Hanson TIS sets out the following development phasing and expected opening years.

### **Phases 1A and 1B (expected 2020 opening year)**

- 254 residential units, comprising:
  - 227 townhouses; and
  - 27 semi-detached houses
- 1,918 m<sup>2</sup> (20,650 ft<sup>2</sup>) neighbourhood commercial space.

### **Phase 1 (all sub-phases 1A, 1B, 1C, 1D and 1E) (expected 2025 opening year)**

- 690 residential units, comprising:
  - 162 apartments;
  - 431 townhouses; and
  - 97 semi-detached houses
- 3,252 m<sup>2</sup> (35,000 ft<sup>2</sup>) neighbourhood commercial space.

### **Phases 2 and 3 (expected 2030 opening year)**

→ 1,013 residential units, comprising:

- 199 apartments;
- 475 townhouses;
- 103 single family houses; and
- 236 semi-detached residential units.

A site visit was conducted in December 2020 and it was observed that only Phase 1A had been constructed. In light of this progress in construction, the following assumptions have been made in terms of the correlation between the Hanson development phasing and the horizon years for this study:

- 2023 Phase One Opening - both Phase 1a and 1b of Hanson are assumed to be complete;
- 2026 Phase Two Opening - all of Phase 1 (1a to 1e) is assumed to be complete;
- 2031 and beyond - all phases of Hanson development (1 to 3) are assumed to be complete.

The volumes associated with each phase of the Hanson background development are reflected in the relevant assessment scenario for each horizon year of this study and are illustrated in **Figure 4.7** to **Figure 4.9**. These traffic volumes have been extracted from Figures 8, 9 and 10 of the Hanson TIS. However, the link volumes have been balanced to ensure continuity along Highway 12.

Total Future Background volumes for the 2023, 2026, 2031 and 2036 horizon years are illustrated in **Figure 4.10** to **Figure 4.13**, respectively.

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## **4.4 PLANNED TRANSPORTATION NETWORK IMPROVEMENTS**

### **4.4.1 ROAD INFRASTRUCTURE IMPROVEMENTS**

No publicly funded future roadway improvements are currently proposed by the Town, County or MTO.

The Hanson TIS details several road infrastructure improvements required to mitigate the impact of the ultimate build-out of the development by phase.

The road improvements relevant to the study area network are related to the intersection of Beamish Road, Hanson Road and Highway 12. Section 6.2.3 of the Hanson TIS states that signalization of this intersection is required in the year 2025 when the entirety of Phase 1 is scheduled to be built-out. It also identifies the need for the following lane configuration changes by the year 2020:

- Northbound, southbound and eastbound approaches - a through-right and exclusive left-turn lane
- Westbound approach - single through lane and exclusive left and right turn lanes

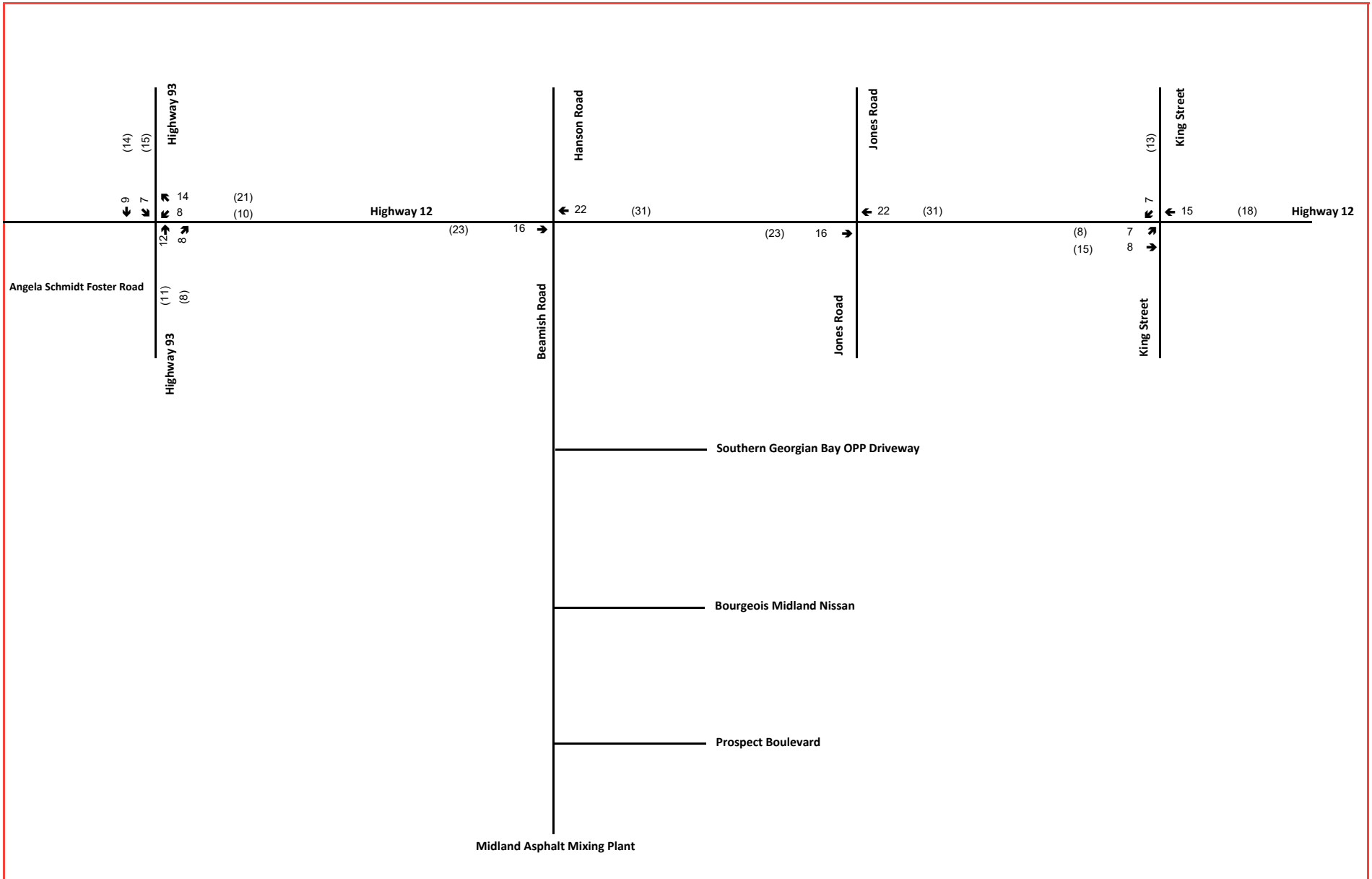
During the site visit in December 2020, it was observed that the eastbound and westbound approaches had exclusive turns, as detailed above, but not the northbound approach.

No infrastructure improvements were deemed necessary at any of the other three study area intersections.

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#### ***4.4.2 ACTIVE TRANSPORTATION IMPROVEMENTS***

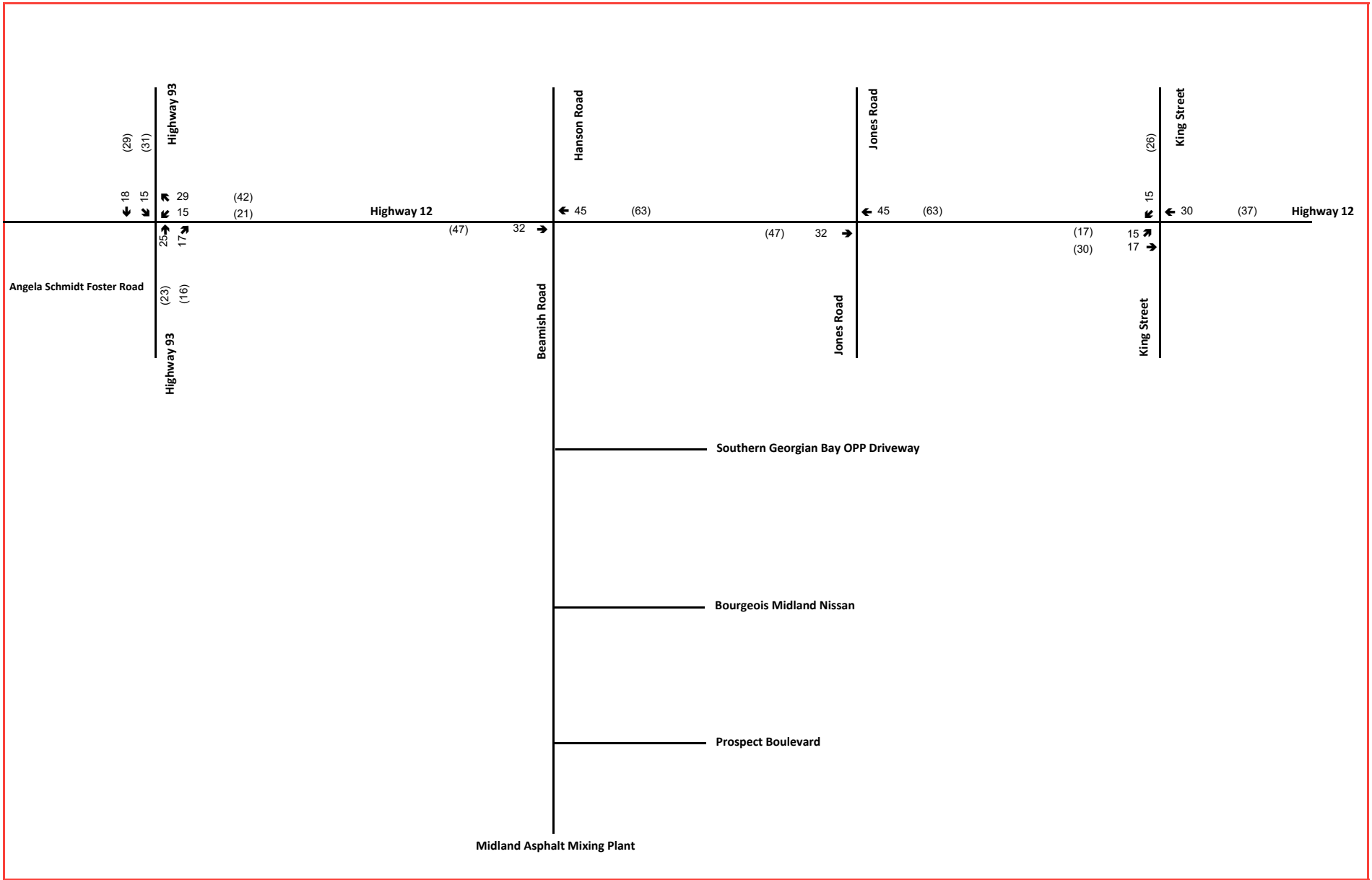
As of February 28, 2018, a Municipal Class Environmental Assessment Study was completed for County Road 93 (Penetanguishene Road) from Highway 12 to Thompsons Road for proposed transportation upgrades. The proposed upgrades were aligned with Complete Streets concepts. For the intersection of County Road 93 (Penetanguishene Road) and Highway 12, paved shoulders on either side of the road were proposed as part of the study. Currently, the shoulders are unpaved.



Legend

- xx A.M. Peak Hour Traffic Volumes
- (xx) P.M. Peak Hour Traffic Volumes
- ➔ Movement

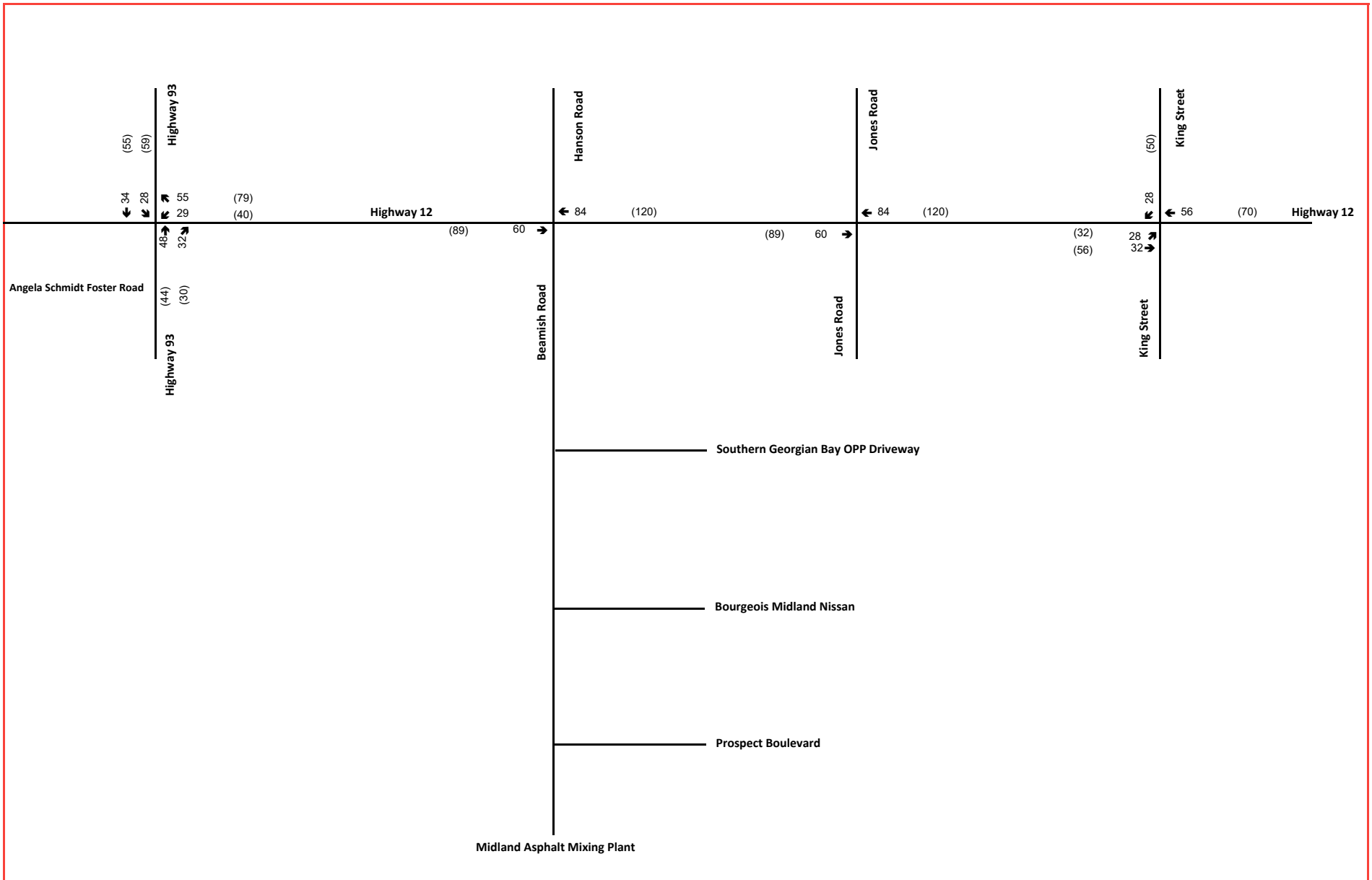
**Figure 4.1**  
Corridor Growth (2023)



**Legend**

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

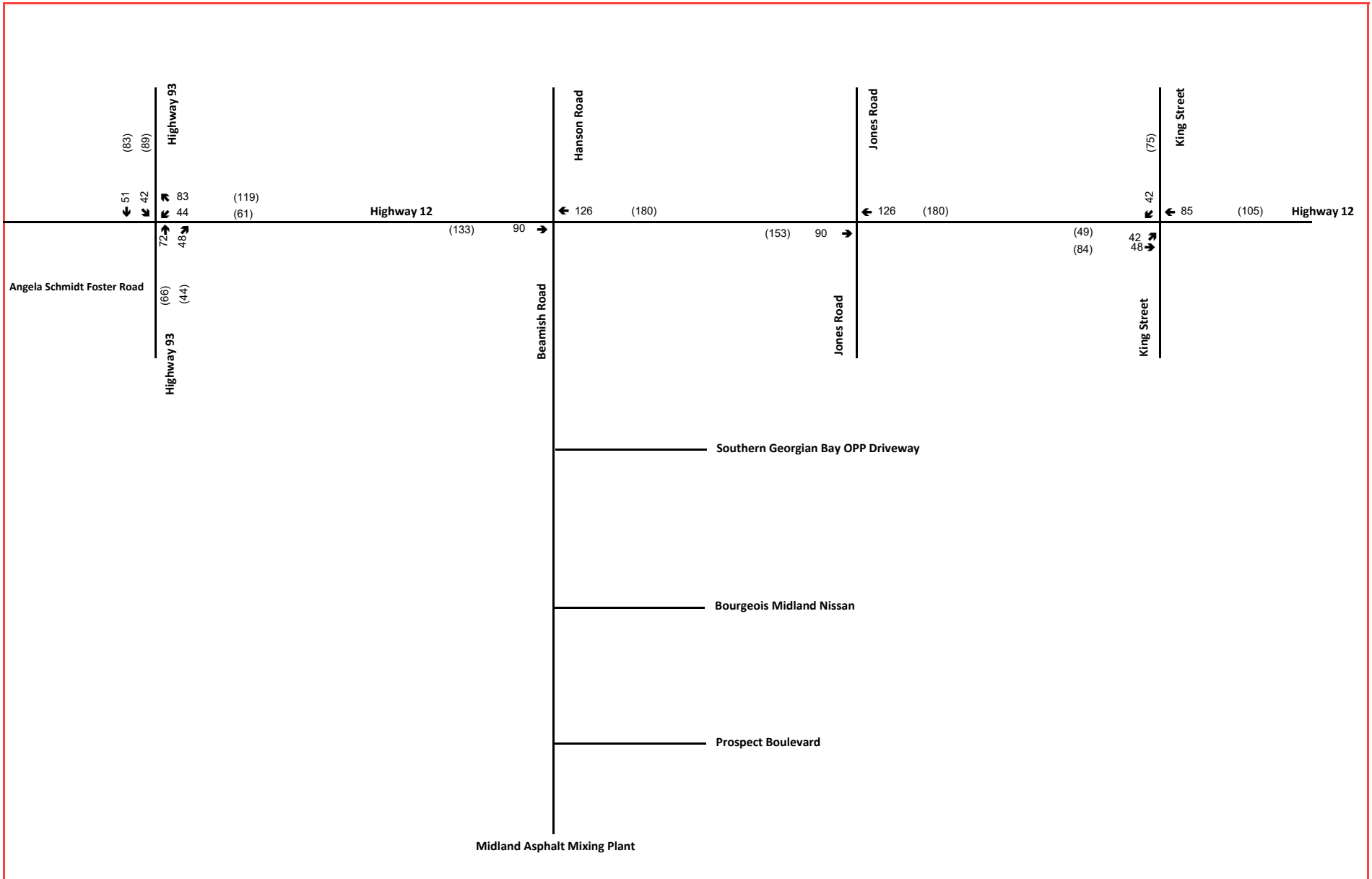
**Figure 4.2**  
Corridor Growth (2026)



**Legend**

- xx A.M. Peak Hour Traffic Volumes
- ((xx)) P.M. Peak Hour Traffic Volumes
- ➔ Movement

**Figure 4.3**  
Corridor Growth (2031)



**Legend**

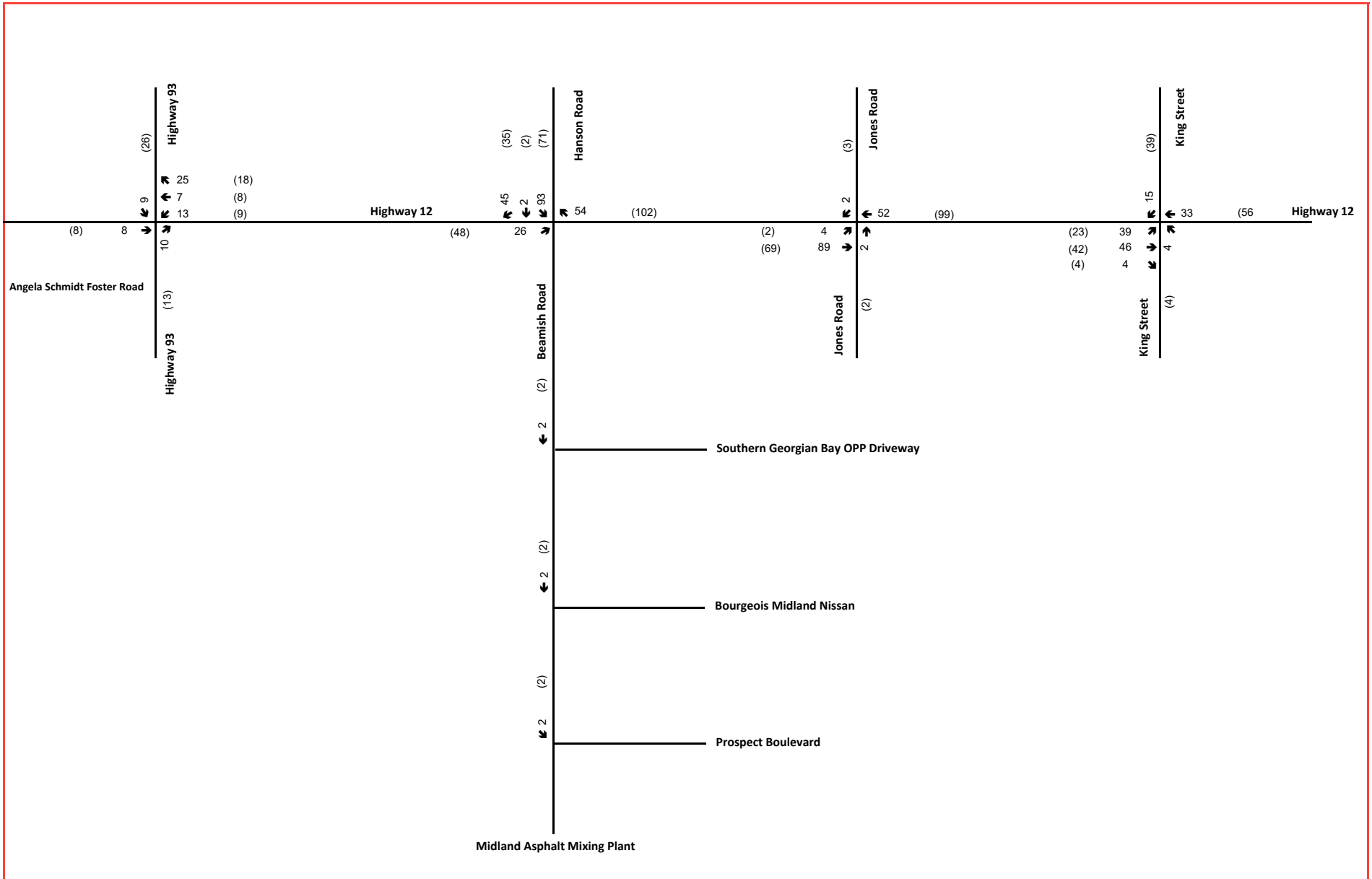
xx A.M. Peak Hour Traffic Volumes

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

➔ Movement

**Figure 4.4**  
Corridor Growth (2036)





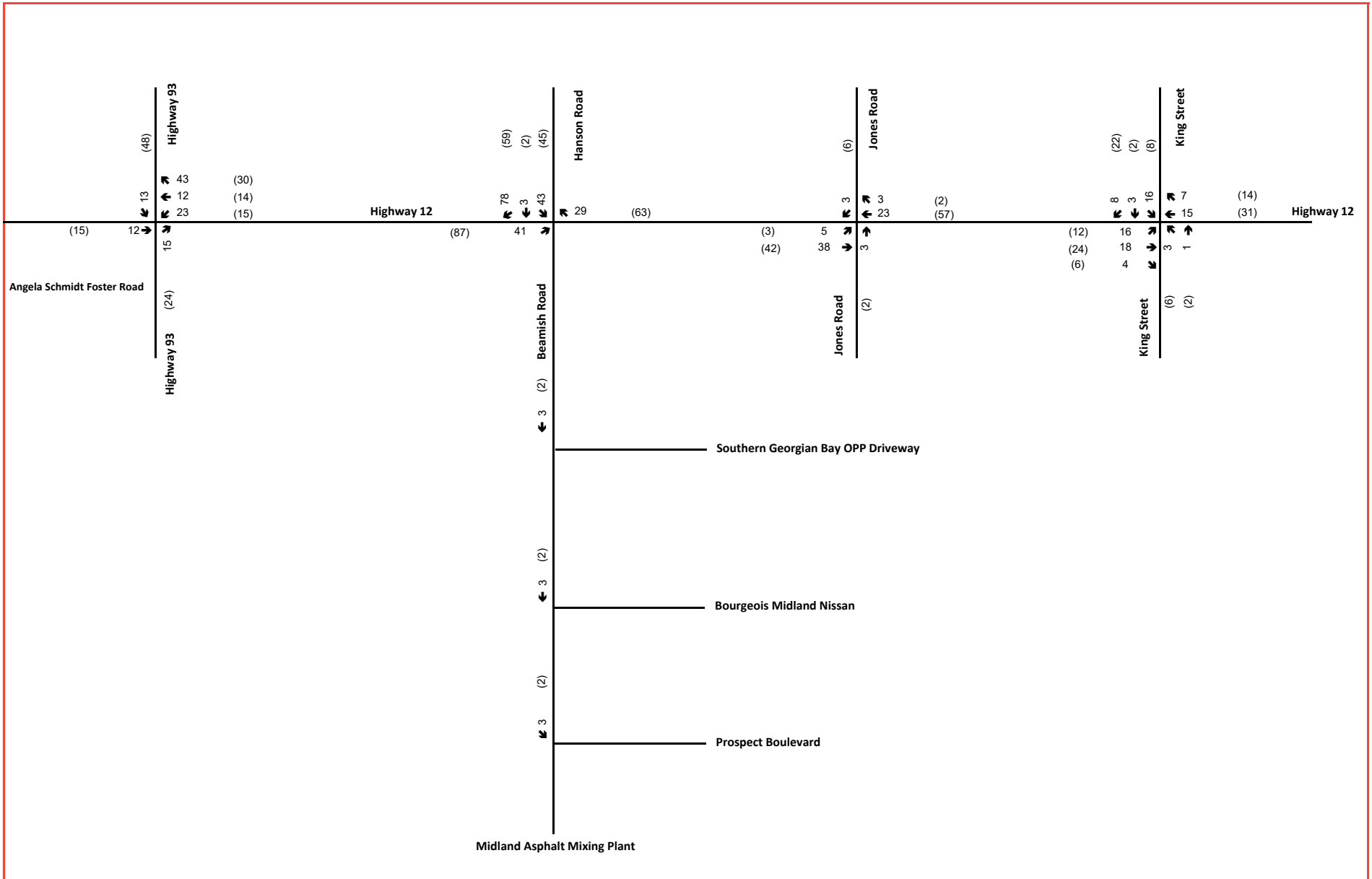
Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

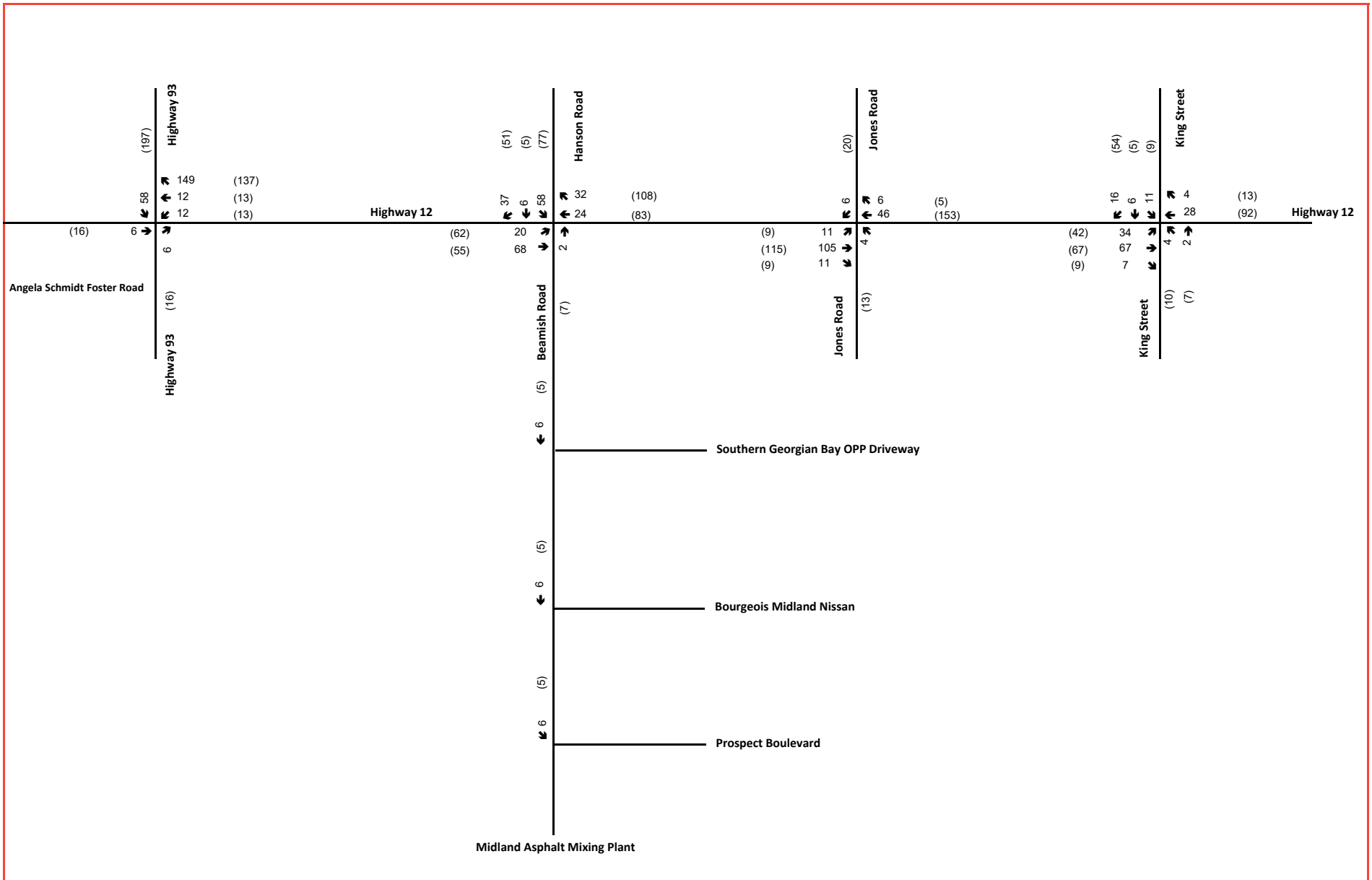
➔ Movement

**Figure 4.7**  
 Future Background Development Volumes  
 - Phase 1A and 1B Only  
 (2023 Horizon Year)



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

**Figure 4.8**  
 Future Background  
 Development Volumes - Phase  
 1 Total (2026 Horizon Year)



Legend

xx A.M. Peak Hour Traffic Volumes

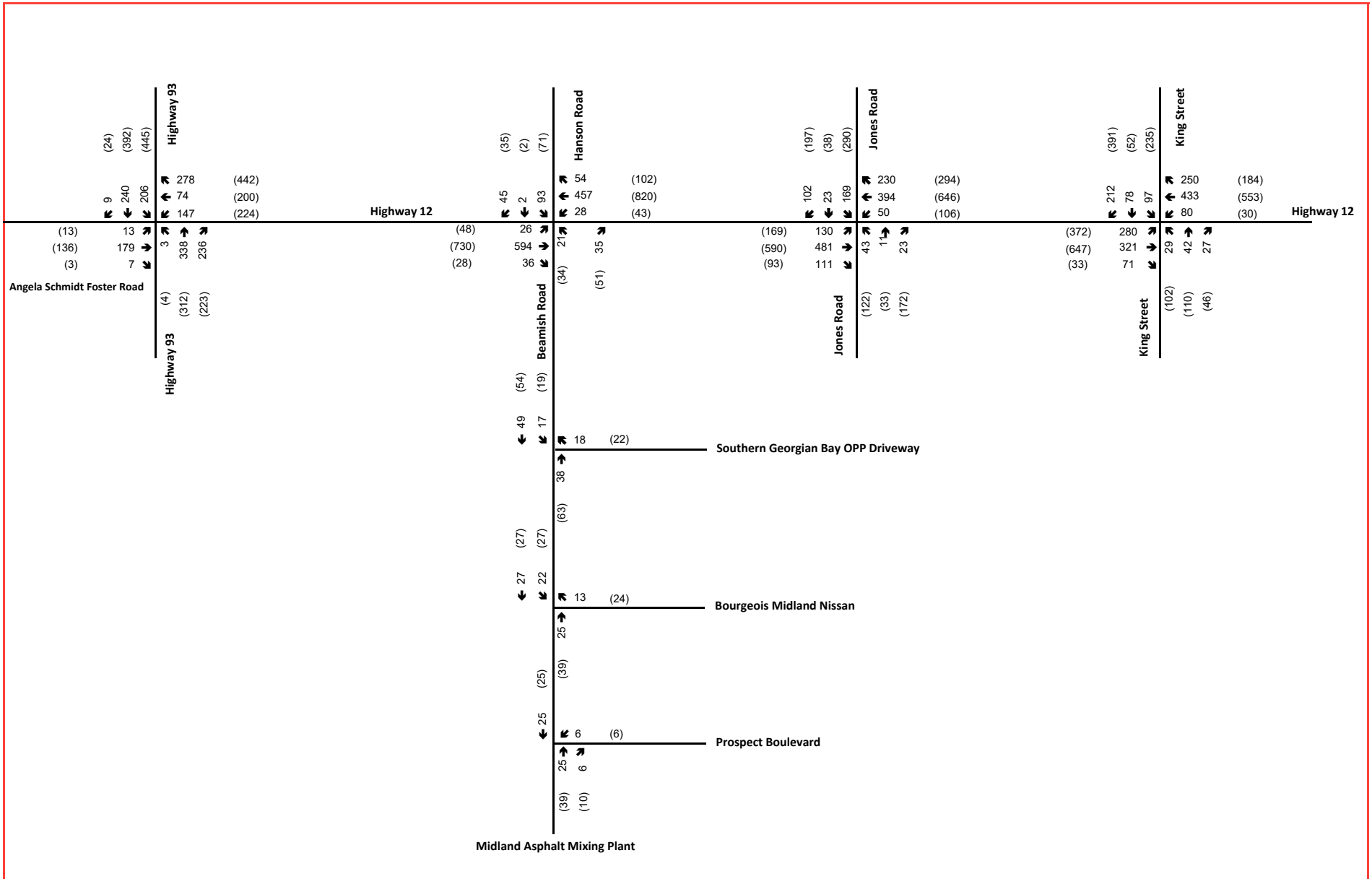
((xx))

P.M. Peak Hour Traffic Volumes



Movement

**Figure 4.9**  
 Future Background Development Volumes - Phase 1 to 3 Total (2031 and 2036 Horizon Years)



**Legend**

xx A.M. Peak Hour Traffic Volumes

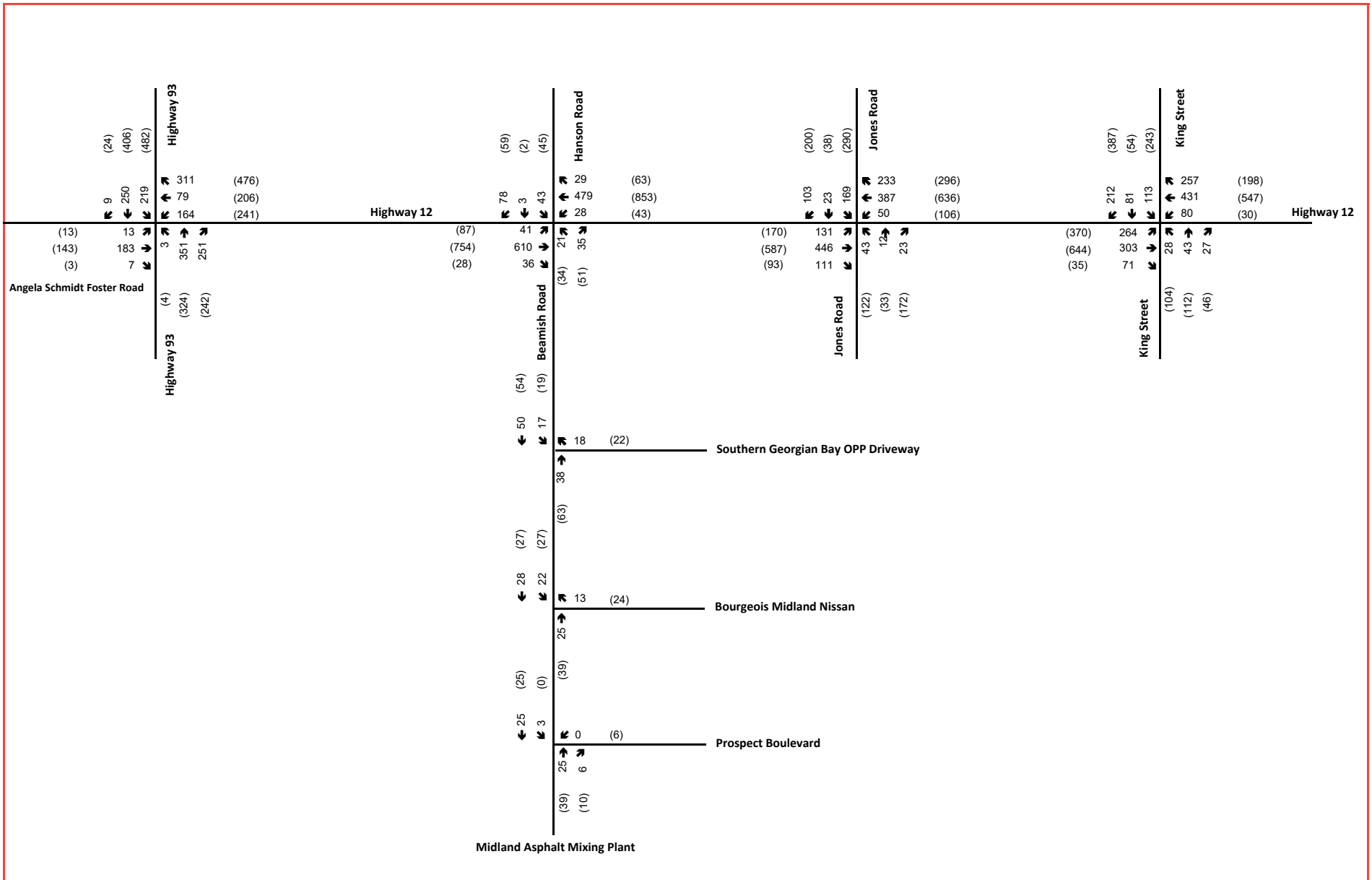
(xx)

P.M. Peak Hour Traffic Volumes



Movement

**Figure 4.10**  
Future Background Traffic Volumes (2023)



**Legend**

xx A.M. Peak Hour Traffic Volumes

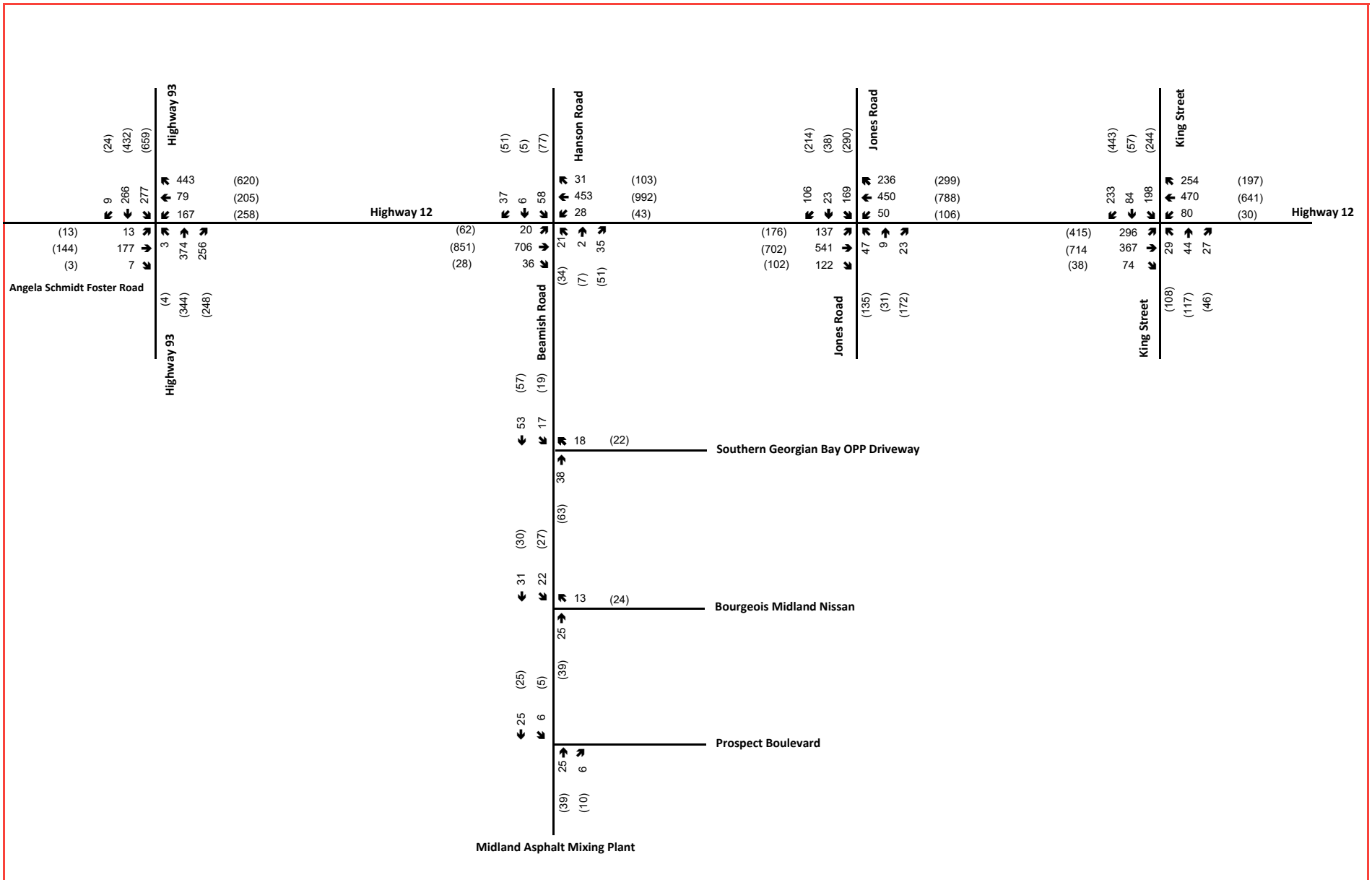
((xx))

P.M. Peak Hour Traffic Volumes



Movement

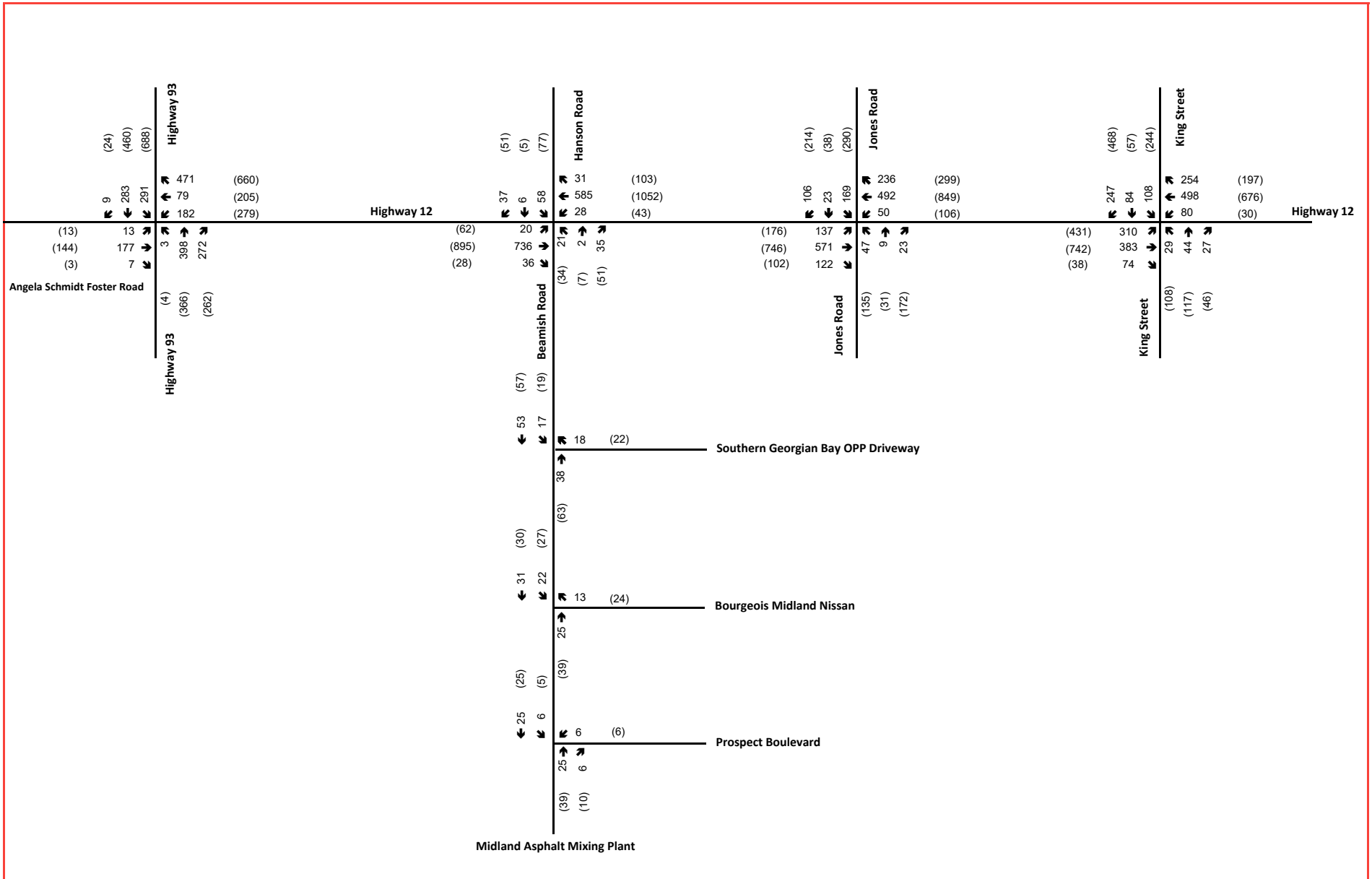
**Figure 4.11**  
Future Background Traffic Volumes (2026)



**Legend**

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

**Figure 4.12**  
Future Background Traffic Volumes (2031)



**Legend**

- xx A.M. Peak Hour Traffic Volumes
- ((xx)) P.M. Peak Hour Traffic Volumes
- ➔ Movement

**Figure 4.13**  
Future Background Traffic Volumes (2036)

## 4.5 FUTURE BACKGROUND TRAFFIC OPERATIONS

### 4.5.1 FUTURE BACKGROUND 2023 ANALYSIS RESULTS

Future background 2023 traffic operations were analyzed on the basis of the traffic volumes illustrated in Figure 4.10. The heavy vehicle percentages, pedestrian volumes, PHFs and all other Synchro parameters were maintained from existing conditions. Existing signal timing plans for all existing signalized intersections were also maintained.

The Synchro analysis results for the 2023 Future Background scenario are summarized in **Table 4-1** with the Synchro analysis worksheets attached in **Appendix H**.

**Table 4-1 Synchro Analysis Results Summary – Future Background Conditions - 2023**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (s) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>	V/C	Delay (s) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.07	23	C	6	0.08	23	C	6
EBTR	0.65	30	C	46	0.47	26	C	34
WBL	0.46	18	B	27	0.56	20	B	38
WBT	0.15	16	B	17	0.34	18	B	37
WBR	0.22	17	B	13	0.30	17	B	18
NBL	0.02	16	B	2	0.01	16	B	2
NBT	0.71	25	C	73	0.57	21	C	62
NBR	0.18	17	B	13	0.16	17	B	15
SBL	0.55	13	B	27	0.90	32	C	78
SBTR	0.34	11	B	37	0.48	12	B	61
<b>Overall</b>	<b>0.62</b>	<b>19</b>	<b>B</b>	<b>-</b>	<b>0.59</b>	<b>21</b>	<b>C</b>	<b>-</b>
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.24	7	A	16	0.39	12	B	32
EBT	0.37	12	B	42	0.48	18	B	69
EBR	0.09	10	A	10	0.06	15	B	11
WBL	0.12	9	A	8	0.25	13	B	21
WBT	0.35	14	B	35	0.55	21	C	76
WBR	0.17	13	B	14	0.19	18	B	18
NBL	0.20	18	B	12	0.33	19	B	30
NBTR	0.05	17	B	7	0.17	17	B	17
SBL	0.56	22	C	36	0.73	28	C	74
SBTR	0.14	18	B	13	0.19	17	B	19
<b>Overall</b>	<b>0.42</b>	<b>13</b>	<b>B</b>	<b>-</b>	<b>0.60</b>	<b>19</b>	<b>B</b>	<b>-</b>
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL	0.51	6	A	28	0.75	16	B	69
EBTR	0.21	5	A	19	0.36	9	A	53
WBL	0.19	10	A	16	0.10	13	B	10
WBT	0.29	10	B	32	0.38	15	B	54
WBR	0.18	10	A	11	0.12	13	B	13
NBL	0.14	25	C	11	0.28	23	C	26
NBT	0.15	25	C	14	0.22	23	C	27
NBR	0.02	24	C	1	0.03	21	C	3
SBL	0.46	27	C	27	0.71	33	C	60



Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (s) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>	V/C	Delay (s) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>
SBT	0.27	25	C	22	0.10	22	C	14
SBR	0.16	25	C	15	0.39	24	C	34
<b>Overall</b>	<b>0.36</b>	<b>12</b>	<b>B</b>	<b>-</b>	<b>0.54</b>	<b>17</b>	<b>B</b>	<b>-</b>
<b>Beamish Road/Hanson Road &amp; Highway 12 (unsignalized)</b>								
EBL	-	9	A	1	-	11	B	2
WBL	-	10	B	1	-	10	B	2
NBL	-	52	F	7	-	348	F	31
NBTR	-	15	B	2	-	17	C	4
SBL	-	113	F	41	-	717	F	67
SBTR	-	13	B	3	-	20	C	4
<b>Beamish Road/Hanson Road &amp; Highway 12 (Signalized)</b>								
EBL	0.07	6	A	5	0.19	5	A	8
EBT	0.63	9	A	71	0.63	8	A	91
EBR	0.03	5	A	3	0.02	4	A	2
WBL	0.12	6	A	5	0.14	5	A	6
WBT	0.50	8	A	50	0.69	9	A	111
WBR	0.04	5	A	4	0.08	4	A	6
NBL	0.10	16	B	7	0.19	26	C	13
NBTR	0.03	16	B	0	0.04	25	C	1
SBL	0.34	18	B	22	0.35	27	C	24
SBTR	0.04	16	B	8	0.03	25	C	9
<b>Overall</b>	<b>0.55</b>	<b>9</b>	<b>A</b>	<b>-</b>	<b>0.62</b>	<b>10</b>	<b>A</b>	<b>-</b>

Notes:

1. Results rounded to nearest whole number

The results in the table above demonstrate that the study area network operates within capacity under 2023 future background conditions with the exception of the northbound and southbound left turn movements at the Beamish Road, Hanson Road and Highway 12 intersection. These movements continue to operate at LOS F as they did under existing conditions with significant delay during the afternoon peak hour. This delay is due to corridor growth along Highway 12 and the completion of Phase 1a and 1b of the Hanson background development.

#### 4.5.2 SIGNALIZATION OF BEAMISH ROAD, HANSON ROAD AND HIGHWAY 12

In the Hanson TIS, an MTO traffic signal warrant was carried out for the Beamish Road, Hanson Road and Highway 12 intersection. The results of the signal warrant showed that the intersection falls short of the 100% threshold to warrant a traffic signal in the future.

Notwithstanding, to mitigate the level of delay experienced at the left-out movements, and in anticipation of future traffic growth in the area, it is recommended that this intersection be signalized by 2023.

It must be noted that this signalization is triggered by a combination of corridor growth and the introduction of Phase 1a and 1b of the Hanson background development. It is not triggered by the completion of Phase One of the development proposal, which has an expected opening year of 2023.

**Table 4-2** sets out the recommended signal timings for this intersection under all future background conditions.

**Table 4-2 Future Background Signal Timing Phases for Beamish Road, Hanson Road & Highway 12**

Phase	AM Peak	PM Peak
E-W	39.2	59.2
N-S	55.8	55.8

Phase	AM Peak	PM Peak
Cycle Length	95	115

The Synchro results of signalizing this intersection using the recommended phases above are located in **Table 4-1** above. The results demonstrate that this intersection would operate well within capacity if signalized with an overall intersection v/c ratio of 0.56 and 0.63 during the morning and afternoon peak hours, respectively, and an overall LOS of B during both peaks.

### 4.5.3 FUTURE BACKGROUND 2026 ANALYSIS RESULTS

Future background 2026 traffic operations were analyzed on the basis of the traffic volumes illustrated in Figure 4.11. Heavy vehicle percentages, pedestrian volumes, PHFs and all other Synchro parameters were maintained. Existing signal timing plans for existing signalized intersections were maintained with the exception of Highway 93, Penetanguishene Road and Highway 12 which was optimized for both peak hours. The signal timings recommended for Beamish Road, Hanson Road and Highway 12 in section 4.5.2 above were also maintained.

The Synchro analysis results for the 2026 Future Background scenario are summarized in **Table 4-3** with the Synchro analysis worksheets attached in **Appendix H**.

**Table 4-3 Synchro Analysis Results Summary – Future Background Conditions - 2026**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (s)	LOS	95th % Queue (m)	V/C	Delay (s)	LOS	95th % Queue (m)
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.07	25	C	7	0.10	32	C	8
EBTR	0.62	32	C	56	0.63	39	D	53
WBL	0.52	21	C	39	0.61	26	C	56
WBT	0.16	18	B	22	0.37	23	C	51
WBR	0.25	19	B	15	0.32	22	C	24
NBL	0.01	17	B	2	0.01	22	C	3
NBT	0.67	25	C	81	0.65	30	C	82
NBR	0.19	18	B	13	0.17	23	C	17
SBL	0.60	15	B	33	0.84	24	C	72
SBTR	0.35	12	B	44	0.45	12	B	66
<b>Overall</b>	<b>0.62</b>	<b>20</b>	<b>B</b>	-	<b>0.68</b>	<b>23</b>	<b>C</b>	-
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.24	7	A	16	0.39	12	B	32
EBT	0.34	11	B	39	0.48	18	B	69
EBR	0.09	10	A	10	0.06	15	B	11
WBL	0.12	9	A	8	0.25	13	B	21
WBT	0.34	14	B	34	0.54	21	C	74
WBR	0.17	13	B	14	0.20	18	B	18
NBL	0.20	18	B	11	0.33	19	B	30
NBTR	0.05	17	B	7	0.17	17	B	17
SBL	0.57	22	C	36	0.73	28	C	73
SBTR	0.14	18	B	13	0.19	17	B	19
<b>Overall</b>	<b>0.41</b>	<b>13</b>	<b>B</b>	-	<b>0.60</b>	<b>19</b>	<b>B</b>	-
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL	0.49	6	A	28	0.74	16	B	66
EBTR	0.20	6	A	19	0.37	10	A	53
WBL	0.19	10	B	17	0.10	13	B	10

WBT	0.29	11	B	34	0.38	15	B	53
WBR	0.19	10	B	11	0.13	14	B	13
NBL	0.12	24	C	10	0.28	23	C	26
NBT	0.14	24	C	14	0.22	23	C	27
NBR	0.02	24	C	0	0.03	21	C	3
SBL	0.51	28	C	31	0.73	34	C	62
SBT	0.26	25	C	22	0.11	22	C	15
SBR	0.16	24	C	15	0.37	24	C	33
<b>Overall</b>	<b>0.37</b>	<b>13</b>	<b>B</b>	-	<b>0.54</b>	<b>18</b>	<b>B</b>	-
<b>Beamish Road/Hanson Road &amp; Highway 12 (signalized)</b>								
EBL	0.11	5	A	6	0.31	5	A	13
EBT	0.62	9	A	65	0.62	7	A	86
EBR	0.03	5	A	3	0.02	4	A	2
WBL	0.12	5	A	4	0.14	4	A	6
WBT	0.50	7	A	47	0.69	8	A	108
WBR	0.02	5	A	2	0.05	4	A	4
NBL	0.11	18	B	7	0.22	29	C	13
NBTR	0.03	17	B	2	0.04	28	C	0
SBL	0.18	18	B	12	0.26	30	C	17
SBTR	0.07	17	B	10	0.05	28	C	11
<b>Overall</b>	<b>0.51</b>	<b>9</b>	<b>A</b>	-	<b>0.61</b>	<b>9</b>	<b>A</b>	-

The results in the table above demonstrate that the study area network operates within capacity under 2026 future background conditions with highest overall v/c of 0.68 observed at Highway 93, Penetanguishene Road and Highway 12 during the afternoon peak hour. All other intersections and individual movements operate with acceptable levels of delay and queuing.

#### 4.5.4 FUTURE BACKGROUND 2031 ANALYSIS RESULTS

Future background 2031 traffic operations were analyzed on the basis of the traffic volumes illustrated in Figure 4.12. Heavy vehicle percentages, pedestrian volumes, PHFs and all other Synchro parameters were maintained. Existing signal timing plans for existing signalized intersections were maintained with the exception of Highway 93, Penetanguishene Road and Highway 12 which was optimized for both peak hours. The signal timings recommended for Beamish Road, Hanson Road and Highway 12 in section 4.5.2 above were also maintained.

The Synchro analysis results for the 2031 Future Background scenario are summarized in **Table 4-4** with the Synchro analysis worksheets attached in **Appendix H**.

**Table 4-4 Synchro Analysis Results Summary – Future Background Conditions - 2031**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S)	LOS	95 <sup>th</sup> % Queue (m)	V/C	Delay (S)	LOS	95 <sup>th</sup> % Queue (m)
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.07	27	C	7	0.11	33	C	8
EBTR	0.63	34	C	56	0.64	41	D	50
WBL	0.58	24	C	41	0.81	43	D	69
WBT	0.17	20	C	23	0.44	28	C	54
WBR	0.41	22	C	25	0.42	27	C	31
NBL	0.01	17	B	2	0.02	24	C	3
NBT	0.72	27	C	91	0.76	38	D	100
NBR	0.20	19	B	13	0.17	26	C	18
SBL	0.70	17	B	39	1.00	53	D	160

SBTR	0.35	11	B	44	0.44	10	B	65
<b>Overall</b>	<b>0.67</b>	<b>22</b>	<b>C</b>	<b>-</b>	<b>0.82</b>	<b>34</b>	<b>C</b>	<b>-</b>
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.26	7	A	18	0.47	13	B	33
EBT	0.41	12	B	48	0.55	19	B	84
EBR	0.09	10	B	10	0.07	15	B	11
WBL	0.12	10	A	8	0.28	13	B	21
WBT	0.40	14	B	41	0.64	22	C	95
WBR	0.17	13	B	14	0.20	18	B	18
NBL	0.21	19	B	13	0.39	20	C	34
NBTR	0.04	17	B	7	0.16	18	B	17
SBL	0.56	22	C	37	0.74	30	C	75
SBTR	0.14	18	B	14	0.20	18	B	20
<b>Overall</b>	<b>0.45</b>	<b>14</b>	<b>B</b>	<b>-</b>	<b>0.65</b>	<b>20</b>	<b>B</b>	<b>-</b>
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL	0.57	7	A	31	0.93	37	D	101
EBTR	0.24	6	A	23	0.41	10	A	60
WBL	0.21	10	B	17	0.10	14	B	10
WBT	0.32	11	B	36	0.44	16	B	64
WBR	0.19	10	B	11	0.13	14	B	13
NBL	0.13	24	C	11	0.30	23	C	28
NBT	0.15	25	C	14	0.23	23	C	28
NBR	0.02	24	C	1	0.03	21	C	3
SBL	0.49	28	C	30	0.73	34	C	63
SBT	0.28	25	C	23	0.11	22	C	16
SBR	0.17	25	C	16	0.58	27	C	57
<b>Overall</b>	<b>0.39</b>	<b>13</b>	<b>C</b>	<b>-</b>	<b>0.59</b>	<b>21</b>	<b>C</b>	<b>-</b>
<b>Beamish Road/Hanson Road &amp; Highway 12 (signalized)</b>								
EBL	0.06	5	A	4	0.35	6	A	14
EBT	0.70	10	A	86	0.71	9	A	127
EBR	0.03	5	A	3	0.02	4	A	2
WBL	0.15	5	A	5	0.17	5	A	7
WBT	0.55	8	A	57	0.81	12	B	188
WBR	0.03	5	A	3	0.08	4	A	7
NBL	0.11	19	B	7	0.20	29	C	13
NBTR	0.04	18	B	7	0.07	28	C	11
SBL	0.25	20	B	15	0.40	31	C	25
SBTR	0.05	18	B	8	0.06	28	C	11
<b>Overall</b>	<b>0.59</b>	<b>10</b>	<b>A</b>	<b>-</b>	<b>0.73</b>	<b>12</b>	<b>B</b>	<b>-</b>

The results in the table above demonstrate that the study area network operates within capacity under 2031 future background conditions with highest overall v/c of 0.82 observed at Highway 93, Penetanguishene Road and Highway 12 during the afternoon peak hour. At this intersection, although the cycle length and signal phases have been optimized, the southbound left movement operates at capacity during the afternoon peak hour given the projected volume demand of 660 vehicles. This movement would operate with greater capacity and less queuing if it were served by a dual left lane.

All other intersections and individual movements operate with acceptable levels of delay and queuing.

## 4.5.5 FUTURE BACKGROUND 2036 ANALYSIS RESULTS

Future background 2036 traffic operations were analyzed on the basis of the traffic volumes illustrated in **Figure 4.13**. Heavy vehicle percentages, pedestrian volumes, PHFs and all other Synchro parameters were maintained. Existing signal timing plans for existing signalized intersections were also maintained with the exception of the following:

- Highway 93, Penetanguishene Road and Highway 12 - cycle length and phases optimized for both peak hours
- King Street & Highway 12 - eastbound left phase increased from 10 to 15 seconds during the afternoon peak hour

In addition to optimizing the signal timings, the southbound left turn movement was modelled as a dual lane.

The Synchro analysis results for the 2036 Future Background scenario are summarized in **Table 4-5** with the Synchro analysis worksheets attached in **Appendix H**.

**Table 4-5 Synchro Analysis Results Summary – Future Background Conditions - 2036**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S)	LOS	95th % Queue (m)	V/C	Delay (S)	LOS	95th % Queue (m)
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.08	29	C	8	0.10	31	C	8
EBTR	0.70	39	D	63	0.61	38	D	50
WBL	0.65	27	C	46	0.83	42	D	79
WBT	0.17	21	C	23	0.42	25	C	54
WBR	0.50	24	C	39	0.48	26	C	40
NBT	0.73	28	C	94	0.77	36	D	110
NBR	0.21	19	B	13	0.18	24	C	19
SBL <sup>1</sup>	0.65	35	D	39	0.76	32	C	78
SBTR	0.36	11	B	44	0.48	11	B	70
<b>Overall</b>	<b>0.69</b>	<b>25</b>	<b>C</b>	<b>-</b>	<b>0.73</b>	<b>28</b>	<b>C</b>	<b>-</b>
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.28	7	A	18	0.49	13	B	33
EBT	0.43	12	B	51	0.57	19	B	91
EBR	0.09	10	B	10	0.07	15	B	11
WBL	0.13	10	A	8	0.29	13	B	21
WBT	0.43	15	B	45	0.68	23	C	104
WBR	0.17	13	B	14	0.20	18	B	18
NBL	0.21	19	B	13	0.40	21	C	34
SBL	0.56	22	C	39	0.75	31	C	75
SBTR	0.14	18	B	14	0.20	19	B	20
<b>Overall</b>	<b>0.46</b>	<b>14</b>	<b>B</b>	<b>-</b>	<b>0.68</b>	<b>21</b>	<b>C</b>	<b>-</b>
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL <sup>2</sup>	0.67	16	B	33	0.89	28	C	99
EBTR	0.33	16	B	24	0.41	10	A	62
WBL	0.21	16	B	17	0.11	16	B	11
WBT	0.45	24	C	39	0.49	19	B	73
WBR	0.19	21	C	11	0.13	16	B	14
NBL	0.08	23	C	11	0.31	26	C	31
NBT	0.09	24	C	14	0.24	25	C	31
SBL	0.30	26	C	30	0.76	38	D	70
SBT	0.17	24	C	23	0.12	24	C	17

SBR	0.18	24	C	16	0.56	29	C	58
<b>Overall</b>	<b>0.43</b>	<b>21</b>	<b>C</b>	-	<b>0.64</b>	<b>21</b>	<b>C</b>	-
<b>Beamish Road/Hanson Road &amp; Highway 12 (signalized)</b>								
EBL	0.07	5	A	4	0.45	7	A	19
EBT	0.73	11	B	93	0.74	10	B	142
EBR	0.03	5	A	3	0.02	4	A	2
WBL	0.16	6	A	5	0.19	5	A	7
WBT	0.59	8	A	64	0.86	15	B	236
WBR	0.02	5	A	3	0.08	4	A	7
NBL	0.11	19	B	7	0.20	29	C	13
NBTR	0.04	18	B	7	0.07	28	C	11
SBL	0.25	20	B	15	0.40	31	C	25
SBTR	0.05	18	B	8	0.09	28	C	12
<b>Overall</b>	<b>0.61</b>	<b>10</b>	<b>B</b>	-	<b>0.77</b>	<b>14</b>	<b>B</b>	-

Notes:

1. Dual left lane
2. EBL phase increased to 15 seconds in PM peak

The results in the table above demonstrate that the study area network operates within capacity under 2036 future background conditions with highest overall v/c of 0.79 observed at Beamish Road, Hanson Road and Highway 12 during the afternoon peak hour. All other intersections and individual movements operate with acceptable levels of delay and queuing.

#### 4.5.6 ANALYSIS CONCLUSIONS

The following are conclusions from the traffic operations analyses carried out for future background conditions:

1. Despite the MTO traffic signal warrant carried out in the Hanson TIS concluding that a signal was not warranted, the intersection of Beamish Road, Hanson Road and Highway 12 requires signalization at future background 2023. This is due to the poor level of service experienced at the northbound and southbound left movements with delays of up to 717 seconds during the afternoon peak hour. No dedicated left or right turn phases are required under any future background scenarios. The signalization of this intersection is not precipitated by either Phase One or Phase Two site traffic volumes.
2. A dual left turn lane is required at the southbound left movement of the Highway 93, Penetanguishene Road and Highway 12 intersection under future background 2036 conditions. This movement begins to operate at capacity under future background 2031 conditions with optimized signal phases. However, under future background 2036 conditions, infrastructure improvements are required at this movement given the projected demand of almost 700 vehicles during the afternoon peak hour.
3. Under future background 2036 conditions, the eastbound left phase at the King Street and Highway 12 intersection requires more green time to accommodate the project vehicle demand.

# 5 FUTURE TOTAL CONDITIONS

## 5.1 FUTURE TOTAL 2023 ANALYSIS RESULTS

Future total 2023 traffic operations were analyzed on the basis of the traffic volumes illustrated in **Figure 5.1**, which are a combination of future background 2023 and Phase One site traffic volumes. Heavy vehicle percentages, pedestrian volumes, PHFs, signal timings and any changes to lane configurations were maintained from future background conditions.

The Synchro analysis results for the future total 2023 scenario are summarized in **Table 5-1** with the Synchro analysis worksheets attached in **Appendix I**.

**Table 5-1 Synchro Analysis Results Summary - Future Total Conditions - 2023**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>	V/C	Delay (S) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.07	23	C	6	0.08	24	C	6
EBTR	0.65	30	C	46	0.50	27	C	35
WBL	0.48	18	B	28	0.57	20	B	41
WBT	0.15	16	B	17	0.35	18	B	38
WBR	0.22	17	B	13	0.30	17	B	19
NBT	0.71	25	C	73	0.58	22	C	62
NBR	0.18	18	B	13	0.17	18	B	15
SBL	0.58	14	B	28	0.93	39	D	83
SBTR	0.34	11	B	37	0.49	13	B	61
<b>Overall</b>	<b>0.63</b>	<b>19</b>	<b>B</b>	-	<b>0.64</b>	<b>22</b>	<b>C</b>	-
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.24	7	A	17	0.41	12	B	32
EBT	0.38	12	B	44	0.51	19	B	74
EBR	0.09	10	B	10	0.06	15	B	11
WBL	0.12	9	A	8	0.26	13	B	21
WBT	0.37	14	B	37	0.58	21	C	81
WBR	0.17	13	B	14	0.19	18	B	18
NBL	0.19	18	B	12	0.33	19	B	30
NBTR	0.05	17	B	7	0.17	17	B	18
SBL	0.56	22	C	36	0.73	28	C	75
SBTR	0.14	18	B	13	0.19	17	B	19
<b>Overall</b>	<b>0.43</b>	<b>14</b>	<b>B</b>	-	<b>0.61</b>	<b>19</b>	<b>B</b>	-
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL	0.53	7	A	29	0.92	41	D	82
EBTR	0.21	5	A	19	0.42	14	B	55
WBL	0.21	10	B	17	0.15	18	B	13
WBT	0.30	11	B	33	0.44	20	B	56
WBR	0.18	10	A	11	0.12	17	B	13
NBL	0.14	25	C	11	0.23	21	C	26
NBT	0.17	25	C	15	0.20	21	C	30
NBR	0.02	24	C	1	0.03	19	B	4
SBL	0.46	27	C	27	0.57	26	C	61
SBT	0.28	26	C	23	0.10	20	B	17

SBR	0.16	25	C	16	0.40	23	C	41
<b>Overall</b>	<b>0.36</b>	<b>13</b>	<b>B</b>	-	<b>0.54</b>	<b>22</b>	<b>C</b>	-
<b>Beamish Road/Hanson Road &amp; Highway 12 (signalized)</b>								
EBL <sup>2</sup>	0.07	5	A	5	0.17	4	A	8
EBT	0.60	9	A	72	0.61	7	A	92
EBR	0.05	5	A	4	0.05	4	A	3
WBL <sup>2</sup>	0.20	6	A	8	0.26	5	A	12
WBT	0.48	7	A	50	0.67	8	A	113
WBR	0.04	5	A	4	0.08	4	A	6
NBL <sup>2</sup>	0.16	18	B	9	0.36	30	C	20
NBTR	0.05	18	B	3	0.07	28	C	8
SBL <sup>2</sup>	0.37	20	B	22	0.39	30	C	24
SBTR	0.04	18	B	8	0.03	28	C	9
<b>Overall</b>	<b>0.54</b>	<b>9</b>	<b>A</b>	-	<b>0.62</b>	<b>10</b>	<b>A</b>	-
<b>Beamish Road &amp; Prospect Boulevard (unsignalized)</b>								
WBLR	-	9	A	1	-	9	A	1
<b>Beamish Road &amp; Phase One Driveway (unsignalized)</b>								
EBLR	-	10	A	1	-	10	A	2

Notes:

1. Rounded to the nearest second / metre
2. No dedicated left turn phase

The results in the table above demonstrate that the study area network operates within capacity under 2023 future total conditions with the highest overall v/c of 0.64 observed at Highway 93, Penetanguishene Road and Highway 12 during the afternoon peak hour. The northbound left lane at Beamish Road, Hanson Road and Highway 12 was modelled with a storage length of 75m. The northbound left movement at this intersection operates with the lowest level of service and highest 95<sup>th</sup> percentile queue during the afternoon peak hour, with an LOS of C and a queue of 20m, respectively. The eastbound movement at the Phase One site driveway operates at LOS A with no queuing during both peak hours. A small portion of Phase One traffic was assigned to the northern driveway (which will become the primary access for Phase Two) since this driveway will be constructed and in operation when Phase One is complete. The northern driveway also operates at LOS A with no queuing during both peak hours. All other intersections and individual movements operate with acceptable levels of delay and queuing.



## 5.2 FUTURE TOTAL 2026 ANALYSIS RESULTS

Future total 2026 traffic operations were analyzed on the basis of the traffic volumes illustrated in **Figure 5.2**, which are a combination of future background 2026 and site traffic volumes for both development phases. Heavy vehicle percentages, pedestrian volumes, PHFs and any changes to lane configurations were maintained from future background conditions.

The Synchro analysis results for the future total 2026 scenario are summarized in Error! Reference source not found. with the Synchro analysis worksheets attached in **Appendix I**.

**Table 5-2 Synchro Analysis Results Summary – Future Total Conditions - 2026**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>	V/C	Delay (S) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)<sup>2</sup></b>								
EBL	0.07	25	C	7	0.11	32	C	8
EBTR	0.65	32	C	60	0.70	44	D	61
WBL	0.55	21	C	39	0.70	30	C	62
WBT	0.16	18	B	22	0.40	24	C	55
WBR	0.25	19	B	15	0.34	23	C	25
NBL	0.01	17	B	2	0.01	22	C	3
NBT	0.68	26	C	83	0.66	31	C	82
NBR	0.21	19	B	13	0.19	24	C	18
SBL	0.67	17	B	37	0.89	30	C	99
SBTR	0.35	13	B	45	0.45	12	B	66
<b>Overall</b>	<b>0.64</b>	<b>21</b>	<b>C</b>	<b>-</b>	<b>0.73</b>	<b>26</b>	<b>C</b>	<b>-</b>
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.25	7	A	16	0.44	12	B	32
EBT	0.36	12	B	41	0.54	19	B	81
EBR	0.09	10	A	10	0.06	15	B	11
WBL	0.12	9	A	8	0.27	13	B	21
WBT	0.40	14	B	41	0.62	22	C	90
WBR	0.17	13	B	14	0.20	18	B	18
NBL	0.20	18	B	12	0.34	19	B	30
NBTR	0.05	17	B	7	0.17	18	B	18
SBL	0.57	22	C	37	0.74	29	C	75
SBTR	0.14	18	B	13	0.19	18	B	19
<b>Overall</b>	<b>0.42</b>	<b>14</b>	<b>B</b>	<b>-</b>	<b>0.64</b>	<b>20</b>	<b>B</b>	<b>-</b>
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL	0.54	7	A	30	0.87	28	C	91
EBTR	0.21	6	A	20	0.40	10	A	58
WBL	0.22	11	B	19	0.16	14	B	14
WBT	0.33	11	B	37	0.42	16	B	61
WBR	0.19	10	B	11	0.13	14	B	13
NBL	0.13	24	C	10	0.29	24	C	27
NBT	0.16	25	C	15	0.27	23	C	32
NBR	0.02	24	C	1	0.04	22	C	4
SBL	0.51	28	C	31	0.74	35	C	63
SBT	0.30	25	C	25	0.14	22	C	19
SBR	0.17	25	C	16	0.55	27	C	53
<b>Overall</b>	<b>0.40</b>	<b>13</b>	<b>B</b>	<b>-</b>	<b>0.58</b>	<b>20</b>	<b>B</b>	<b>-</b>

Beamish Road/Hanson Road & Highway 12 (signalized) <sup>3</sup>								
EBL	0.11	12	B	11	0.34	16	B	26
EBT	0.72	21	C	125	0.93	39	D	216
EBR	0.14	13	B	11	0.15	14	B	14
WBL <sup>4</sup>	0.48	9	A	20	0.68	23	C	55
WBT	0.39	7	A	57	0.71	12	B	162
WBR	0.02	5	A	3	0.05	6	A	6
NBL <sup>5</sup>	0.55	30	C	32	0.66	36	D	46
NBTR	0.12	25	C	0	0.15	26	C	0
SBL	0.18	26	C	15	0.20	26	C	15
SBTR	0.06	25	C	12	0.04	25	C	10
<b>Overall</b>	<b>0.63</b>	<b>16</b>	<b>B</b>	<b>-</b>	<b>0.82</b>	<b>24</b>	<b>C</b>	<b>-</b>
Beamish Road & Prospect Boulevard (unsignalized)								
WBLR	-	9	A	1	-	9	A	1
Beamish Road & Phase One driveway (unsignalized)								
EBLR	-	10	A	1	-	10	B	2
Beamish Road & Phase Two driveway (unsignalized)								
EBL	-	12	B	7	-	16	C	16
EBR	-	9	A	0	-	16	C	16
SBR	-	0	A	0	-	0	A	0

Notes:

1. Rounded to the nearest second / metre
1. Signal phases optimized
2. AM Cycle Length increased to 115 seconds
3. 15 & 18 second dedicated WBL phase for AM & PM, respectively, with existing 93m storage length maintained
4. 75m storage length

The results in the table above demonstrate that the study area network operates within capacity under 2026 future total conditions with the highest overall v/c of 0.82 observed at Beamish Road, Hanson Road and Highway 12 during the afternoon peak hour. This intersection has been optimized by introducing a dedicated westbound left turn phase and by increasing the cycle length to 115 seconds during the morning peak hour. The eastbound through movement operates with the highest v/c ratio of 0.93 during the afternoon peak hour. The westbound and northbound left movements experience 95<sup>th</sup> percentile queues of 55m and 46m, respectively.

At the site driveways, the highest delay and queuing is experienced at the northern (Phase Two) driveway during the afternoon peak hour with a LOS of C and a 95<sup>th</sup> percentile queue of 16m. This is equivalent to two vehicles with an assumed Passenger Car Unit (PCU) length of 7.5m. The southern (Phase One) driveway experiences no queuing during either peak hour and a LOS of B or better.

All other intersections and individual movements operate with acceptable levels of delay and queuing. Due to the relatively low volumes along Beamish Road travelling to/from Prospect Boulevard, there is little to no queuing of vehicles attempting to turn left into either site driveway from Beamish Road. Therefore, no dedicated left turn lanes are required along Beamish Road with the exception of the northbound left lane at Highway 12.

Left and right turn lane warrants were carried out at the site driveways, which are discussed in further detail in **Section 0** below. The results of the warrants indicate that no dedicated turning lanes are required at either site driveway with the exception of the northern site driveway, which will require an inbound right turn lane upon the construction of Phase Two.

The southern site driveway is not aligned with Prospect Boulevard due to the presence of a proposed pad-mounted transformers in the southeast corner of the Phase One site. Another transformer is located in the

southwest corner of the site. Aligning the driveway with Prospect Boulevard would require a complete redesign of the site including relocation of the proposed hotel and conference centre buildings.

## 5.3 FUTURE TOTAL 2031 ANALYSIS RESULTS

Future total 2031 traffic operations were analyzed on the basis of the traffic volumes illustrated in **Figure 5.3**, which are a combination of future background 2031 and site traffic volumes for both development phases. Heavy vehicle percentages, pedestrian volumes, PHFs and any changes to lane configurations were maintained from future background conditions.

The Synchro analysis results for the future total 2031 scenario are summarized in Error! Reference source not found. with the Synchro analysis worksheets attached in **Appendix I**.

**Table 5-3 Synchro Analysis Results Summary – Future Total Conditions - 2031**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S) <sup>1</sup>	LOS	95th % Queue (m)	V/C	Delay (S)	LOS	95th % Queue (m)
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.07	27	C	7	0.10	32	C	8
EBTR	0.68	36	D	60	0.66	41	D	57
WBL	0.64	26	C	43	0.88	50	D	85
WBT	0.17	20	C	23	0.45	26	C	57
WBR	0.44	23	C	29	0.54	28	C	53
NBL	0.01	18	B	2	0.01	22	C	3
NBT	0.72	27	C	91	0.68	31	C	85
NBR	0.21	19	B	13	0.19	23	C	18
SBL <sup>2</sup>	0.66	35	C	44	0.86	39	D	98
SBTR	0.35	11	B	44	0.45	11	B	65
<b>Overall</b>	<b>0.67</b>	<b>25</b>	<b>C</b>	-	<b>0.75</b>	<b>30</b>	<b>C</b>	-
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.28	7	A	18	0.51	14	B	33
EBT	0.43	12	B	51	0.59	20	B	97
EBR	0.09	10	B	10	0.07	15	B	11
WBL	0.13	10	A	8	0.30	14	B	21
WBT	0.46	15	B	48	0.71	24	C	113
WBR	0.17	13	B	14	0.20	18	B	18
NBL	0.21	19	B	13	0.40	21	C	34
NBTR	0.04	17	B	7	0.16	19	B	17
SBL	0.56	22	C	39	0.76	33	C	75
SBTR	0.14	18	B	14	0.20	19	B	20
<b>Overall</b>	<b>0.46</b>	<b>14</b>	<b>B</b>	-	<b>0.70</b>	<b>21</b>	<b>C</b>	-
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL <sup>3</sup>	0.62	8	A	33	0.91	33	C	106
EBTR	0.24	6	A	24	0.42	10	B	65
WBL	0.24	11	B	19	0.20	18	B	16
WBT	0.35	11	B	40	0.54	21	C	81
WBR	0.19	10	B	11	0.13	17	B	14
NBL	0.13	24	C	10	0.31	27	C	31
NBT	0.17	25	C	16	0.28	26	C	37
NBR	0.02	24	C	1	0.04	24	C	5
SBL	0.50	28	C	30	0.77	41	D	71
SBT	0.31	26	C	26	0.15	25	C	22

SBR	0.19	25	C	16	0.57	30	C	61
<b>Overall</b>	<b>0.42</b>	<b>13</b>	<b>B</b>	-	<b>0.68</b>	<b>23</b>	<b>C</b>	-
<b>Beamish Road/Hanson Road &amp; Highway 12 (signalized)<sup>4</sup></b>								
EBL	0.05	11	B	6	0.33	16	B	24
EBT	0.79	23	C	171	0.92	38	D	290
EBR	0.13	12	B	11	0.16	14	B	14
WBL <sup>5</sup>	0.53	12	B	23	0.75	35	C	67
WBT	0.44	7	A	67	0.79	16	B	282
WBR	0.02	5	A	3	0.08	6	A	9
NBL <sup>6</sup>	0.56	33	C	32	0.71	46	D	56
NBTR	0.12	27	C	14	0.18	32	C	20
SBL	0.26	28	C	19	0.40	35	C	29
SBTR	0.04	27	C	9	0.05	31	C	11
<b>Overall</b>	<b>0.69</b>	<b>17</b>	<b>B</b>	-	<b>0.84</b>	<b>27</b>	<b>C</b>	-
<b>Beamish Road &amp; Prospect Boulevard (unsignalized)</b>								
WBLR	-	9	A	1	-	9	A	1
<b>Beamish Road &amp; Phase One driveway (unsignalized)</b>								
EBLR	-	10	A	1	-	10	B	2
<b>Beamish Road &amp; Phase Two driveway (unsignalized)</b>								
EBL	-	12	B	7	-	16	C	16
EBR	-	9	A	0	-	16	C	16
SBR	-	0	A	0	-	0	A	0

Notes:

1. Rounded to the nearest second / metre
2. Dual left lane
3. EBL phase increased to 17 seconds in PM peak
4. 115 & 120 cycle length for AM & PM, respectively
5. 15 & 17 second dedicated WBL phase for AM & PM, respectively, with existing 93m storage length maintained
6. 75m storage length

The results in the table above demonstrate that the study area network operates within capacity under 2031 future total conditions with the highest overall v/c of 0.84 observed at Beamish Road, Hanson Road and Highway 12 during the afternoon peak hour. This intersection has been further optimized by increasing the dedicated westbound left phase and by increasing the cycle length to 120 seconds during the afternoon peak hour. The westbound left movement operates with a v/c of 0.53 and 0.75 and experiences 95<sup>th</sup> percentile queuing of 23m and 67m during the morning and afternoon peak hour, respectively. The northbound left movement operates with a v/c ratio of 0.56 and 0.71 with 95<sup>th</sup> percentile queuing of 32m and 56m, respectively.

Since the southbound left movement at Highway 93, Penetanguishene Road and Highway 12 was operating over capacity under future background 2031 conditions, this movement is now served by a dual left lane and operates with a v/c ratio of 0.66 and 0.86 during the morning and afternoon peak hour, respectively. The signal timings were maintained from future background conditions.

To accommodate future demand, the eastbound left phase at King Street and Highway 12 was increased from 10 to 15 and 17 seconds during the morning and afternoon peak hour, respectively. As a result, this movement operates with a v/c ratio of 0.62 and 0.91 and a 95<sup>th</sup> percentile queue of 33m and 106m during the morning and afternoon peak hour, respectively.

The movements at the site driveways operate the same as future total 2026 conditions. This is because there is no projected growth along Beamish Road.

## 5.4 FUTURE TOTAL 2036 ANALYSIS RESULTS

Future total 2036 traffic operations were analyzed on the basis of the traffic volumes illustrated in **Figure 5.4**, which are a combination of future background 2036 and site traffic volumes for both development phases. Heavy vehicle percentages, pedestrian volumes, PHFs and any changes to lane configurations were maintained from future background conditions.

The Synchro analysis results for the future total 2036 scenario are summarized in Error! Reference source not found. with the Synchro analysis worksheets attached in **Appendix I**.

**Table 5-4 Synchro Analysis Results Summary – Future Total Conditions - 2036**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S) <sup>1</sup>	LOS	95 <sup>th</sup> % Queue (m) <sup>1</sup>	V/C	Delay (S) <sup>1</sup>	LOS	95 <sup>th</sup> % Queue (m) <sup>1</sup>
<b>Highway 93 / Penetanguishene Road &amp; Highway 12 (signalized)</b>								
EBL	0.08	28	C	7	0.10	32	C	8
EBTR	0.70	38	D	61	0.66	41	D	57
WBL	0.67	28	C	46	0.94	62	E	97
WBT	0.17	21	C	23	0.45	26	C	57
WBR	0.53	24	C	42	0.55	28	C	52
NBL	0.01	18	B	2	0.02	23	C	3
NBT	0.76	30	C	98	0.78	37	D	110
NBR	0.22	20	B	14	0.26	25	C	26
SBL <sup>2</sup>	0.69	37	D	46	0.87	33	C	84
SBTR	0.37	12	B	47	0.48	11	B	70
<b>Overall</b>	<b>0.71</b>	<b>26</b>	<b>C</b>	<b>-</b>	<b>0.77</b>	<b>31</b>	<b>C</b>	<b>-</b>
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.29	7	A	18	0.54	15	B	35
EBT	0.45	12	B	54	0.62	20	B	104
EBR	0.09	10	B	10	0.07	15	B	11
WBL	0.13	10	A	8	0.31	14	B	21
WBT	0.49	15	B	52	0.74	25	C	123
WBR	0.17	13	B	14	0.20	18	B	18
NBL	0.22	19	B	14	0.41	22	C	34
NBTR	0.04	18	B	7	0.16	19	B	17
SBL	0.56	22	C	40	0.77	34	C	76
SBTR	0.14	18	B	14	0.20	20	B	20
<b>Overall</b>	<b>0.48</b>	<b>14</b>	<b>B</b>	<b>-</b>	<b>0.72</b>	<b>22</b>	<b>C</b>	<b>-</b>
<b>King Street &amp; Highway 12 (signalized)</b>								
EBL <sup>3</sup>	0.67	9	A	34	0.95	42	D	120
EBTR	0.25	6	A	25	0.43	10	B	67
WBL	0.24	11	B	19	0.21	19	B	17
WBT	0.37	11	B	43	0.58	23	C	87
WBR	0.19	10	B	11	0.13	18	B	15
NBL	0.13	24	C	10	0.31	27	C	31
NBT	0.17	25	C	16	0.29	27	C	37
NBR	0.02	24	C	1	0.04	25	C	5
SBL	0.50	28	C	30	0.77	41	D	71
SBT	0.31	26	C	26	0.15	25	C	22
SBR	0.22	25	C	18	0.62	32	C	67
<b>Overall</b>	<b>0.44</b>	<b>13</b>	<b>B</b>	<b>-</b>	<b>0.71</b>	<b>25</b>	<b>C</b>	<b>-</b>

Beamish Road/Hanson Road & Highway 12 (signalized) <sup>4</sup>								
EBL	0.06	12	B	7	0.38	17	B	25
EBT	0.88	31	C	200	0.94	41	D	308
EBR	0.14	13	B	13	0.15	13	B	14
WBL <sup>5</sup>	0.59	15	B	32	0.78	42	D	73
WBT	0.49	7	A	75	0.83	17	B	309
WBR	0.02	5	A	3	0.07	6	A	8
NBL <sup>6</sup>	0.54	31	C	32	0.71	47	D	56
NBTR	0.12	26	C	14	0.18	34	C	20
SBL	0.26	27	C	19	0.42	37	D	30
SBTR	0.04	25	C	9	0.05	33	C	11
<b>Overall</b>	<b>0.74</b>	<b>20</b>	<b>C</b>	<b>-</b>	<b>0.86</b>	<b>29</b>	<b>C</b>	<b>-</b>
Beamish Road & Prospect Boulevard (unsignalized)								
WBLR	-	9	A	1	-	9	A	1
Beamish Road & Phase One driveway (unsignalized)								
EBLR	-	10	A	1	-	10	B	2
Beamish Road & Phase Two driveway (unsignalized)								
EBL	-	12	B	7	-	16	C	16
EBR	-	9	A	0	-	16	C	16
SBR	-	0	A	0	-	0	A	0

Notes:

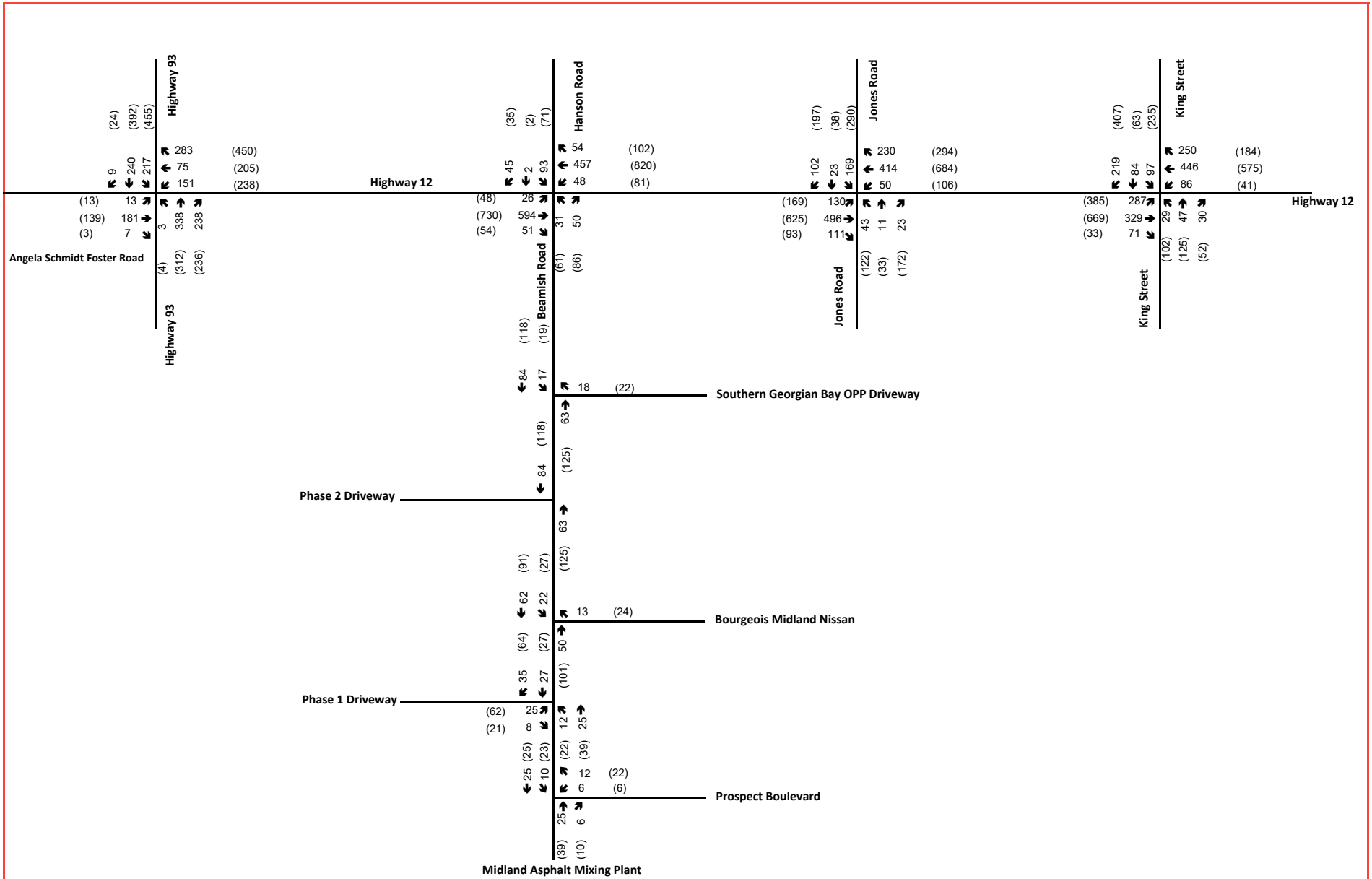
1. Rounded to the nearest second / metre
2. Dual left lane
3. EBL phase increased to 18 seconds in PM peak
4. 115 & 120 cycle length for AM & PM, respectively
5. 15 & 18 second dedicated WBL phase for AM & PM, respectively, with a 110m storage length
6. 75m storage length

The results in the table above demonstrate that the study area network operates within capacity under 2036 future total conditions with the highest overall v/c of 0.86 observed at Beamish Road, Hanson Road and Highway 12 during the afternoon peak hour. The westbound left phase green time was increased in both peak hours to accommodate higher volumes but the cycle lengths from future total 2031 conditions were maintained. The westbound left movement operates with a v/c of 0.59 and 0.78 with 95<sup>th</sup> percentile queuing of 32m and 73m during the morning and afternoon peak hour, respectively. The northbound left movement operates with a v/c ratio of 0.54 and 0.71 with 95<sup>th</sup> percentile queue of 32m and 56m, respectively.

Since the southbound left movement at Highway 93, Penetanguishene Road and Highway 12 was operating over capacity under future background 2031 conditions, this movement is now served by a dual left lane and operates with a v/c ratio of 0.87. The signal timings were maintained from future background conditions.

To accommodate future demand, the eastbound left phase at King Street and Highway 12 was increased from 10 to 15 and 17 seconds during the morning and afternoon peak hour, respectively. As a result, this movement operates with a v/c ratio of 0.67 and 0.95 and a 95<sup>th</sup> percentile queue of 34m and 120m during the morning and afternoon peak hour, respectively.

The movements at the site driveways operate the same as all other future total scenarios as there is no projected growth along Beamish Road.



xx A.M. Peak Hour Traffic Volumes

(xx)

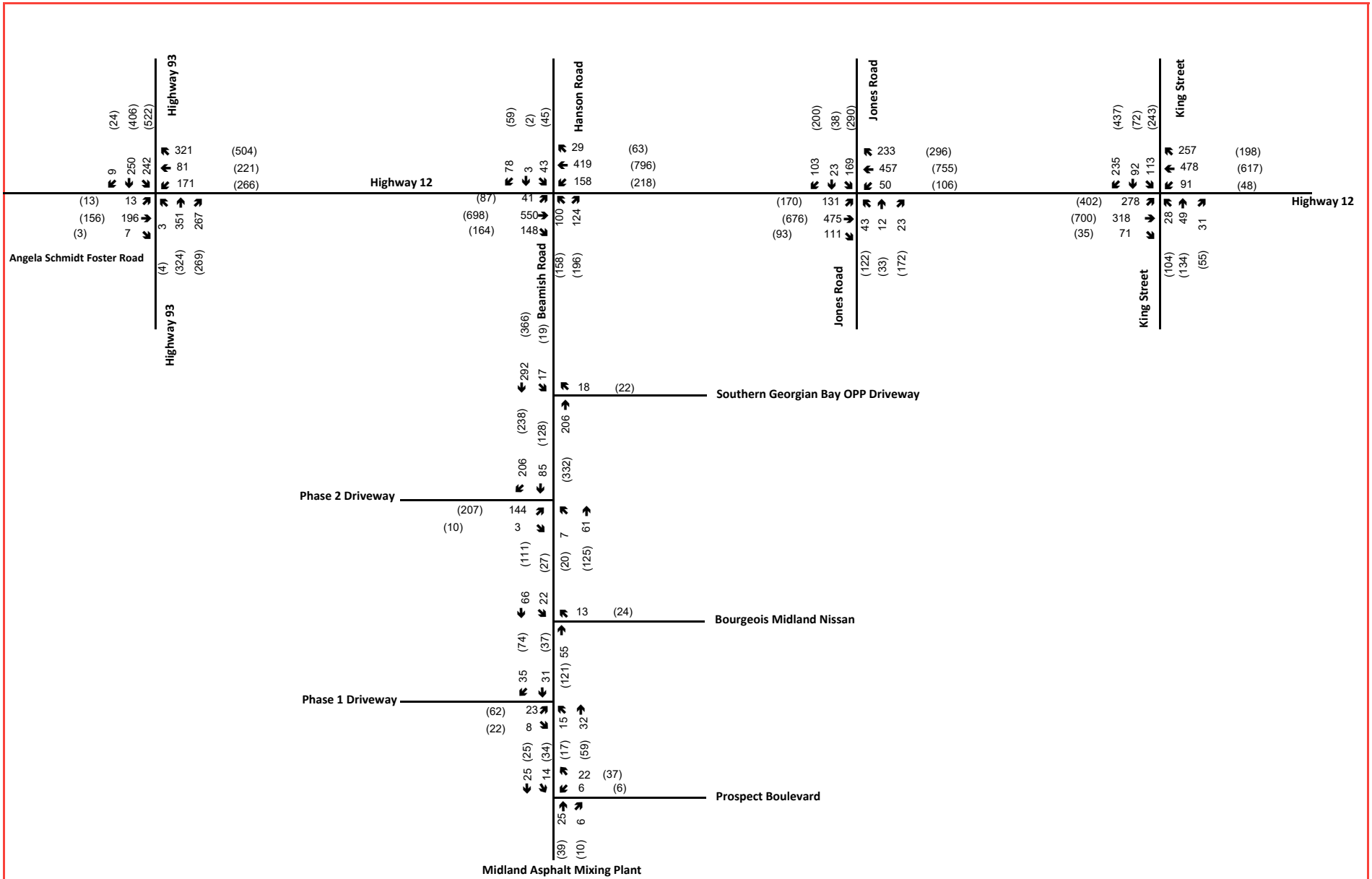
Legend

P.M. Peak Hour Traffic Volumes



Movement

Figure 5.1  
Future Total Traffic Volumes  
(2023)



**Legend**

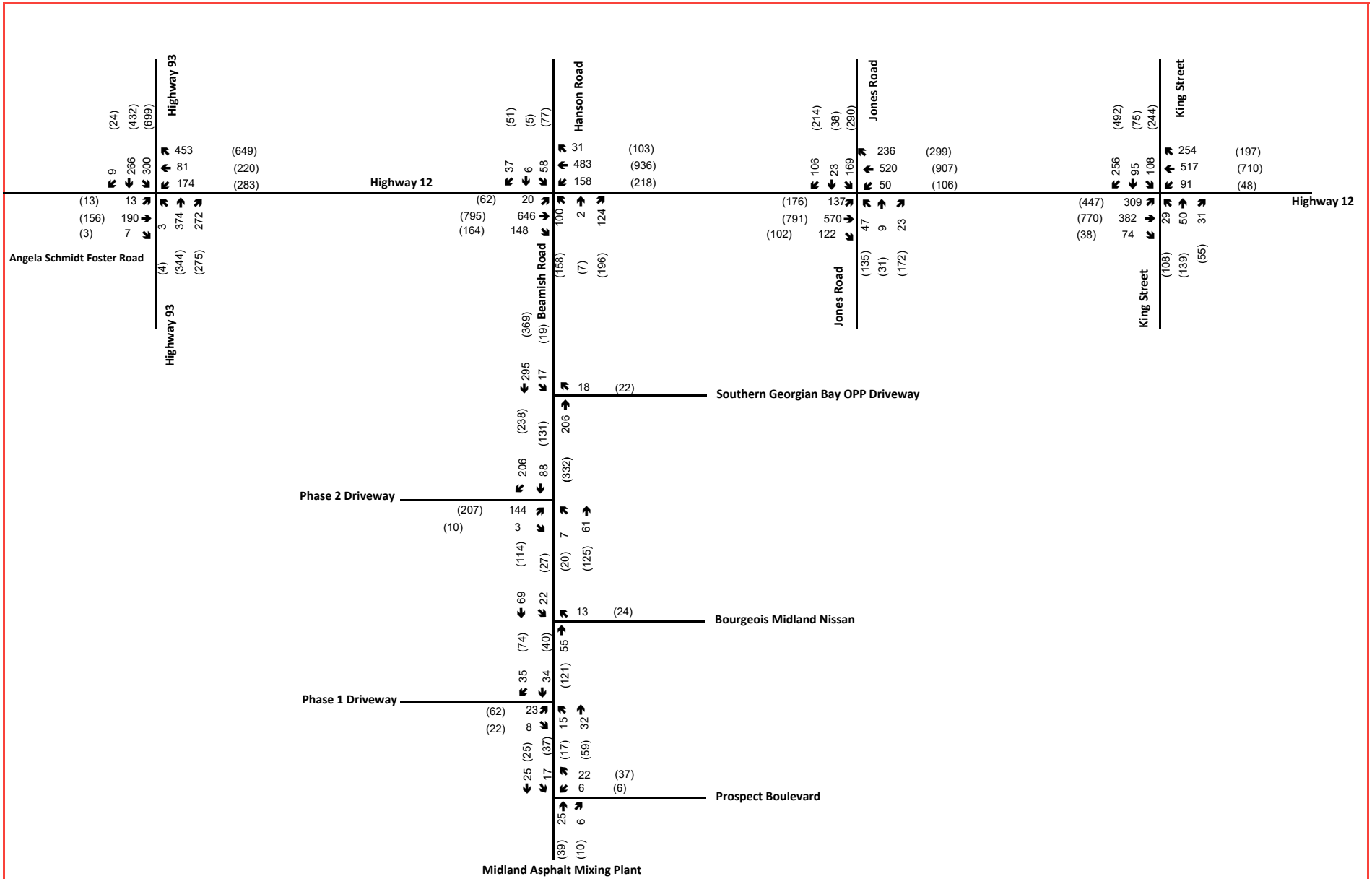
xx A.M. Peak Hour Traffic Volumes

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

→ Movement

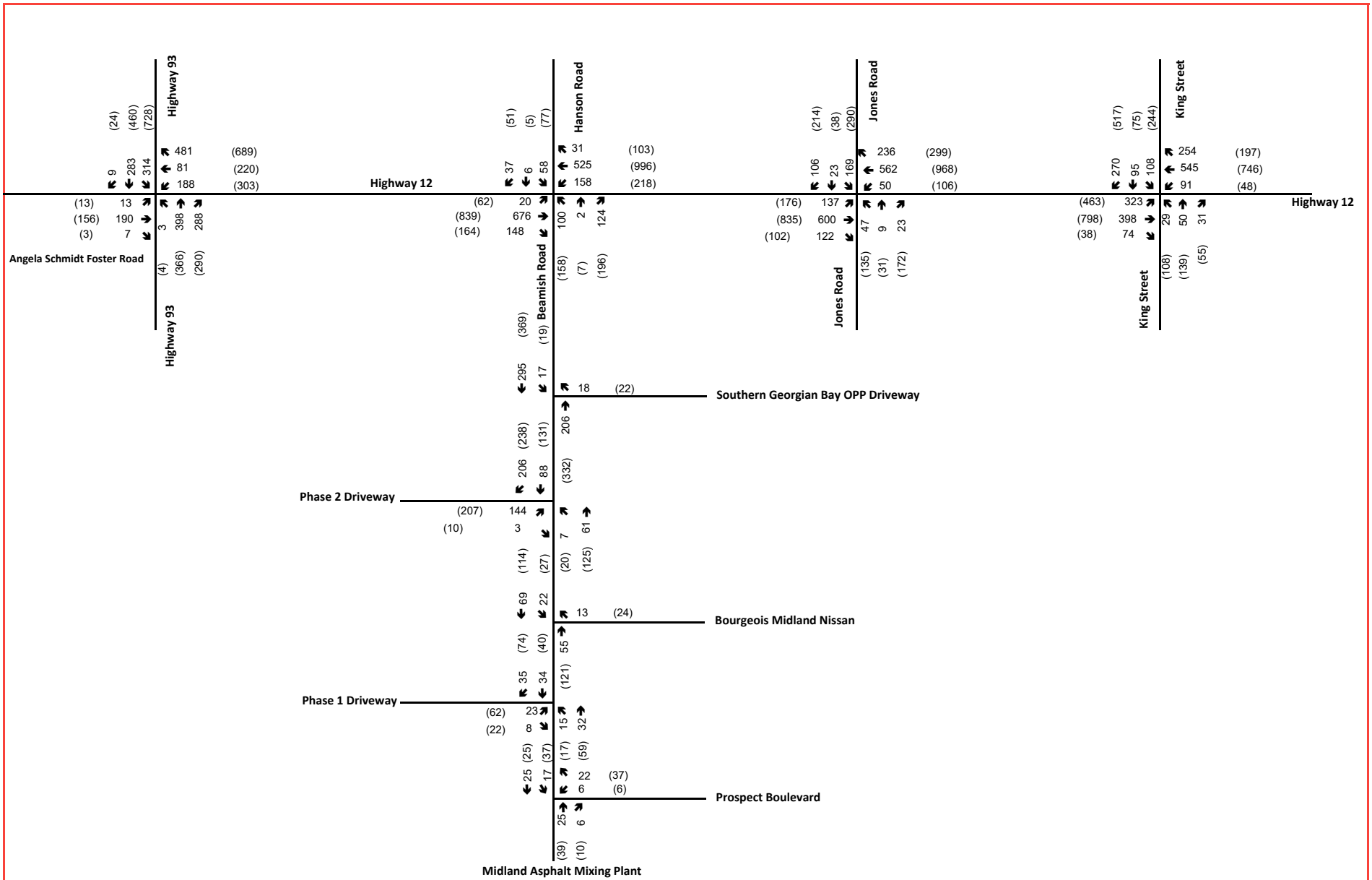
**Figure 5.2**  
Future Total Traffic Volumes (2026)





xx A.M. Peak Hour Traffic Volumes      (xx) P.M. Peak Hour Traffic Volumes      **→** Movement

**Figure 5.3**  
Future Total Traffic Volumes (2031)



Legend

xx A.M. Peak Hour Traffic Volumes

(xx)

P.M. Peak Hour Traffic Volumes



Movement

Figure 5.4

Future Total Total Traffic Volumes (2036)

## 5.5 FUTURE TOTAL 2036 SENSITIVITY ANALYSIS

At the request of the Town and MTO, a sensitivity analysis was carried out for the future total 2036 scenario which looked at the impact of changing the operation of the northern site driveway (Phase Two) to Right-In, Right-Out (RIRO) only. For the purposes of this sensitivity analysis, it was assumed that all outbound traffic from the northern site driveway would reroute to the Jones Road and Highway 12 signalized intersection via Prospect Boulevard, since this is the first opportunity to access Highway 12 via a signalized intersection. Figure 5.5 illustrates the net site traffic volumes as result of the northern site driveway being RIRO only.

**Table 5-5** summarizes the impact of having the northern site driveway as RIRO only on the relevant study area intersections based on the traffic volumes illustrated in Figure 5.6. The Synchro analysis worksheets for this sensitivity analysis are attached in **Appendix J**.

**Table 5-5 Sensitivity Analysis Results Summary – Future Total Conditions – 2036**

Intersection / Movement	Weekday A.M. Peak Hour				Weekday P.M. Peak Hour			
	V/C	Delay (S) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>	V/C	Delay (S) <sup>1</sup>	LOS	95th % Queue (m) <sup>1</sup>
<b>Jones Road &amp; Highway 12 (signalized)</b>								
EBL	0.30	8	A	19	0.61	20	B	50
EBT	0.44	12	B	55	0.61	23	C	105
EBR	0.09	10	B	10	0.07	17	B	12
WBL	0.13	10	A	8	0.33	16	B	24
WBT	0.50	16	B	54	0.79	30	C	147
WBR	0.17	13	B	14	0.20	20	C	19
NBL	0.51	22	C	30	0.61	26	C	59
NBTR	0.09	18	B	12	0.25	19	B	23
SBL	0.58	23	C	41	0.89	50	D	90
SBTR	0.14	18	B	14	0.20	19	B	19
<b>Overall</b>	<b>0.49</b>	<b>15</b>	<b>B</b>	<b>-</b>	<b>0.81</b>	<b>26</b>	<b>C</b>	<b>-</b>
<b>Beamish Road/Hanson Road &amp; Highway 12 (signalized)<sup>2</sup></b>								
EBL	0.05	11	B	6	0.29	12	B	18
EBT	0.84	25	C	170	0.87	26	C	248
EBR	0.14	11	B	11	0.15	10	B	12
WBL <sup>3</sup>	0.55	12	B	24	0.65	22	C	44
WBT	0.47	6	A	54	0.79	11	B	201
WBR	0.02	4	A	2	0.07	3	A	6
NBL <sup>4</sup>	0.21	28	C	13	0.41	39	D	25
NBTR	0.06	26	C	10	0.10	36	D	16
SBL	0.30	28	C	20	0.44	39	D	29
SBTR	0.05	26	C	10	0.06	35	D	12
<b>Overall</b>	<b>0.68</b>	<b>16</b>	<b>B</b>	<b>-</b>	<b>0.78</b>	<b>19</b>	<b>B</b>	<b>-</b>
<b>Beamish Road &amp; Prospect Boulevard (unsignalized)</b>								
WBLR	-	11	B	1	-	11	B	1
<b>Beamish Road &amp; Phase One driveway (unsignalized)</b>								
EBLR	-	10	B	1	-	12	B	4
<b>Beamish Road &amp; Phase Two driveway (unsignalized)</b>								
EBR	-	10	B	6	-	12	B	11
SBTR	-	0	A	0	-	0	A	0

Notes:

1. Rounded to the nearest second / metre
2. 115 & 120 cycle length for AM & PM, respectively
3. 15 & 18 second dedicated WBL phase for AM & PM, respectively, with the existing 93m storage length maintained
4. 75m storage length

**Table 5-6** compares the northern site driveway as a full-moves and RIRO for those movements at the two relevant signalized intersections which experience the greatest impact.

**Table 5-6 Traffic Operations Comparison Summary**

Intersection / Movement	Weekday A.M. Peak Hour						Weekday P.M. Peak Hour					
	Full-Moves			RIRO			Full-Moves			RIRO		
	V/C	LOS	95th % Queue (m)	V/C	LOS	95th % Queue (m)	V/C	LOS	95th % Queue (m)	V/C	LOS	95th % Queue (m)
<b>Jones Road &amp; Highway 12 (signalized)</b>												
NBL	0.22	B	14	0.51	C	30	0.41	C	34	0.61	C	59
NBTR	0.04	B	7	0.09	B	12	0.16	B	17	0.25	B	23
SBL	0.56	C	40	0.58	C	41	0.77	C	76	0.89	D	90
<b>Overall</b>	<b>0.48</b>	<b>B</b>	-	<b>0.49</b>	<b>B</b>	-	<b>0.72</b>	<b>C</b>	-	<b>0.81</b>	<b>C</b>	-
<b>Beamish Road/Hanson Road &amp; Highway 12 (signalized)</b>												
EBT	0.88	C	200	0.84	C	170	0.94	D	308	0.87	C	248
WBL	0.59	B	32	0.55	B	24	0.78	D	73	0.65	C	44
NBL	0.54	C	32	0.21	C	13	0.71	D	56	0.41	D	25
NBTR	0.12	C	14	0.06	C	10	0.18	C	20	0.10	D	16
<b>Overall</b>	<b>0.74</b>	<b>C</b>	-	<b>0.68</b>	<b>B</b>	-	<b>0.86</b>	<b>C</b>	-	<b>0.78</b>	<b>B</b>	-

As expected, the results show a reduced impact on the Beamish Road, Hanson Road and Highway 12 intersection and a greater impact on the Jones Road and Highway 12 intersection.

At the Beamish Road, Hanson Road and Highway 12 intersection, the overall v/c ratio reduces from 0.74 to 0.68 in the morning peak hour and from 0.86 to 0.78 in the afternoon peak hour. The greatest change takes place at the northbound left movement with a reduced v/c of 0.54 to 0.21 in the morning peak hour and 0.71 to 0.41 in the afternoon peak hour. The 95<sup>th</sup> percentile queue at this movement reduces from 32m to 13m in the morning and from 56m to 25m in the afternoon, respectively. This is equivalent to two and three vehicles, respectively, assuming a PCU length of 7.5m.

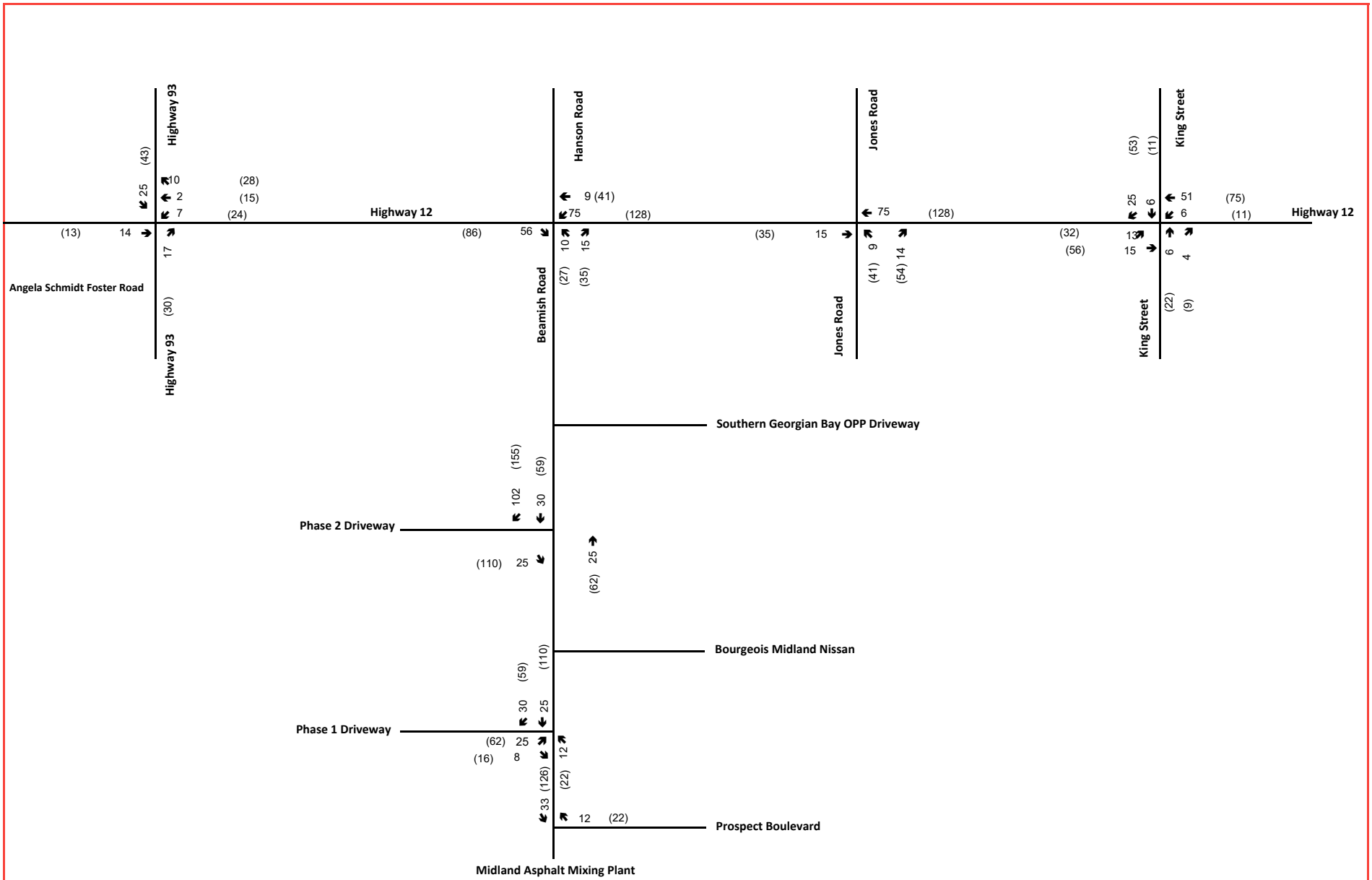
At the Jones Road and Highway 12 intersection, the overall v/c ratio increases from 0.48 to 0.49 in the morning peak hour and from 0.72 to 0.81 in the afternoon peak hour. The greatest change takes place at the northbound left movement with an increased v/c of 0.22 to 0.51 in the morning peak hour and 0.41 to 0.61 in the afternoon peak hour. The 95<sup>th</sup> percentile queue at this movement increases from 14m to 30m in the morning and from 34m to 59m in the afternoon, respectively. This is equivalent to four and eight vehicles, respectively, assuming a PCU length of 7.5m.

The results demonstrate that the Jones Road and Highway 12 intersection has sufficient capacity to accommodate the additional outbound traffic from the northern driveway, up to future total 2036 (ultimate) conditions, if this driveway were to have a RIRO formation.

However, since Beamish Road is a local road with relatively low volumes, there is significant potential for outbound vehicles at a RIRO driveway to commit a movement infraction, that is, to turn left out of the driveway due to the number of vehicle gaps available on Beamish Road. If Beamish Road were an arterial road, the opportunity to commit such an infraction would be diminished due to the volume of traffic effectively forcing outbound vehicles to continue travelling southbound. However, the combination of the proximity of Highway 12 to the site and the low volumes along Beamish Road, even under future total 2036 conditions, increases the potential and opportunity for such infractions to take place without proper enforcement.

It is anticipated that a RIRO at this location will take the form of a raised 'pork chop' pedestrian refuge island, with right-turn slip lanes, since there is no space for a raised centre median along Beamish Road. Even with this island in place, an outbound vehicle has ample opportunity to maneuver right and then turn left to travel northbound towards Highway 12. Even if a vehicle does not immediately turn left when exiting the driveway, there is an opportunity for vehicles to turnaround at the Beamish and Prospect intersection, in front of the Dufferin asphalt mixing plant access, in order to travel northbound towards Highway 12.

Finally, with the removal of the two drive-thru facilities in the current site plan, the trip generation of Phase Two is significantly lower than the previous submission, thus negating the need for a RIRO at this location.



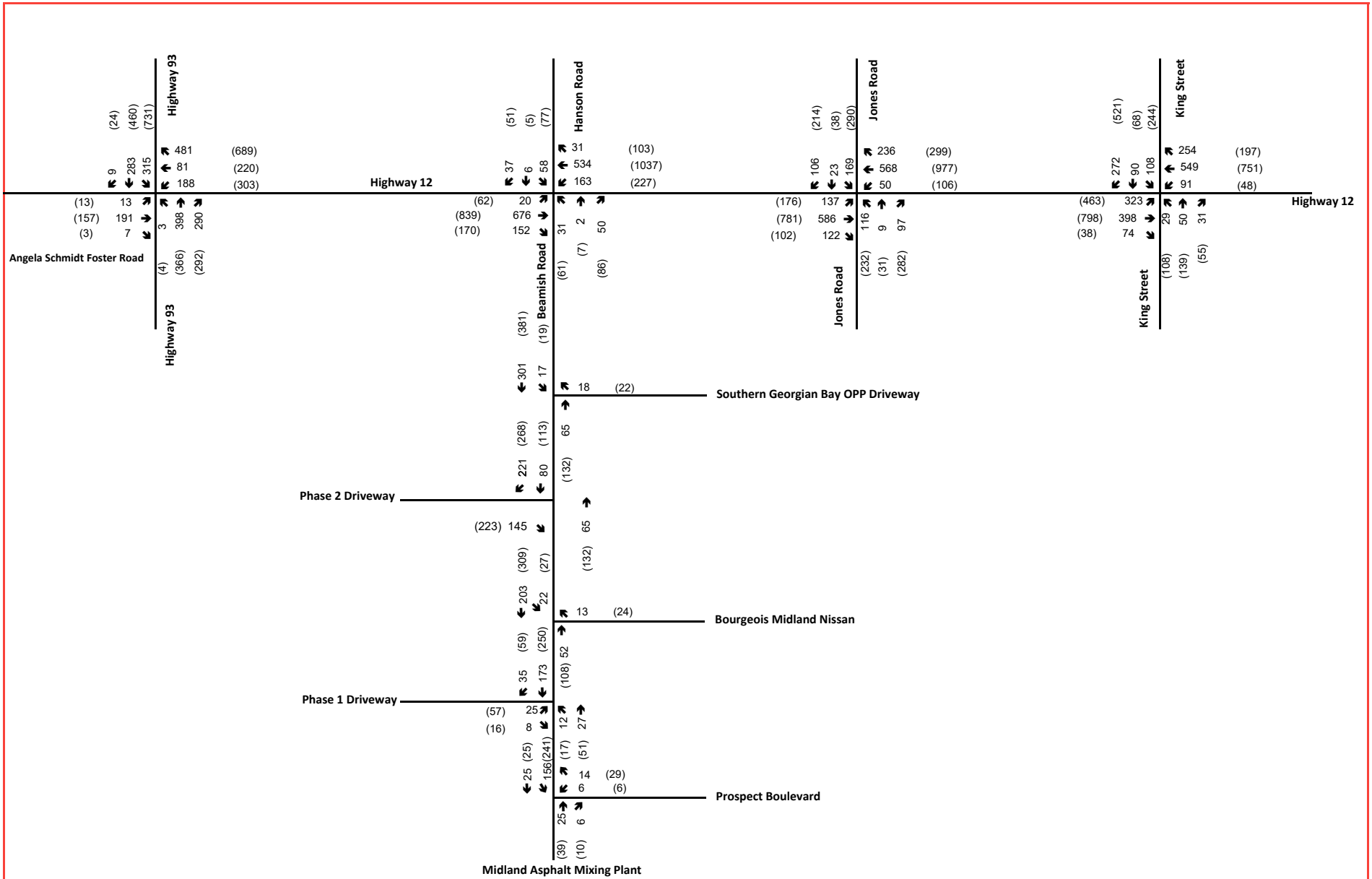
Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

→ Movement

Figure 5.5  
Total Net Site Traffic Volumes  
(North Site Driveway as a RIRO)



xx A.M. Peak Hour Traffic Volumes (xx) P.M. Peak Hour Traffic Volumes  $\longrightarrow$  Movement

**Figure 5.6**  
 Future Total 2036 Traffic Volumes  
 (North Site Driveway as a RIRO)

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## 5.6 TURN LANE WARRANTS

An auxiliary Left-Turn Lane Warrant was conducted at both site driveways via Beamish Road for both peak hours based upon the MTO's Geometric Design Guidelines for Ontario Highways, Chapter E, Section E.A.1, to determine if northbound left-turn lanes are required. Intersection approach volumes from the 2036 horizon year were used when conducting the respective Left-Turn Lane Warrants. Using a design speed of 50 km/h for an unsignalized intersection located along a two-lane highway, a left-turn lane on Beamish Road at either driveway was deemed unwarranted. The Left-Turn Lane Warrant calculations are attached as **Appendix K**.

To determine the need for an auxiliary right-turn lane into both site driveways, the York Region Access Guidelines dated November 2020 was consulted. The guidelines state that an exclusive right-turn lane is generally required on a public road when there will be 100 or more right-turning vehicles. There were no other empirical warrant analysis parameters with right-turn lanes reviewed and required on a case-by-case basis. The southern driveway (Phase One) does not warrant an inbound right-turn lane on Beamish Road since the volume does not exceed 100 vehicles. However, since the right turn volume at the northern driveway (Phase Two) is 206 and 239 vehicles during the morning and afternoon peak hours, respectively, an exclusive right-turn lane is warranted at this driveway.

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## 5.7 ANALYSIS CONCLUSIONS

The following are conclusions from the traffic operations analyses carried out for future total conditions:

1. The proposed northbound left turn lane at Beamish Road, Hanson Road and Highway 12 has sufficient storage space to accommodate the forecasted 95<sup>th</sup> percentile queue lengths for both peak hours under all future total conditions. The highest 95<sup>th</sup> percentile queue length of 56m occurs under future total 2036 conditions during the afternoon peak hour. The highest v/c of 0.71 at this movement occurs during the afternoon peak hour under 2036 future conditions.
2. The westbound left turn lane at Beamish Road, Hanson Road and Highway 12 experiences a 95<sup>th</sup> percentile queue length of 73m under future total 2036 conditions during the afternoon peak hour. Therefore, the existing storage length of 93m is sufficient for accommodate future queuing.
3. A Right-In, Right-Out formation at the northern site driveway (Phase Two) is not required due to a reduction in Phase Two site trip generation from the last submission. In addition, under future total 2036 conditions, the 95<sup>th</sup> percentile queue at the northbound approach of Beamish Road, Hanson Road and Highway 12 is 56m (or approximately eight vehicles) and will not extend past the northern site driveway.
4. No turn lanes are required and/or warranted along Beamish Road at the site driveways with the exception of a southbound right turn lane into the northern site driveway (Phase Two).
5. The north site driveway (Phase Two) will have two outbound lanes to reduce internal site queuing. The south site driveway (Phase One) will have one outbound lane. The highest 95<sup>th</sup> percentile queue of 16m (or approximately two vehicles) takes place at the northern site driveway under future total 2036 conditions during the afternoon peak hour.
6. Site traffic volumes for both development phases can be accommodated within the study area network by the 2036 horizon year.



## 6 SITE PLAN REVIEW

The proposed site plan for Phase One was reviewed to ensure adequate maneuverability throughout the site. Swept path analyses were completed using the AutoTURN 10 software package. The dimensions of the vehicles used in each maneuvering diagram are illustrated on their respective figures.

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### 6.1 LOADING

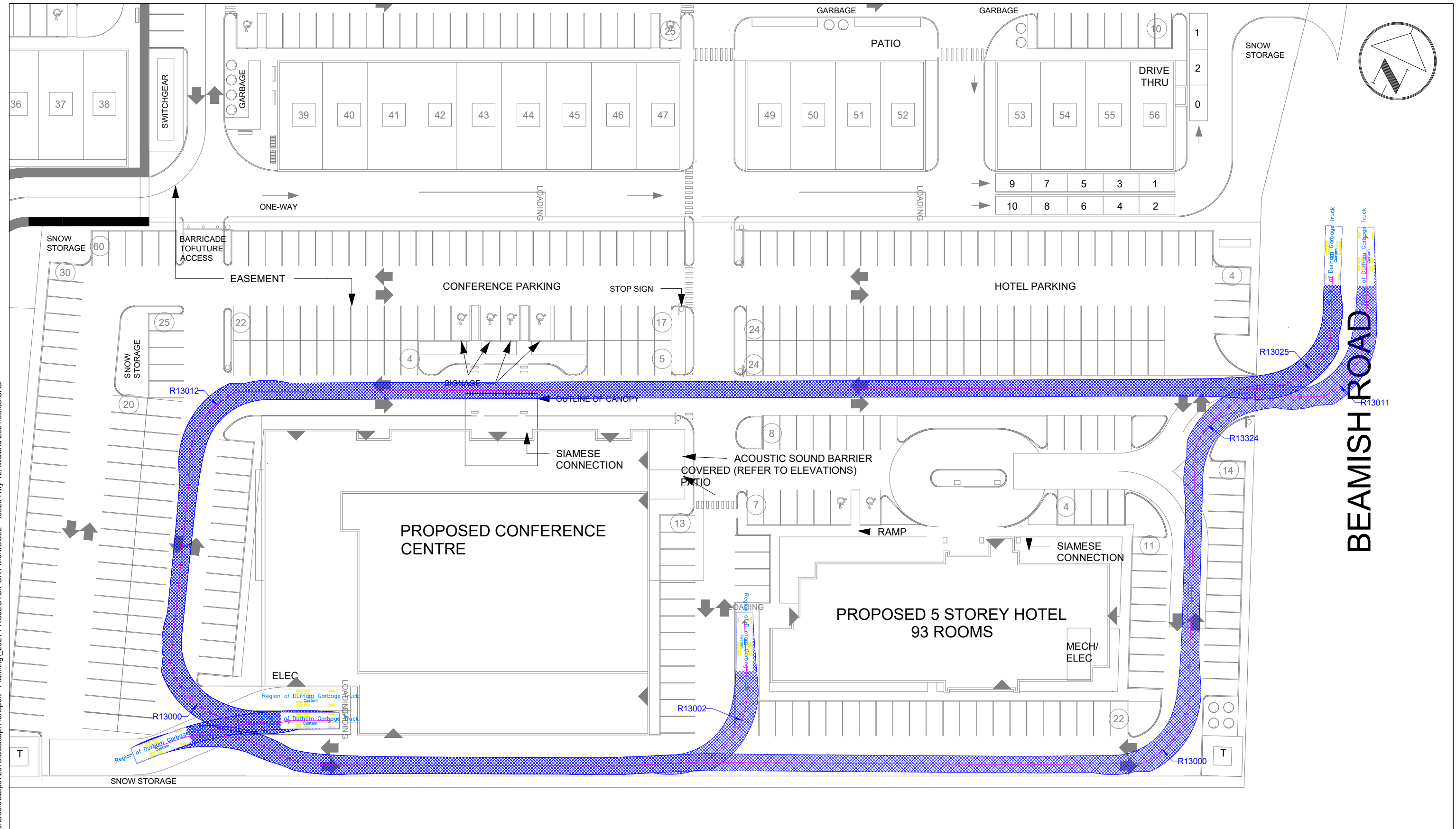
The maneuvers for a Region of Durham garbage truck are illustrated in **Figure 6.1** and **Figure 6.2** for Phase One and Two, respectively. The assessment confirms that the anticipated vehicles used for garbage collection and loading can be accommodated on the proposed Phase One site plan.

---

### 6.2 SITE CIRCULATION

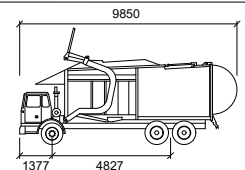
The maneuvers of a Region of Durham fire truck are provided in **Figure 6.3** and **Figure 6.4** for Phase One and Two, respectively. This demonstrates a forward-in and reverse-out maneuver of the fire truck into and out of the proposed turnaround area. The passenger vehicle circulation throughout the proposed parking lot is provided in **Figure 6.5** and **Figure 6.6** for Phase One and Two, respectively.

The assessment confirms that the anticipated vehicular circulations can be readily accommodated on the proposed site plan.



Source: midland masterplan - 0-2- Drawings.dwg, from Chamberlain Architect, received March 2021.

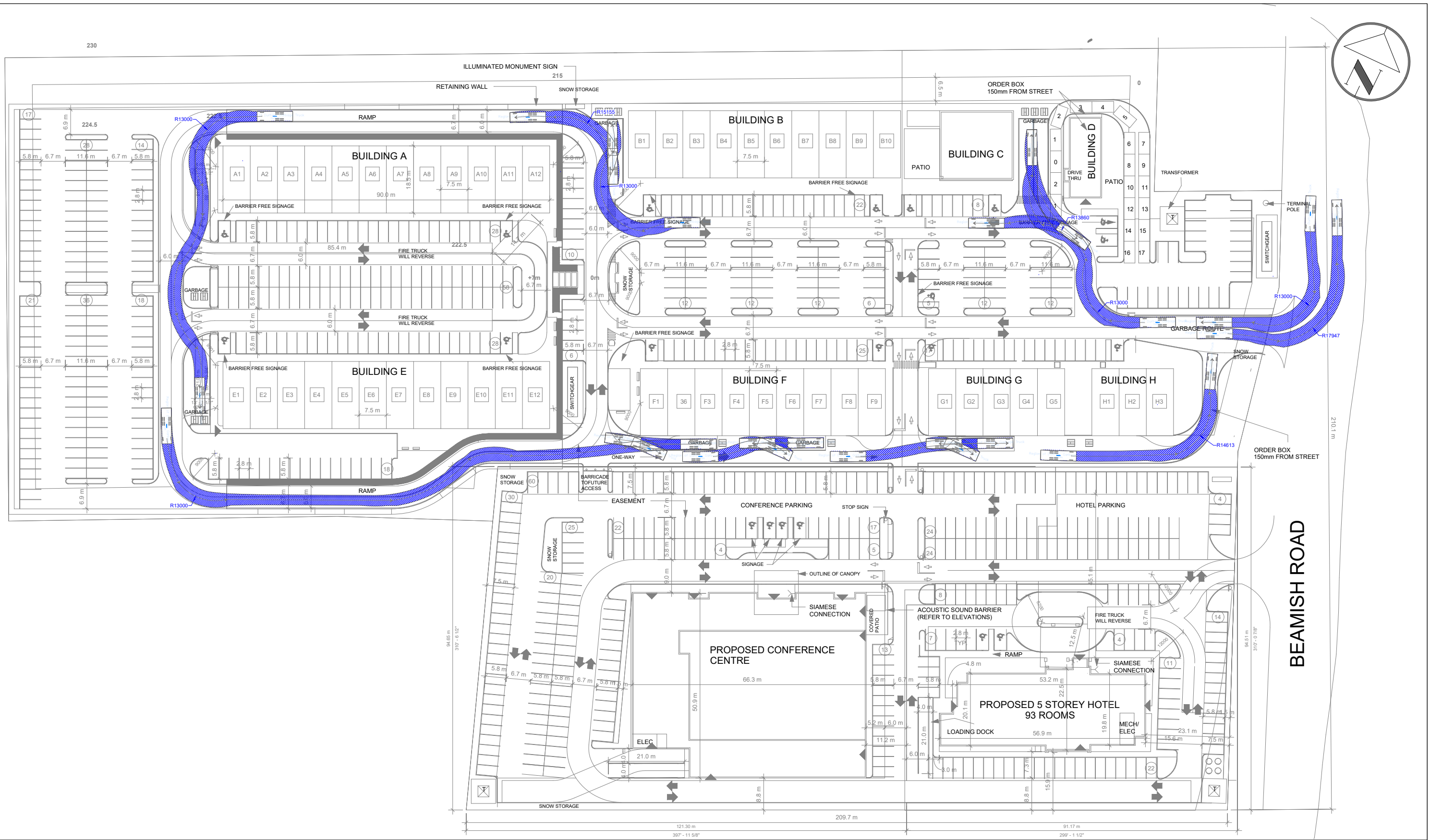
Scale: 1:600



Region of Durham Garbage Truck	
	mm
Width	: 2770
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 24.8

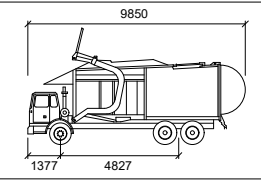
Figure 6.1  
Garbage Truck Circulation  
16928 Hwy 12, Midland - Phase 1

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Source: A001.dwg, from Chamberlain Architect, received September 03, 2021.

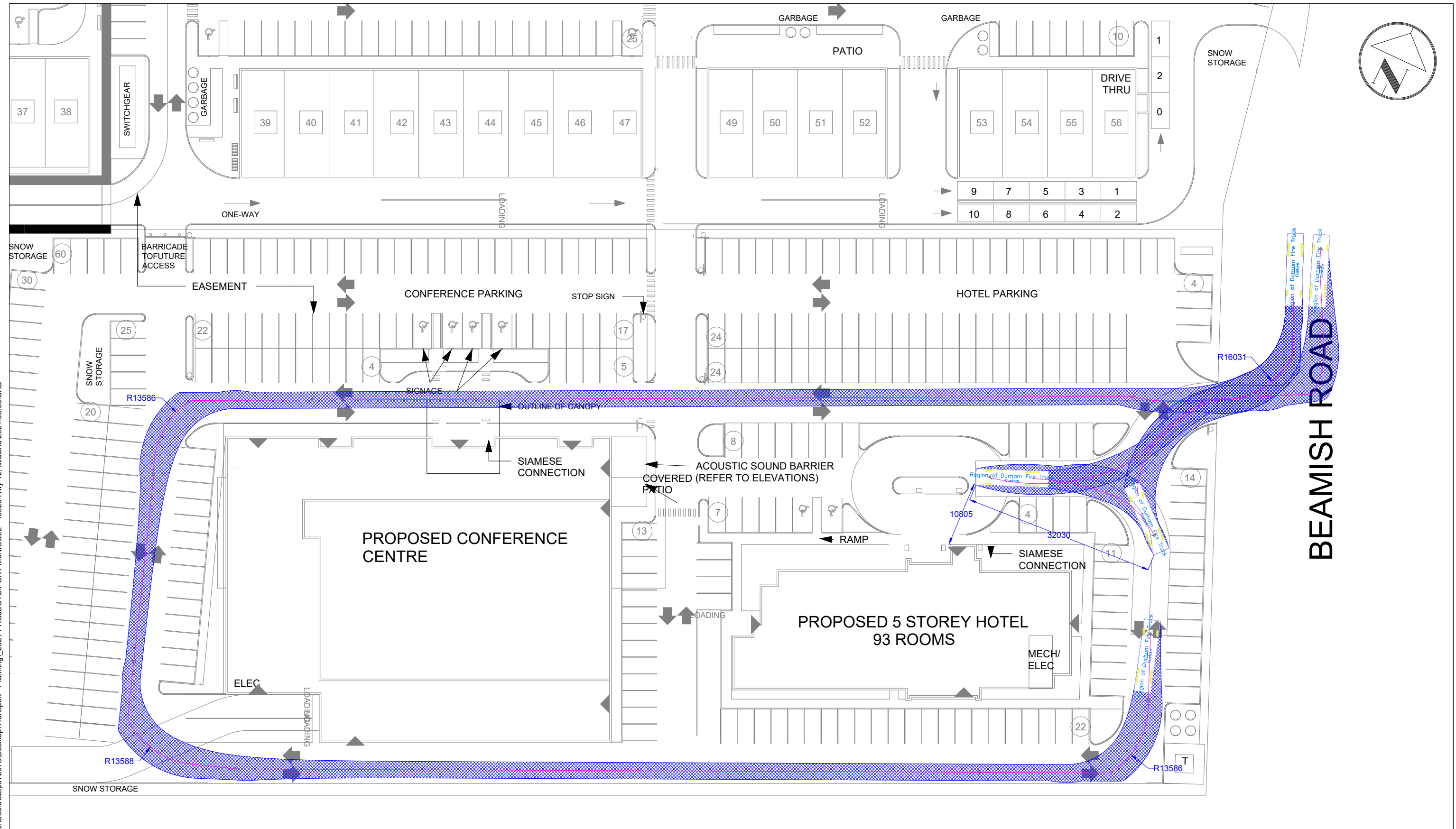
Scale: 1:1000



Region of Durham Garbage Truck

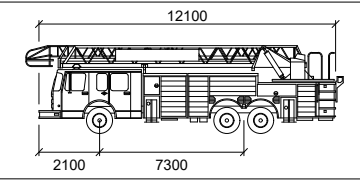
	mm
Width	: 2770
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 24.8

Figure 6.2  
Garbage Truck Circulation  
16928 Hwy 12, Midland - Phase 2



Source: midland masterplan - 0-2- Drawings.dwg, from Chamberlain Architect, received March 2021.

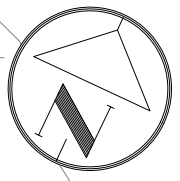
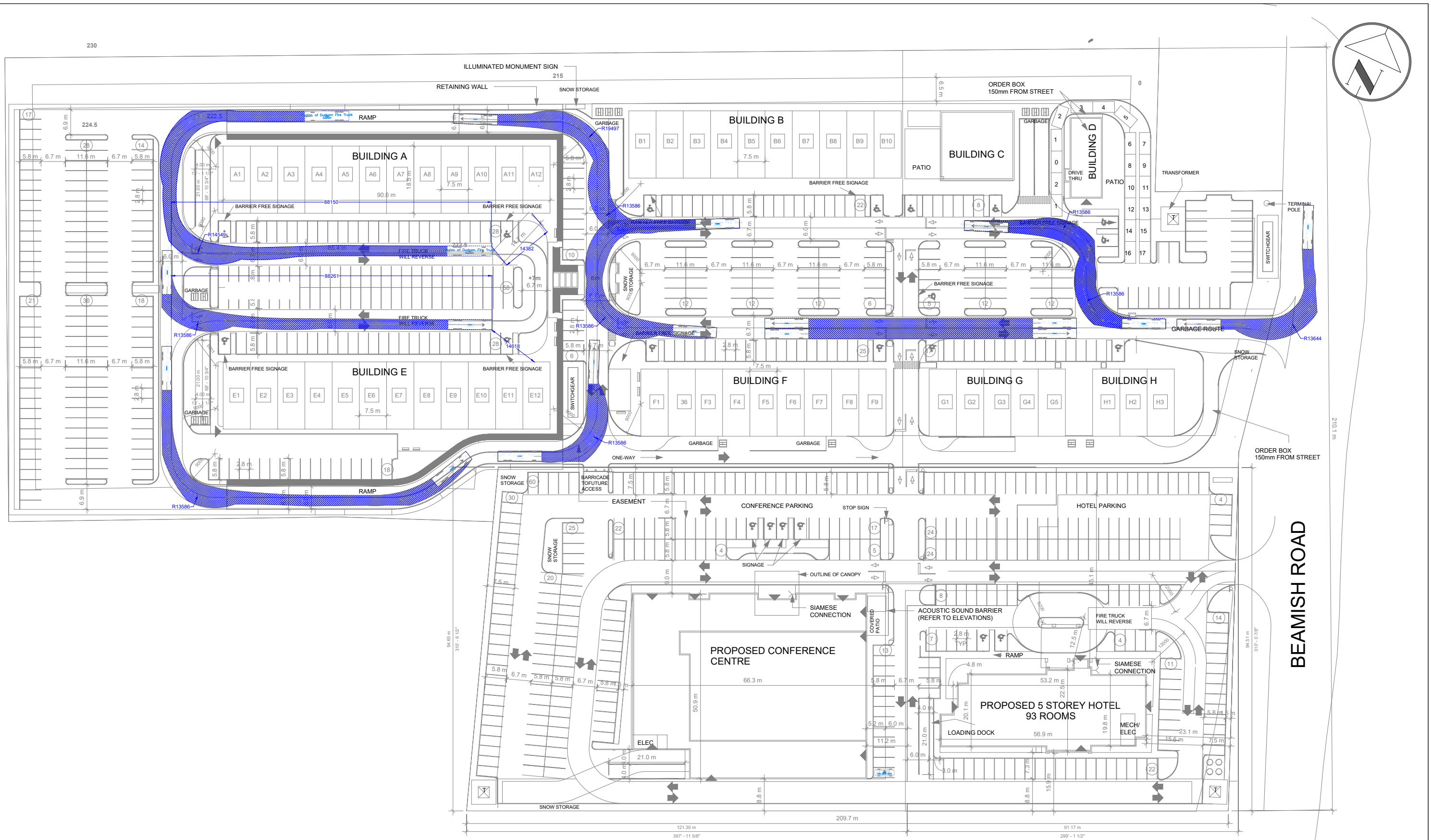
Scale: 1:600



Region of Durham Fire Truck	
	mm
Width	: 2750
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 32.5

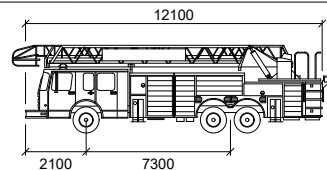
Figure 6.3  
Fire Truck Circulation  
16928 Hwy 12, Midland - Phase 1

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Source: A001.dwg, from Chamberlain Architect, received September 03, 2021.

Scale: 1:1000

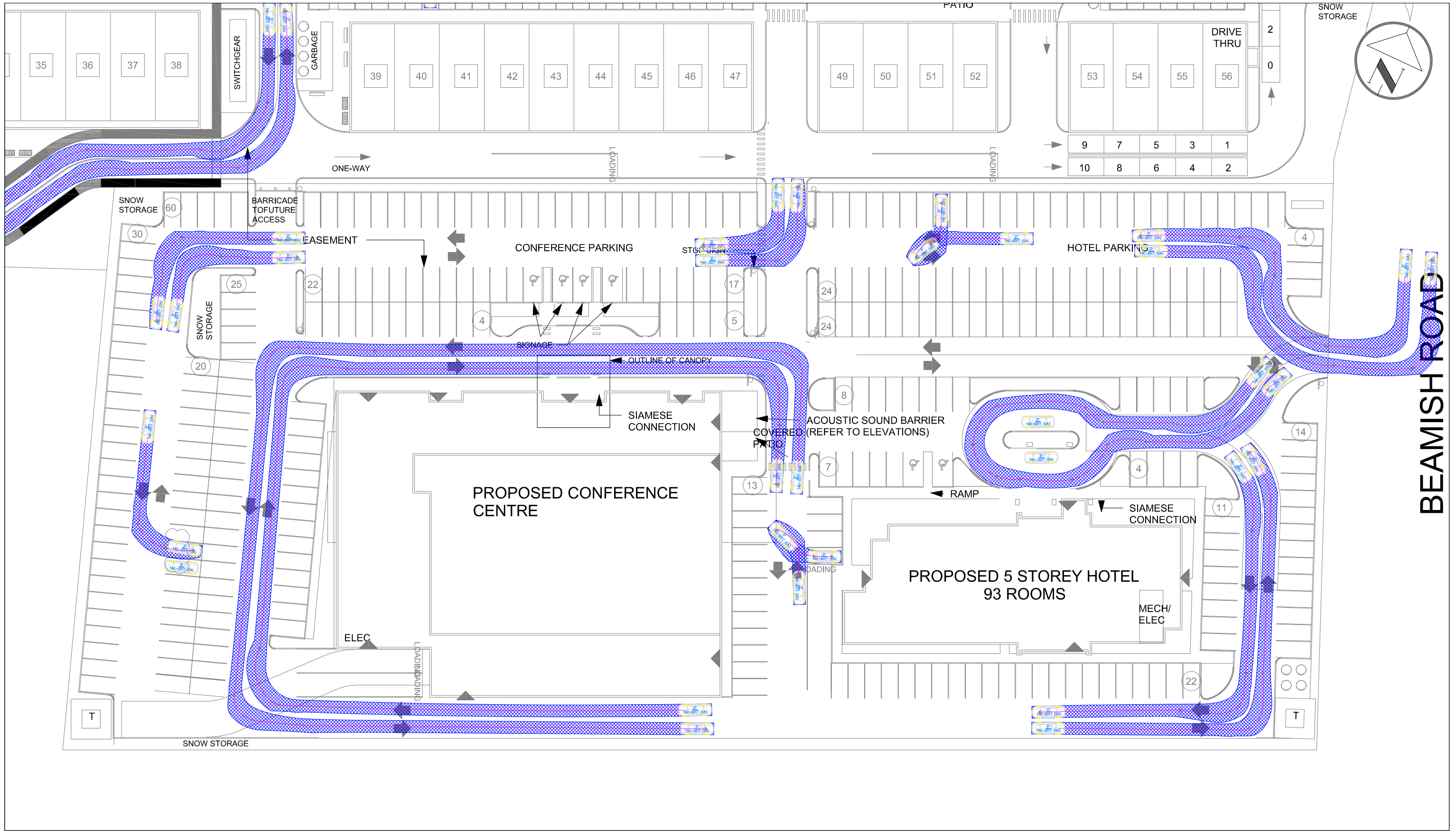


Region of Durham Fire Truck

	mm
Width	: 2750
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 32.5

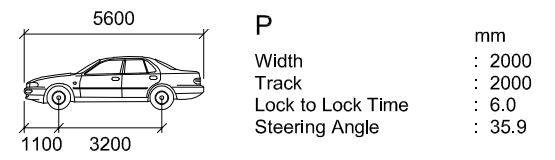
Figure 6.4  
Fire Truck Circulation  
16928 Hwy 12, Midland - Phase 2

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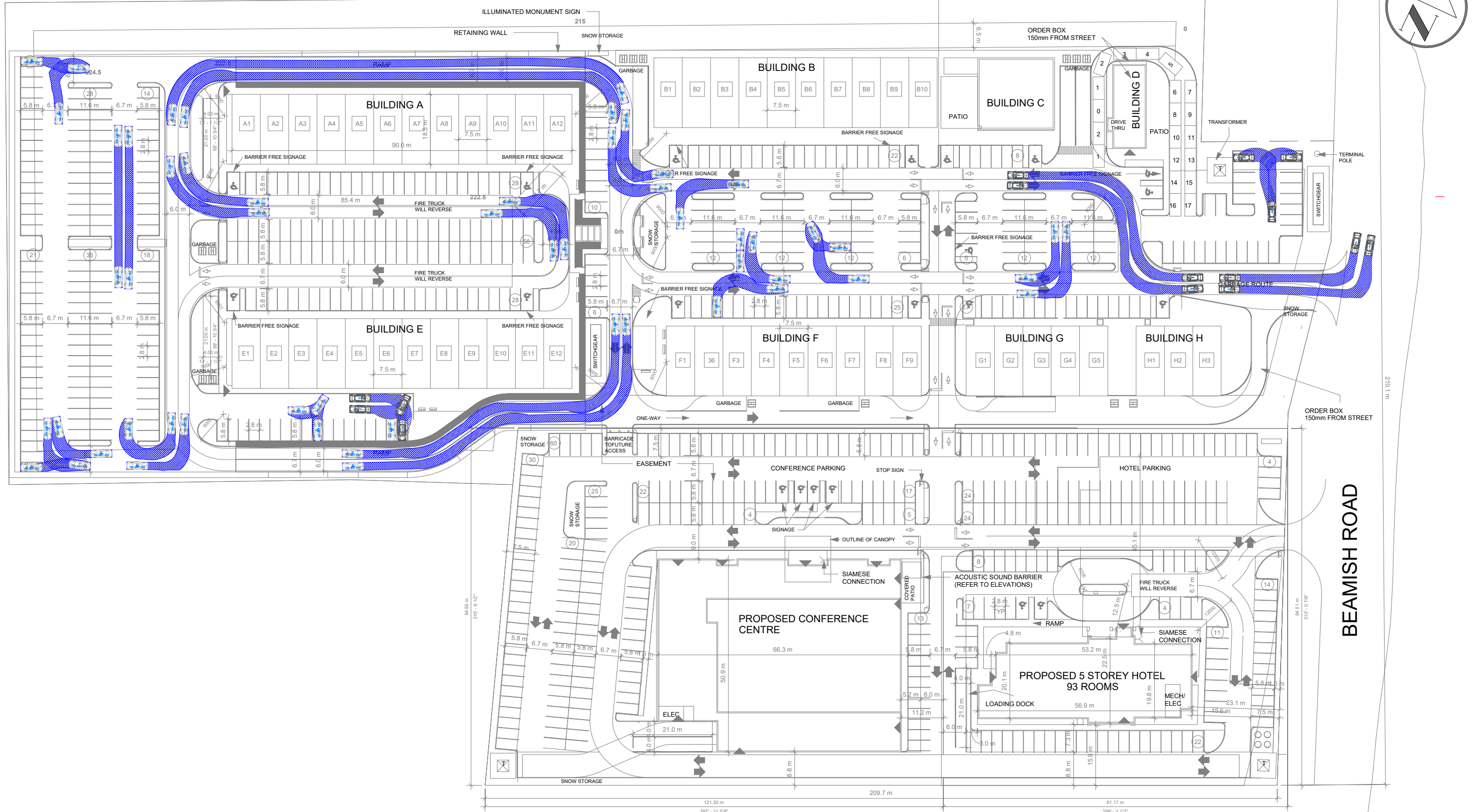
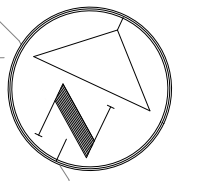


Source: midland masterplan - 0-2- Drawings.dwg, from Chamberlain Architect, received March 2021.

Scale: 1:600

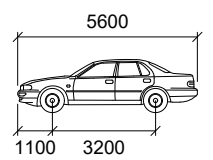


**Figure 6.5**  
**Passenger Vehicle Circulation**  
**16928 Hwy 12, Midland - Phase 1**



Source: A001.dwg, from Chamberlain Architect, received September 03, 2021.

Scale: 1:1000



P	mm
Width	: 2000
Track	: 2000
Lock to Lock Time	: 6.0
Steering Angle	: 35.9

Figure 6.6  
 Passenger Vehicle Circulation  
 16928 Hwy 12, Midland - Phase 2

# 7 PARKING & LOADING

## 7.1 VEHICLE PARKING

### 7.1.1 ZONING BY-LAW REQUIREMENTS & PROPOSED SUPPLY

The development proposal is subject to the Town of Midland’s Zoning By-law 2004-90. **Table 7-1** outlines the applicable By-law parking requirements and proposed parking supply for the site.

**Table 7-1 By-law 2004-90 Minimum Parking Standards & Supply**

Phase	Land Use	Zoning By-law Parking Rate	Parking Spaces Required	Parking Spaces Provided	Surplus/Deficit
One	Hotel (93 Rooms)	1.25 spaces / guest room	116	331	+2
	Conference Centre (852-person seating capacity based on 1 person / 40 ft <sup>2</sup> )	1 space for each 4 persons that can be accommodated at any one time in a dining room, licenced beverage room or a banquet room	213		
<b>Phase One Total</b>			329		
Two	Retail (7,076m <sup>2</sup> )	5 spaces / 90 m <sup>2</sup> GFA	393	450	+2
	Eating Establishments (220 seats)	1 space / 4 seats	55		
<b>Phase Two Total</b>			448		
<b>Site Total</b>			<b>777</b>	<b>781</b>	<b>+4</b>

The table above illustrates that the minimum parking requirement for the site is 777 spaces comprising 329 spaces for Phase One and 448 spaces for Phase Two. The proposed parking supply is 781 spaces which exceeds the minimum By-law standards by four spaces. The site will therefore provide adequate parking to meet the demands of its services.

### 7.1.2 BARRIER-FREE PARKING REGULATIONS

Table 4.2 under section 4.1.7.1 of the By-law sets out the minimum number of designated barrier-free spaces that must be provided based on the number of regular parking spaces. These standards and the proposed supply are summarized in **Table 7-2** below.

**Table 7-2 By-law 2004-90 Barrier-Free Parking Requirements**

No. of Regular Spaces	No. of Barrier-Free Spaces Required	No. of Barrier-Free Spaces Provided
1-10	0	Phase One - 6 Phase Two - 12 <b>Total - 18</b>
11-100	1	
101-200	2	
201-300	3	
301-400	4	



<b>401-500</b>	5	
<b>501 or more</b>	6	

The site will provide 18 barrier-free spaces comprising six spaces in Phase One and 12 spaces in Phase Two. This supply exceeds the minimum by-law requirements.

## 7.2 DRIVE-THRU QUEUING LANE REQUIREMENTS

Table 4.4 under section of 4.1.9.2 of the By-law sets out the minimum queuing space requirements within a designated queuing lane for various drive-through service facilities. For a Drive-Thru Coffee Shop, **Table 7-3** summarizes the minimum ingress and egress spaces.

**Table 7-3 By-law 2004-90 Drive-Thru Queuing Requirements**

Drive-Thru Facility	Minimum Required Ingress Spaces	Minimum Required Egress Spaces
<b>Drive-Thru Coffee Shop</b>	10	2

There is one drive-thru facility proposed for Phase Two. This facility will have over 11 ingress spaces and two egress spaces which meets the minimum standards in the By-law.

## 7.3 LOADING

Table 4.3 under section of 4.1.8.2 of the By-law sets out the minimum loading requirements for new developments which are summarized in **Table 7-4**.

**Table 7-4 By-law 2004-90 Loading Requirements**

GFA	Minimum No. of Loading Spaces	Proposed No. of Loading Spaces
<300 m <sup>2</sup>	0	Phase One - 2
301 m <sup>2</sup> - 2,000 m <sup>2</sup>	1	Phase Two - 8
>2,000 m <sup>2</sup>	2	<b>Site Total - 10</b>

The site will provide 10 loading spaces comprising two spaces in Phase One and eight spaces in Phase Two. This supply exceeds the minimum by-law requirements.

# 8 TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) is a general concept that includes various strategies that increase transportation system efficiency by managing the demand for travel. TDM initiatives discourage single-occupant vehicle travel and encourage more efficient modes such as walking, cycling, ridesharing, public transit and teleworking, particularly under congested conditions. In the context of an already congested road network, 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 the non-automobile travel opportunities within the study area. To achieve this, it is recommended that the marketing strategy for the proposed development highlight key characteristics based on the items below via knowledgeable management staff and visually attractive information packages. This would ensure that employees and guests are aware of the various opportunities and incentives available to them. This would assist to maximize the success of these TDM strategies and minimize the need for automobile use.

Two major categories of TDM measures are described herein. The first aspect of TDM are soft measures, which involve the utilization of technology or encourage the use of existing information technology infrastructure and networks to reduce travel demand or divert them towards non-auto alternatives. The second component of TDM are hard measures, requiring the implementation of physical infrastructure, such as cycling facilities or pedestrian walkways.

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## 8.1 SOFT TDM INITIATIVES

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### 8.1.1 ON-SITE MOBILITY ALTERNATIVES INFORMATION

It is important that information regarding available transit, cycling, trails and other walking facilities and connections be properly conveyed from the Owner to employees of this establishment. It is recommended that the Owner prepare information brochures for each employee and guest. Information can be obtained from the Town and County and should contain the following information:

- Midland Penetanguishene Transit Map;
- Bus schedules of nearby transit routes; and
- Direction to other information available on the Town and County websites.

It is recommended that the Owner provide these information brochures to each new employee as part of their orientation package. The estimated cost for the Owner to prepare these information brochures would be \$200 in materials and printing.

Additionally, it is recommended that real-time information be made available to hotel guests and employees at the hotel lobby. This would be provided through a television screen and displayed during all operating hours. The provision of this television would be the responsibility of the Owner of the site.

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## 8.2 HARD TDM INITIATIVES

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### *8.2.1 PEDESTRIAN AND CYCLING FACILITIES*

To encourage cycling as a mode of transportation, it is recommended that the Owner provide secure bicycle parking facilities.

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## 8.3 TDM MONITORING PROGRAM

To evaluate the success of or the need for improvements to the proposed TDM measures, it is recommended that a monitoring program be put in place by the Owner. The Owner would prepare travel surveys for employees and guests which would be conducted to gather information on how people get to and from the hotel and retail plaza, and what measures can be implemented to change their mode of travel. The travel surveys could be conducted once every other year. The estimated cost of the TDM monitoring program would be \$1,000.

# APPENDIX

## A MUNICIPAL COMMENTS



## Akram, Irfan

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**To:** Boodram, Natalie; david@tripar.ca  
**Cc:** Walters, Shawn; Trajkovski, Nick  
**Subject:** RE: 16928 Highway 12 Phase 1 SPA - 5th Submission

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**From:** Dorton, Peter (MTO) <[Peter.Dorton@ontario.ca](mailto:Peter.Dorton@ontario.ca)>

**Sent:** May 26, 2021 12:11 PM

**To:** Boodram, Natalie <[Natalie.Boodram@wsp.com](mailto:Natalie.Boodram@wsp.com)>; Natalie Murdock <[nmurdock@midland.ca](mailto:nurdock@midland.ca)>

**Cc:** Wes Crown <[wecrown@mhbcplan.com](mailto:wecrown@mhbcplan.com)>; david@tripar.ca; Walters, Shawn <[Shawn.Walters@wsp.com](mailto:Shawn.Walters@wsp.com)>; Trajkovski, Nick <[Nick.Trajkovski@wsp.com](mailto:Nick.Trajkovski@wsp.com)>; Janke, Aaron (MTO) <[Aaron.Janke@ontario.ca](mailto:Aaron.Janke@ontario.ca)>; Hylton, Ramon (MTO) <[Ramon.Hylton@ontario.ca](mailto:Ramon.Hylton@ontario.ca)>; Blaney, Cameron (MTO) <[Cameron.Blaney@ontario.ca](mailto:Cameron.Blaney@ontario.ca)>; Hajjar, Alexander (MTO) <[Alexander.Hajjar@ontario.ca](mailto:Alexander.Hajjar@ontario.ca)>

**Subject:** RE: 16928 Highway 12 Phase 1 SPA - 5th Submission

Natalie and Natalie:

We have completed our review of the April 22, 2021 Traffic Impact Study and offer the following comments:

1. Based on the attached meeting minutes, we were expecting a comparison of an all – moves vs restricted right-in / right-out (RIRO) north access. The TIS does not appear to speak to MTO's preferred RIRO configuration, and does not identify access spacings proposed on Beamish Rd..
2. There also appears to be no recommendations for any Beamish Rd. improvements, including a potential right turn lane or taper into either access, for either Phase 1 or Phase 2.
3. The Site Plan included is only for Phase 1, whereas we had indicated we need to see a buildout site plan, including interconnections between phases, internal circulation, including for drive-thrus, and confirmation on likely tenants for drive-thrus (and analysis based on tenants).
4. We were also expecting further explanation / confirmation as to why the south access is not being lined up with Prospect Blvd.. P. 59/690 suggest that site layout revisions would be required to accommodate this, however, it is common practice to address site access, site circulation, and site layout requirements concurrently.
5. Based on this latest TIS submission, we are not in a position to approve the entrances shown on the Site Plan, and recommend that ultimate access requirements for site buildout be confirmed now (otherwise there is no guarantee access will be approved for Phase 2).
6. The TIS suggests that signals will likely be required in 2023 by Hanson Phases 1A and B, and not by Phase 1 of this Coland development, and that 75m of north bound storage is to be included for the signalized condition. Please note that traffic signals will be installed when warranted based on counts taken at the intersection. The current expectation, based on anticipated phasing for Hanson, is that Hanson will install signals at some point in the future, however their plans do not include the 75m of NB left turn storage referenced in this Coland TIS.

7. Assuming that Hanson triggers the need for signals prior to Phase 2 of Coland, Coland is to be responsible for the cost of the NB LTL on Beamish Rd. at Highway 12. A preliminary design and cost estimate for this lane should be submitted for MTO review and approval, such that securities can be posted in association with the Phase 1 Coland Site Plan. Coland will be responsible for the final construction costs of the NB LTL, to be constructed in association with signalization.
8. A traffic study update will be required for Phase 2 of Coland development, and should re-assess the need for traffic signals at Highway 12.
9. We note that the existing TIS shows little to no north – south through traffic between Hanson Rd. and Beamish Rd.. As the road network within Hanson development will eventually connect out to King St., the Phase 2 Coland TIS should assign more through N-S through traffic at Highway 12 / Beamish Rd. / Hanson Rd..
10. We accept the TIS conclusion that the existing westbound left turn lane on Highway 12 at Beamish technically requires an additional 10m of storage, however this demand for additional storage is very short in duration and will not be a requirement of Coland.

Please feel free to contact me if you have any questions.

Thanks,  
Peter Dorton  
Senior Project Manager  
Ministry of Transportation  
Central Operations, Highway Corridor Management Section  
159 Sir William Hearst Avenue, 7th Floor  
Toronto, ON M3M 0B7  
Cell: (437) 833 - 9396  
E-Mail: [peter.dorton@ontario.ca](mailto:peter.dorton@ontario.ca)  
Web: [www.mto.gov.on.ca/english/engineering/management/corridor](http://www.mto.gov.on.ca/english/engineering/management/corridor)

-LAEhHhHzdJzBITWfa4Hgs7pbKl

## Akram, Irfan

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**To:** Boodram, Natalie  
**Subject:** RE: 16928 Highway 12 Phase 1 SPA - 5th Submission

---

**From:** Mitch Sobil <[msobil@midland.ca](mailto:msobil@midland.ca)>

**Sent:** June 25, 2021 12:13 PM

**To:** Dorton, Peter (MTO) <[peter.dorton@ontario.ca](mailto:peter.dorton@ontario.ca)>; Boodram, Natalie <[Natalie.Boodram@wsp.com](mailto:Natalie.Boodram@wsp.com)>; Natalie Murdock <[nmurdock@midland.ca](mailto:nmurdock@midland.ca)>; Andy Campbell <[acampbell@midland.ca](mailto:acampbell@midland.ca)>

**Cc:** Wes Crown <[wecrown@mhbcpplan.com](mailto:wecrown@mhbcpplan.com)>; David <[David@tripar.ca](mailto:David@tripar.ca)>; Walters, Shawn <[Shawn.Walters@wsp.com](mailto:Shawn.Walters@wsp.com)>; Trajkovski, Nick <[Nick.Trajkovski@wsp.com](mailto:Nick.Trajkovski@wsp.com)>; Janke, Aaron (MTO) <[Aaron.Janke@ontario.ca](mailto:Aaron.Janke@ontario.ca)>; Hylton, Ramon (MTO) <[Ramon.Hylton@ontario.ca](mailto:Ramon.Hylton@ontario.ca)>; Blaney, Cameron (MTO) <[Cameron.Blaney@ontario.ca](mailto:Cameron.Blaney@ontario.ca)>; Hajjar, Alexander (MTO) <[Alexander.Hajjar@ontario.ca](mailto:Alexander.Hajjar@ontario.ca)>; Adam Farr <[afarr@midland.ca](mailto:afarr@midland.ca)>; Hannia Nawaz <[hnawaz@midland.ca](mailto:hnawaz@midland.ca)>; Bailee Yasher <[byasher@midland.ca](mailto:byasher@midland.ca)>

**Subject:** RE: 16928 Highway 12 Phase 1 SPA - 5th Submission

Hi Natalie,

We have reviewed the revised TIS and have the following comments.

1. Similar to the MTO's comments, the previous TIS included additional turning lanes and thru lanes on Beamish into the site entrances on Figure 3.1. Figure 2.1 in the revised TIS does not include these additional lanes. Please elaborate further on the reasoning behind this change as they are a considerable change.
  - a. I agree with Peter that a SB right turn lane should be provided to the site entrances.
2. The Town's TMP includes pedestrian walkways, bike lanes and multi-use trails in this Beamish Rd, Hanson Rd and Hwy 12 area in the medium and long term plans. Since buildout of this site will occur in the medium term for this TMP, please ensure that these components are incorporated into all designs appropriately and appropriate crossings are provided at the Hwy 12 and Beamish intersection.
3. Please confirm that Signals will be installed at the Hwy 12 and Beamish Rd intersection in 2023. My understanding is that signals will be installed when warranted by the MTO. Please clarify who is responsible for the installation of these signals. It is clear that in the existing conditions and the future background conditions in 2023 that this intersection is not operating at an acceptable level. Please confirm that these signals are required before Phase 1 of this site plan is online as indicated in Table 5-1. The Town's position is that these signals should be installed sooner rather than later due to the poor LOS that it operates at in the existing and the unacceptable LOS it operates at in the future background 2023 condition.
4. Please breakdown and clarify which developer is responsible for each upgrade. (ie. Signalization, timing optimization at each milestone, road widenings for turning and through lanes on Beamish Rd, Hwy12 and HWY12/CR93 intersection, etc.)
5. Section 5.2 notes 44m of internal queuing into the site. This will have a direct impact on the site design and could impact egress in the event of an emergency. For emergency reasons the town recommends two east bounds lanes in the phase 2 entrance at full build out. This again stresses the need to see a full build out site plan.
6. Section 5.4.2 states conclusions for future background conditions. Is this meant to state conclusions for Future Total conditions?



7. Conclusion #2 in 5.4.2 states a queuing length of 30m for the phase 2 exit however table 5-2, 5-3 and 5-4 all state 44m. Please confirm.
8. In the future total condition 2023 (Figure 5.1), it appears there has been no allocation of trips given to the Phase 2 entrance to the site. While we understand that Phase 2 won't be developed by 2023 this entrance will in fact be active as a requirement to the Phase 1 development as the second entrance and there will be trips generated.

To add to Peter's comments below I have the following additional comments (numbering matches Peter's comment numbers).

1. While the Town was not in favour of the right-in right-out entrance to Phase 2 as noted in the minutes, I'm in agreement with Peter that we were expecting the all-movements and the RIRO to be analyzed in this revised TIS. As Peter noted MTO approval is required for this intersection and the MTO requested this analysis, so we were also surprised to find it was not completed. Based on the revised TIS it is still the Town's position to have this entrance be an all-movement entrance however we understand MTO approval is required.
2. See comment 1 above.
3. I agree with the MTO that a full buildout plan for Phase 2 was requested as part of this revised TIS. This also ties into comment #5 above.
4. This was a comment made by engineering internally on the first two submissions that appears to have never made its way formally through to the applicant even though that was the intent. Understanding the current situation of this and that this is on a 5<sup>th</sup> submission the Town is ok with the proposed entrance to Phase 1 considering the traffic information provided in the revised TIS.
5. Agreed with MTO. Also see comment #8 above for the trip generation to this Phase 2 entrance.
6. Agree with MTO. Also see comment #3 above and clarify timing, costs and who is responsible for what. Please note that the latest cost estimates for the Coland development did not include a turn lane at the Beamish Hwy 12 intersection.
7. Agree with MTO. Please ensure the design complies with comment #2 above.
8. Agree with MTO, depending on timing a TIS update will be required prior to Phase 2 site plan approval.
9. Agree with MTO.
10. Agree with MTO and the conclusion of the report for this item.

Let me know if you have any questions.

Thanks,

**Mitch Sobil**

Manager of Engineering

Tel: 705-526-4275 ext 2213

Cell: 705-528-9420

# APPENDIX

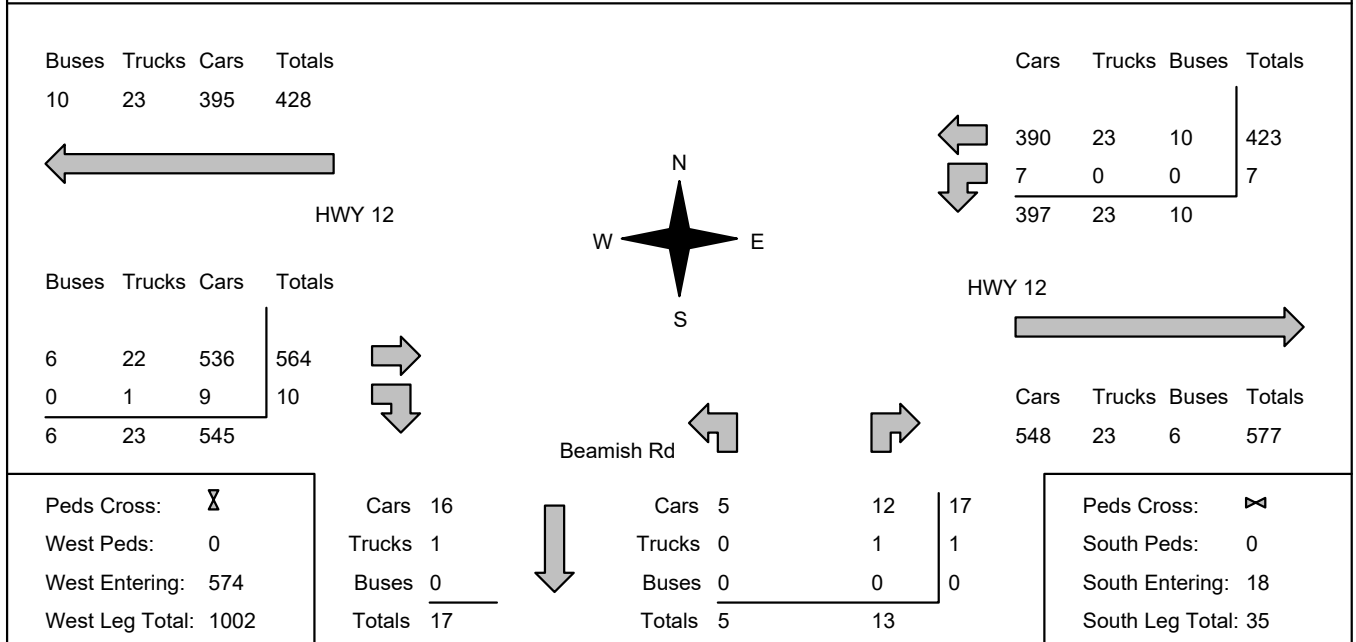
## **B** TRAFFIC DATA AND SIGNAL TIMING PLANS



# Accu-Traffic Inc.

<b>Morning Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 7:45:00 <b>To:</b> 8:45:00
<b>Municipality:</b> Midland <b>Site #:</b> 1815100001 <b>Intersection:</b> HWY 12 & Beamish Rd <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>	
<b>** Non-Signalized Intersection **</b>	<b>Major Road:</b> HWY 12 runs W/E	

East Leg Total: 1007
East Entering: 430
East Peds: 0
Peds Cross: 8

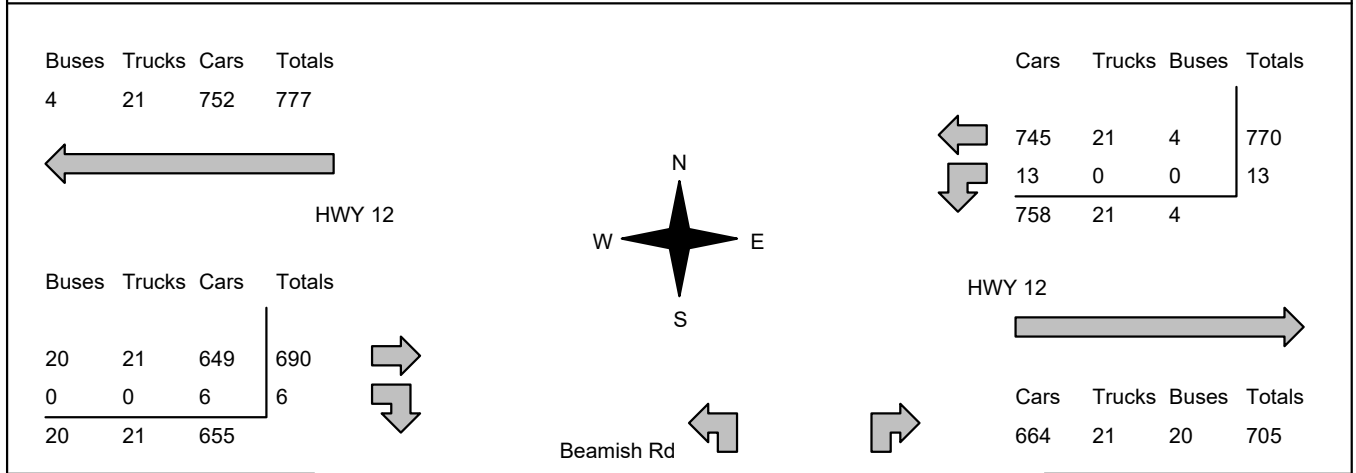


**Comments**

# Accu-Traffic Inc.

<b>Afternoon Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 18:00:00	<b>One Hour Peak</b> <b>From:</b> 16:00:00 <b>To:</b> 17:00:00
<b>Municipality:</b> Midland <b>Site #:</b> 1815100001 <b>Intersection:</b> HWY 12 & Beamish Rd <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>	
<b>** Non-Signalized Intersection **</b>	<b>Major Road:</b> HWY 12 runs W/E	

	East Leg Total: 1488 East Entering: 783 East Peds: 0 Peds Cross: 8
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Peds Cross: 8 West Peds: 0 West Entering: 696 West Leg Total: 1473	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>19</td></tr> <tr><td>Trucks</td><td>0</td></tr> <tr><td>Buses</td><td>0</td></tr> <tr><td><b>Totals</b></td><td><b>19</b></td></tr> </table>	Cars	19	Trucks	0	Buses	0	<b>Totals</b>	<b>19</b>	<table style="width: 100%; border-collapse: collapse;"> <tr><td>Cars</td><td>7</td><td>15</td><td>22</td></tr> <tr><td>Trucks</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Buses</td><td>0</td><td>0</td><td>0</td></tr> <tr><td><b>Totals</b></td><td><b>7</b></td><td><b>15</b></td><td></td></tr> </table>	Cars	7	15	22	Trucks	0	0	0	Buses	0	0	0	<b>Totals</b>	<b>7</b>	<b>15</b>		Peds Cross: 8 South Peds: 0 South Entering: 22 South Leg Total: 41
Cars	19																										
Trucks	0																										
Buses	0																										
<b>Totals</b>	<b>19</b>																										
Cars	7	15	22																								
Trucks	0	0	0																								
Buses	0	0	0																								
<b>Totals</b>	<b>7</b>	<b>15</b>																									

Comments

# Accu-Traffic Inc.

## Total Count Diagram

**Municipality:** Midland  
**Site #:** 1815100001  
**Intersection:** HWY 12 & Beamish Rd  
**TFR File #:** 1  
**Count date:** 22-Nov-18

**Weather conditions:**

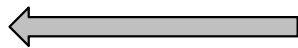
**Person counted:**  
**Person prepared:**  
**Person checked:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** HWY 12 runs W/E

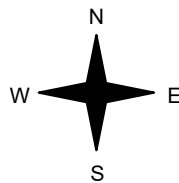
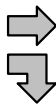
East Leg Total: 4648  
 East Entering: 2230  
 East Peds: 0  
 Peds Cross: X

Buses	Trucks	Cars	Totals
33	71	2112	2216



HWY 12

Buses	Trucks	Cars	Totals
31	78	2260	2369
0	1	31	32
31	79	2291	



Cars	Trucks	Buses	Totals
------	--------	-------	--------

2089	71	33	2193
36	1	0	37
2125	72	33	

HWY 12



Cars	Trucks	Buses	Totals
2306	81	31	2418

Peds Cross: X  
 West Peds: 0  
 West Entering: 2401  
 West Leg Total: 4617

Cars	67
Trucks	2
Buses	0
Totals	69



Cars	23	46	69
Trucks	0	3	3
Buses	0	0	0
Totals	23	49	

Peds Cross: X  
 South Peds: 0  
 South Entering: 72  
 South Leg Total: 141

### Comments



**Accu-Traffic Inc.**  
Traffic Monitoring & Data Analysis

# Accu-Traffic Inc. Traffic Count Summary

Intersection: HWY 12 & Beamish Rd      Count Date: 22-Nov-18      Municipality: Midland

<b>North Approach Totals</b>						North/South Total Approaches	<b>South Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	0	0	0	0	0	14	8:00:00	5	0	9	14	0
9:00:00	0	0	0	0	0	16	9:00:00	3	0	13	16	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	0	0	0	0	0	22	17:00:00	7	0	15	22	0
18:00:00	0	0	0	0	0	20	18:00:00	8	0	12	20	0
<b>Totals:</b>	0	0	0	0	0	72	<b>S Totals:</b>	23	0	49	72	0
<b>East Approach Totals</b>						East/West Total Approaches	<b>West Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	8	387	0	395	0	855	8:00:00	0	448	12	460	0
9:00:00	7	446	0	453	0	999	9:00:00	0	538	8	546	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	13	770	0	783	0	1479	17:00:00	0	690	6	696	0
18:00:00	9	590	0	599	0	1298	18:00:00	0	693	6	699	0
<b>Totals:</b>	37	2193	0	2230	0	4631	<b>W Totals:</b>	0	2369	32	2401	0
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	16:00			17:00	18:00	0:00	0:00		
Crossing Values:	0	5	3	0			7	8	0	0		












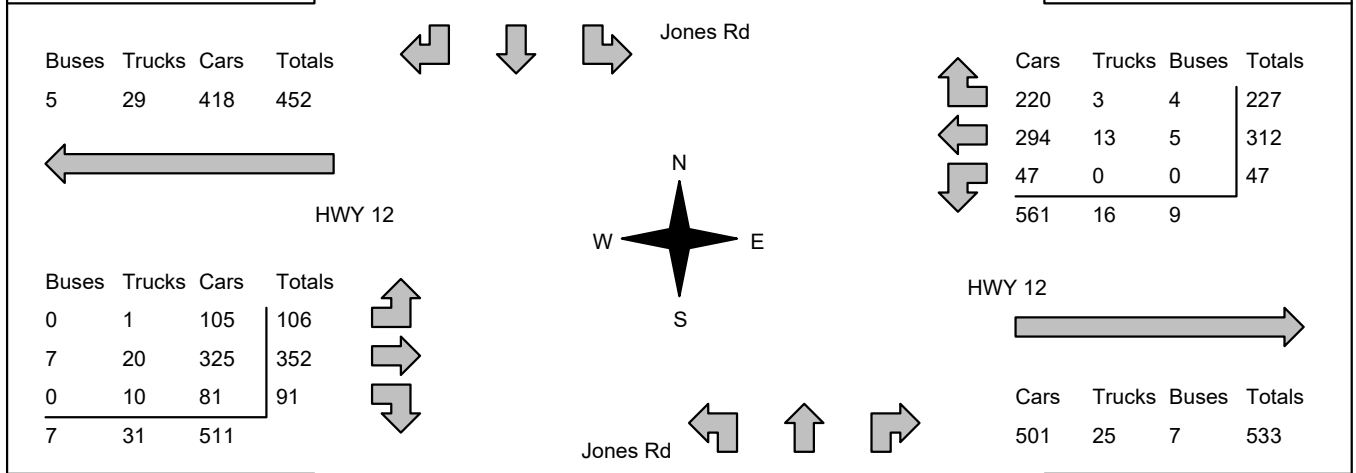
# Accu-Traffic Inc.


<b>Morning Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 8:00:00 <b>To:</b> 9:00:00
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<b>Municipality:</b> Midland <b>Site #:</b> 1815100002 <b>Intersection:</b> HWY 12 & Jones Rd <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>
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<b>** Signalized Intersection **</b>	<b>Major Road:</b> HWY 12 runs W/E
--------------------------------------	------------------------------------

North Leg Total: 624 North Entering: 282 North Peds: 0 Peds Cross: ☒	<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>0</td><td>1</td><td>0</td><td>1</td></tr> <tr><td>Trucks</td><td>4</td><td>0</td><td>5</td><td>9</td></tr> <tr><td>Cars</td><td>95</td><td>22</td><td>155</td><td>272</td></tr> <tr><td>Totals</td><td>99</td><td>23</td><td>160</td><td></td></tr> </table>	Buses	0	1	0	1	Trucks	4	0	5	9	Cars	95	22	155	272	Totals	99	23	160			<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>4</td></tr> <tr><td>Trucks</td><td>5</td></tr> <tr><td>Cars</td><td>333</td></tr> <tr><td>Totals</td><td>342</td></tr> </table>	Buses	4	Trucks	5	Cars	333	Totals	342	East Leg Total: 1119 East Entering: 586 East Peds: 3 Peds Cross: ☒
Buses	0	1	0	1																												
Trucks	4	0	5	9																												
Cars	95	22	155	272																												
Totals	99	23	160																													
Buses	4																															
Trucks	5																															
Cars	333																															
Totals	342																															



Peds Cross: ☒ West Peds: 0 West Entering: 549 West Leg Total: 1001	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>150</td></tr> <tr><td>Trucks</td><td>10</td></tr> <tr><td>Buses</td><td>1</td></tr> <tr><td>Totals</td><td>161</td></tr> </table>	Cars	150	Trucks	10	Buses	1	Totals	161		<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>29</td><td>8</td><td>21</td><td>58</td></tr> <tr><td>Trucks</td><td>12</td><td>1</td><td>0</td><td>13</td></tr> <tr><td>Buses</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Totals</td><td>41</td><td>9</td><td>21</td><td></td></tr> </table>	Cars	29	8	21	58	Trucks	12	1	0	13	Buses	0	0	0	0	Totals	41	9	21		Peds Cross: ☒ South Peds: 0 South Entering: 71 South Leg Total: 232
Cars	150																															
Trucks	10																															
Buses	1																															
Totals	161																															
Cars	29	8	21	58																												
Trucks	12	1	0	13																												
Buses	0	0	0	0																												
Totals	41	9	21																													


**Comments**

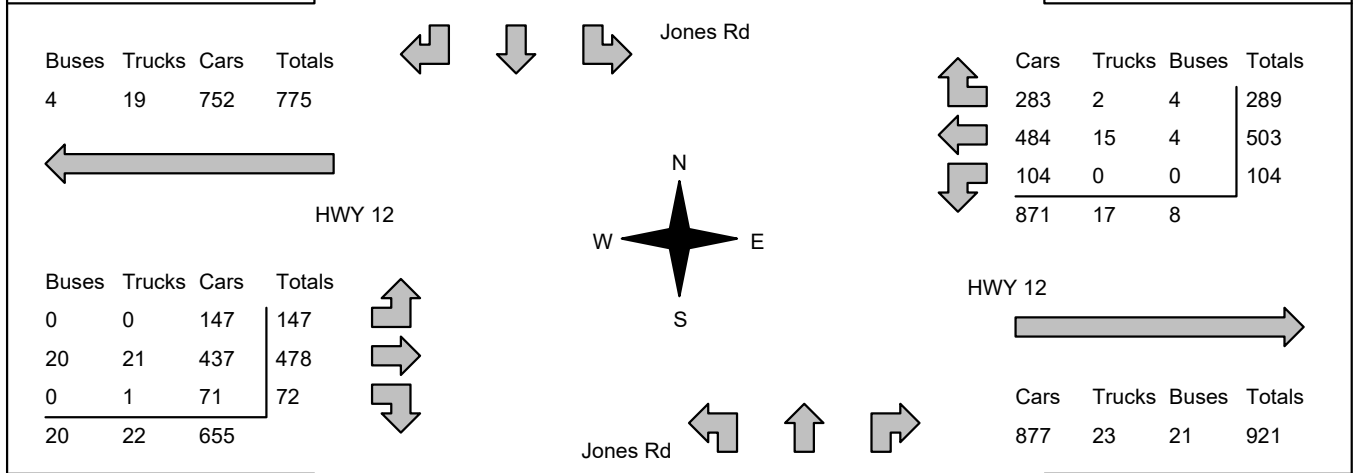
# Accu-Traffic Inc.

<b>Afternoon Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 18:00:00	<b>One Hour Peak</b> <b>From:</b> 16:00:00 <b>To:</b> 17:00:00
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<b>Municipality:</b> Midland <b>Site #:</b> 1815100002 <b>Intersection:</b> HWY 12 & Jones Rd <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>
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<b>** Signalized Intersection **</b>	<b>Major Road:</b> HWY 12 runs W/E
--------------------------------------	------------------------------------

North Leg Total: 955 North Entering: 488 North Peds: 2 Peds Cross: ☒	<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>0</td><td>1</td><td>1</td><td>2</td></tr> <tr><td>Trucks</td><td>2</td><td>0</td><td>1</td><td>3</td></tr> <tr><td>Cars</td><td>170</td><td>37</td><td>276</td><td>483</td></tr> <tr><td>Totals</td><td>172</td><td>38</td><td>278</td><td></td></tr> </table>	Buses	0	1	1	2	Trucks	2	0	1	3	Cars	170	37	276	483	Totals	172	38	278			<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>4</td></tr> <tr><td>Trucks</td><td>2</td></tr> <tr><td>Cars</td><td>461</td></tr> <tr><td>Totals</td><td>467</td></tr> </table>	Buses	4	Trucks	2	Cars	461	Totals	467	East Leg Total: 1817 East Entering: 896 East Peds: 3 Peds Cross: ☒
Buses	0	1	1	2																												
Trucks	2	0	1	3																												
Cars	170	37	276	483																												
Totals	172	38	278																													
Buses	4																															
Trucks	2																															
Cars	461																															
Totals	467																															



Peds Cross: ☒ West Peds: 0 West Entering: 697 West Leg Total: 1472	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>212</td></tr> <tr><td>Trucks</td><td>1</td></tr> <tr><td>Buses</td><td>1</td></tr> <tr><td>Totals</td><td>214</td></tr> </table>	Cars	212	Trucks	1	Buses	1	Totals	214	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>98</td><td>31</td><td>164</td><td>293</td></tr> <tr><td>Trucks</td><td>2</td><td>0</td><td>1</td><td>3</td></tr> <tr><td>Buses</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>Totals</td><td>100</td><td>31</td><td>165</td><td></td></tr> </table>	Cars	98	31	164	293	Trucks	2	0	1	3	Buses	0	0	0	0	Totals	100	31	165		Peds Cross: ☒ South Peds: 1 South Entering: 296 South Leg Total: 510
Cars	212																														
Trucks	1																														
Buses	1																														
Totals	214																														
Cars	98	31	164	293																											
Trucks	2	0	1	3																											
Buses	0	0	0	0																											
Totals	100	31	165																												

**Comments**

# Accu-Traffic Inc.

## Total Count Diagram

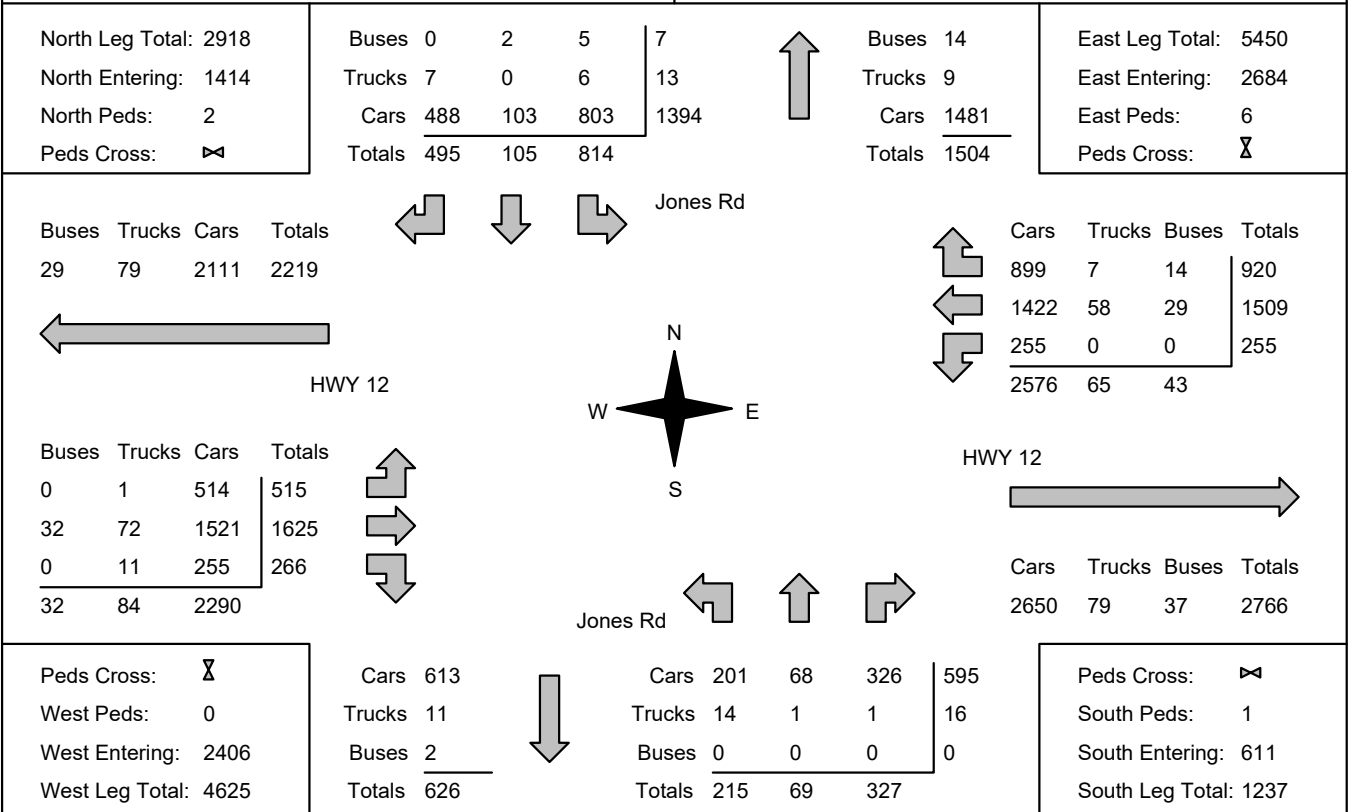
**Municipality:** Midland  
**Site #:** 1815100002  
**Intersection:** HWY 12 & Jones Rd  
**TFR File #:** 1  
**Count date:** 22-Nov-18

**Weather conditions:**

**Person counted:**  
**Person prepared:**  
**Person checked:**

**\*\* Signalized Intersection \*\***

**Major Road:** HWY 12 runs W/E



### Comments



**Accu-Traffic Inc.**  
Traffic Monitoring & Data Analysis

# Accu-Traffic Inc. Traffic Count Summary

Intersection: HWY 12 & Jones Rd      Count Date: 22-Nov-18      Municipality: Midland

<b>North Approach Totals</b>						North/South Total Approaches	<b>South Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	91	11	64	166	0	223	8:00:00	18	6	33	57	0
9:00:00	160	23	99	282	0	353	9:00:00	41	9	21	71	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	278	38	172	488	2	784	17:00:00	100	31	165	296	1
18:00:00	285	33	160	478	0	665	18:00:00	56	23	108	187	0
<b>Totals:</b>	814	105	495	1414	2	2025	<b>S Totals:</b>	215	69	327	611	1
<b>East Approach Totals</b>						East/West Total Approaches	<b>West Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	28	318	145	491	0	943	8:00:00	99	310	43	452	0
9:00:00	47	312	227	586	3	1135	9:00:00	106	352	91	549	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	104	503	289	896	3	1593	17:00:00	147	478	72	697	0
18:00:00	76	376	259	711	0	1419	18:00:00	163	485	60	708	0
<b>Totals:</b>	255	1509	920	2684	6	5090	<b>W Totals:</b>	515	1625	266	2406	0
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	16:00			17:00	18:00	0:00	0:00		
Crossing Values:	0	120	227	0			419	374	0	0		











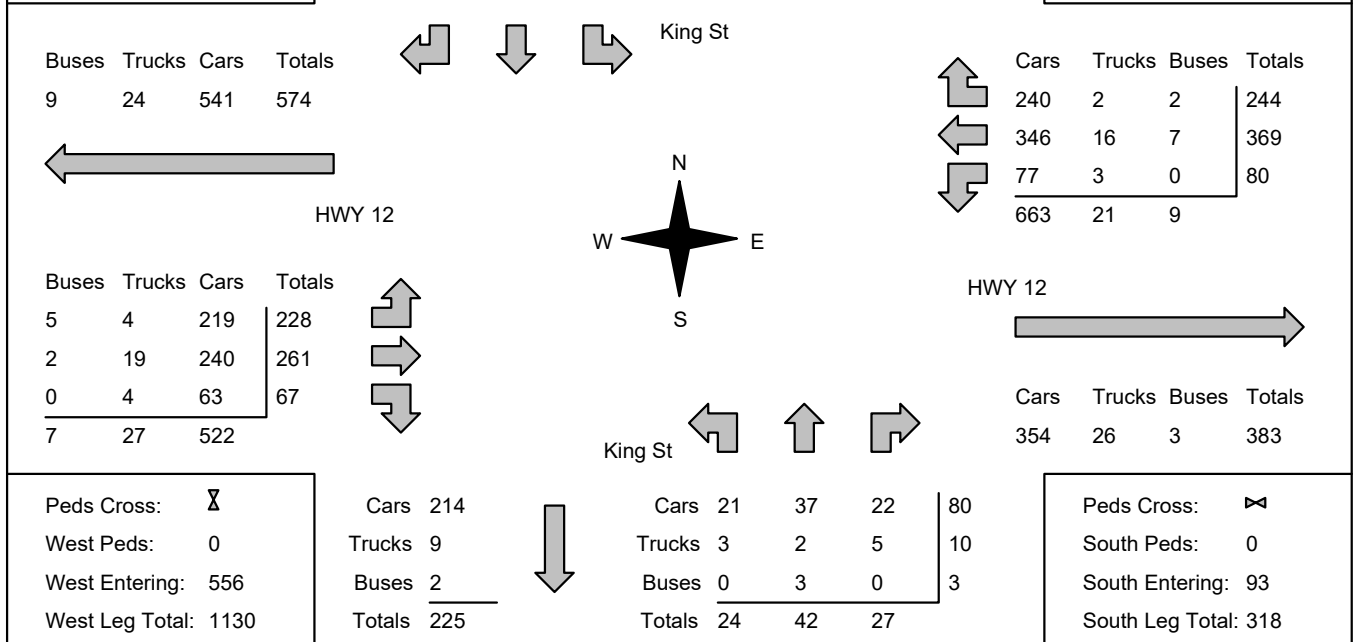
# Accu-Traffic Inc.

<b>Morning Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 7:45:00 <b>To:</b> 8:45:00
-----------------------------	---	--

<b>Municipality:</b> Midland <b>Site #:</b> 1815100003 <b>Intersection:</b> HWY 12 & King St <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>
--	---

<b>** Signalized Intersection **</b>	<b>Major Road:</b> HWY 12 runs W/E
--------------------------------------	------------------------------------

North Leg Total: 868 North Entering: 354 North Peds: 1 Peds Cross: ☒	<table style="margin: auto;"> <tr><td>Buses</td><td>2</td><td>2</td><td>1</td><td>5</td></tr> <tr><td>Trucks</td><td>5</td><td>2</td><td>2</td><td>9</td></tr> <tr><td>Cars</td><td>174</td><td>74</td><td>92</td><td>340</td></tr> <tr><td>Totals</td><td>181</td><td>78</td><td>95</td><td></td></tr> </table>	Buses	2	2	1	5	Trucks	5	2	2	9	Cars	174	74	92	340	Totals	181	78	95		<table style="margin: auto;"> <tr><td>Buses</td><td>10</td></tr> <tr><td>Trucks</td><td>8</td></tr> <tr><td>Cars</td><td>496</td></tr> <tr><td>Totals</td><td>514</td></tr> </table>	Buses	10	Trucks	8	Cars	496	Totals	514	East Leg Total: 1076 East Entering: 693 East Peds: 1 Peds Cross: ☒
Buses	2	2	1	5																											
Trucks	5	2	2	9																											
Cars	174	74	92	340																											
Totals	181	78	95																												
Buses	10																														
Trucks	8																														
Cars	496																														
Totals	514																														




## Comments

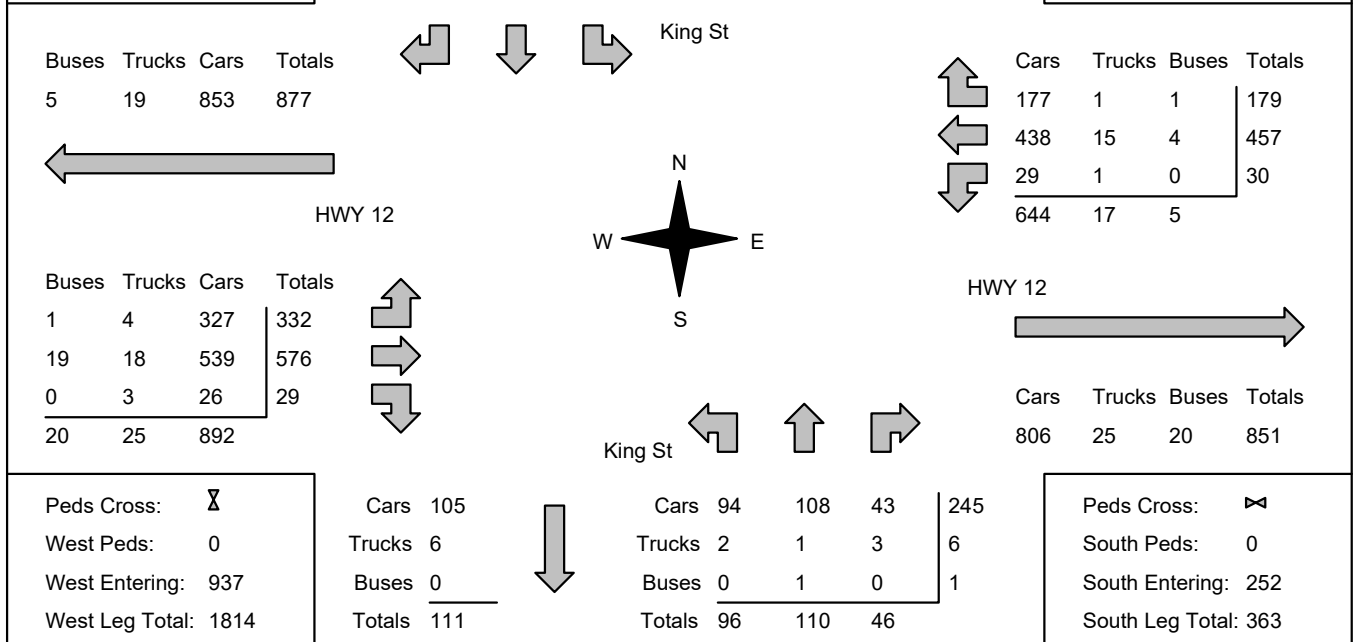
# Accu-Traffic Inc.

<b>Afternoon Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 18:00:00	<b>One Hour Peak</b> <b>From:</b> 16:00:00 <b>To:</b> 17:00:00
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<b>Municipality:</b> Midland <b>Site #:</b> 1815100003 <b>Intersection:</b> HWY 12 & King St <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>
--	---

<b>** Signalized Intersection **</b>	<b>Major Road:</b> HWY 12 runs W/E
--------------------------------------	------------------------------------

North Leg Total: 1226 North Entering: 605 North Peds: 0 Peds Cross: ☒	<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>1</td><td>0</td><td>1</td><td>2</td></tr> <tr><td>Trucks</td><td>2</td><td>2</td><td>4</td><td>8</td></tr> <tr><td>Cars</td><td>321</td><td>50</td><td>224</td><td>595</td></tr> <tr><td>Totals</td><td>324</td><td>52</td><td>229</td><td></td></tr> </table>	Buses	1	0	1	2	Trucks	2	2	4	8	Cars	321	50	224	595	Totals	324	52	229			<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>3</td></tr> <tr><td>Trucks</td><td>6</td></tr> <tr><td>Cars</td><td>612</td></tr> <tr><td>Totals</td><td>621</td></tr> </table>	Buses	3	Trucks	6	Cars	612	Totals	621	East Leg Total: 1517 East Entering: 666 East Peds: 0 Peds Cross: ☒
Buses	1	0	1	2																												
Trucks	2	2	4	8																												
Cars	321	50	224	595																												
Totals	324	52	229																													
Buses	3																															
Trucks	6																															
Cars	612																															
Totals	621																															



**Comments**

# Accu-Traffic Inc.

## Total Count Diagram

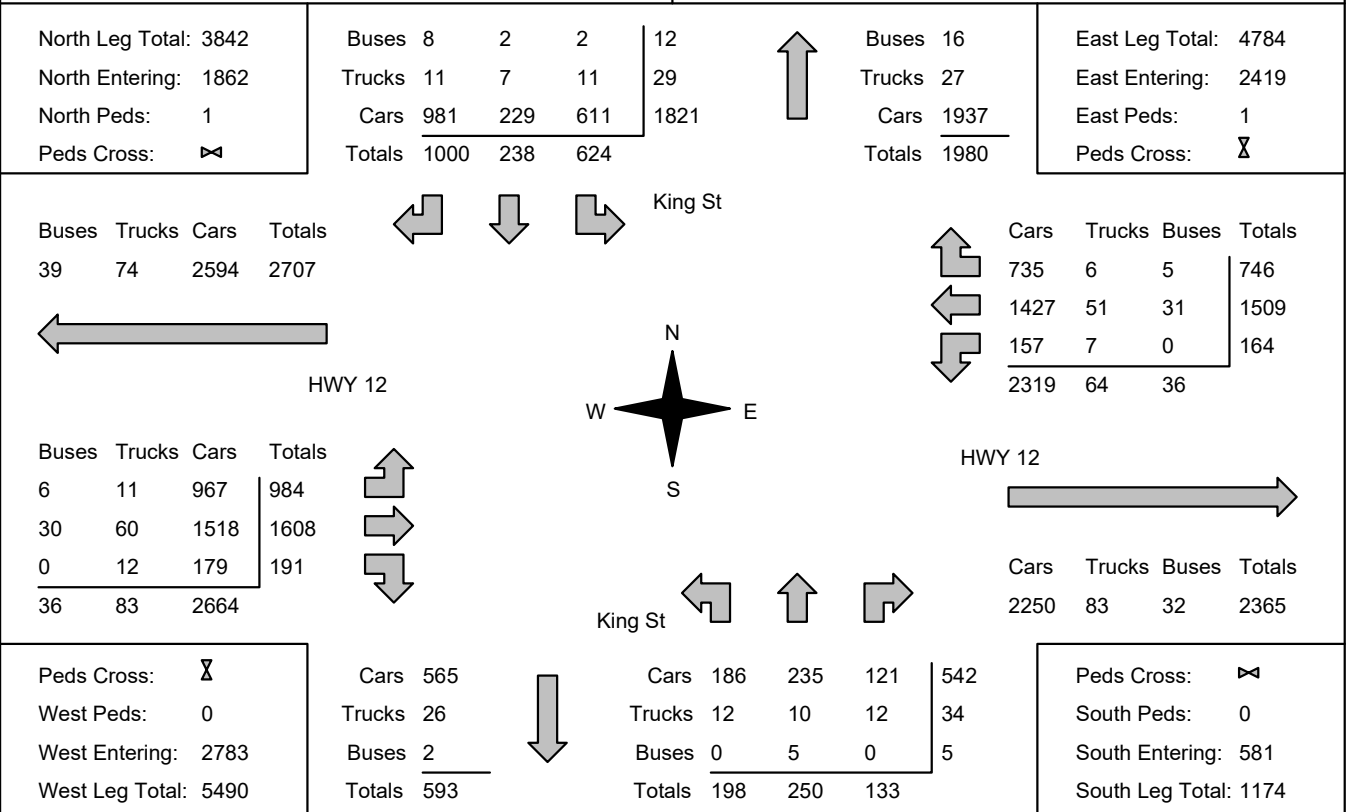
**Municipality:** Midland  
**Site #:** 1815100003  
**Intersection:** HWY 12 & King St  
**TFR File #:** 1  
**Count date:** 22-Nov-18

**Weather conditions:**

**Person counted:**  
**Person prepared:**  
**Person checked:**

**\*\* Signalized Intersection \*\***

**Major Road:** HWY 12 runs W/E



### Comments



**Accu-Traffic Inc.**  
Traffic Monitoring & Data Analysis

# Accu-Traffic Inc. Traffic Count Summary

Intersection: HWY 12 & King St      Count Date: 22-Nov-18      Municipality: Midland

<b>North Approach Totals</b>						North/South Total Approaches	<b>South Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	110	88	162	360	1	427	8:00:00	17	30	20	67	0
9:00:00	92	65	218	375	0	469	9:00:00	24	44	26	94	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	229	52	324	605	0	857	17:00:00	96	110	46	252	0
18:00:00	193	33	296	522	0	690	18:00:00	61	66	41	168	0
<b>Totals:</b>	624	238	1000	1862	1	2443	<b>S Totals:</b>	198	250	133	581	0
<b>East Approach Totals</b>						East/West Total Approaches	<b>West Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	58	330	181	569	0	1008	8:00:00	125	238	76	439	0
9:00:00	63	372	232	667	1	1205	9:00:00	218	252	68	538	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	30	457	179	666	0	1603	17:00:00	332	576	29	937	0
18:00:00	13	350	154	517	0	1386	18:00:00	309	542	18	869	0
<b>Totals:</b>	164	1509	746	2419	1	5202	<b>W Totals:</b>	984	1608	191	2783	0
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	16:00				17:00	18:00	0:00	0:00	
Crossing Values:	0	215	182	0				435	320	0	0	











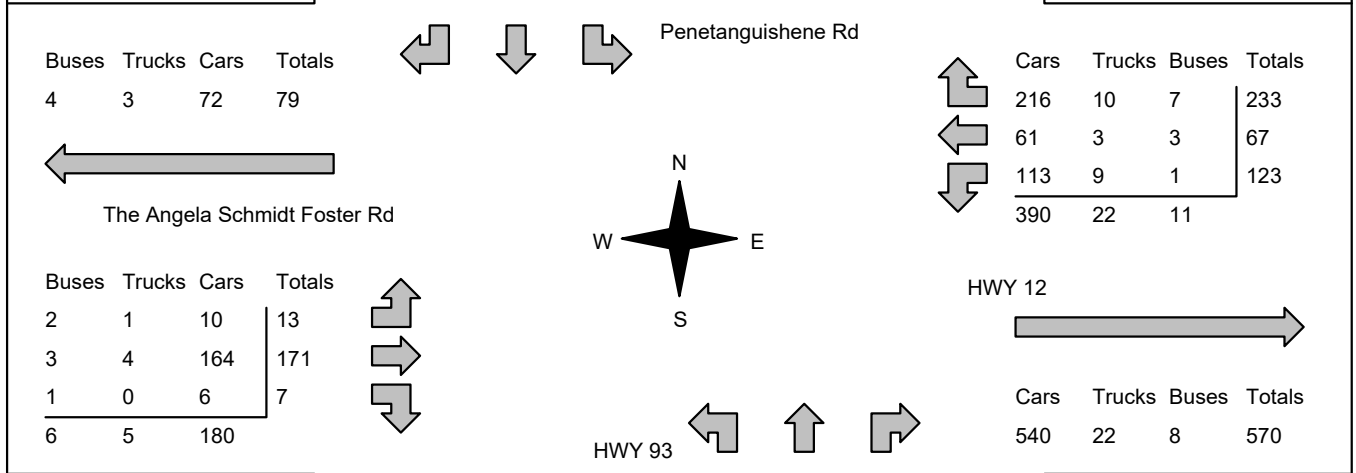
# Accu-Traffic Inc.

<b>Morning Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 7:00:00 <b>To:</b> 9:00:00	<b>One Hour Peak</b> <b>From:</b> 7:45:00 <b>To:</b> 8:45:00
-----------------------------	---	--

<b>Municipality:</b> Midland <b>Site #:</b> 1815100004 <b>Intersection:</b> HWY 93 & HWY 12 <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>
---	---

<b>** Signalized Intersection **</b>	<b>Major Road:</b> HWY 93 runs N/S
--------------------------------------	------------------------------------

North Leg Total: 985 North Entering: 421 North Peds: 0 Peds Cross: ☒	<table style="border-collapse: collapse; margin: auto;"> <tr><td>Buses</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr><td>Trucks</td><td>0</td><td>17</td><td>9</td><td>26</td></tr> <tr><td>Cars</td><td>9</td><td>208</td><td>175</td><td>392</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>9</td><td>226</td><td>186</td><td></td></tr> </table>	Buses	0	1	2	3	Trucks	0	17	9	26	Cars	9	208	175	392	Totals	9	226	186		<table style="border-collapse: collapse; margin: auto;"> <tr><td>Buses</td><td>11</td></tr> <tr><td>Trucks</td><td>28</td></tr> <tr><td>Cars</td><td>525</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>564</td></tr> </table>	Buses	11	Trucks	28	Cars	525	Totals	564	East Leg Total: 993 East Entering: 423 East Peds: 0 Peds Cross: ☒
Buses	0	1	2	3																											
Trucks	0	17	9	26																											
Cars	9	208	175	392																											
Totals	9	226	186																												
Buses	11																														
Trucks	28																														
Cars	525																														
Totals	564																														



Peds Cross: ☒ West Peds: 0 West Entering: 191 West Leg Total: 270	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>327</td></tr> <tr><td>Trucks</td><td>26</td></tr> <tr><td>Buses</td><td>3</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>356</td></tr> </table>	Cars	327	Trucks	26	Buses	3	Totals	356	<table style="border-collapse: collapse;"> <tr><td>Cars</td><td>2</td><td>299</td><td>201</td><td>502</td></tr> <tr><td>Trucks</td><td>0</td><td>17</td><td>9</td><td>26</td></tr> <tr><td>Buses</td><td>1</td><td>2</td><td>3</td><td>6</td></tr> <tr style="border-top: 1px solid black;"><td>Totals</td><td>3</td><td>318</td><td>213</td><td></td></tr> </table>	Cars	2	299	201	502	Trucks	0	17	9	26	Buses	1	2	3	6	Totals	3	318	213		Peds Cross: ☒ South Peds: 0 South Entering: 534 South Leg Total: 890
Cars	327																														
Trucks	26																														
Buses	3																														
Totals	356																														
Cars	2	299	201	502																											
Trucks	0	17	9	26																											
Buses	1	2	3	6																											
Totals	3	318	213																												


**Comments**

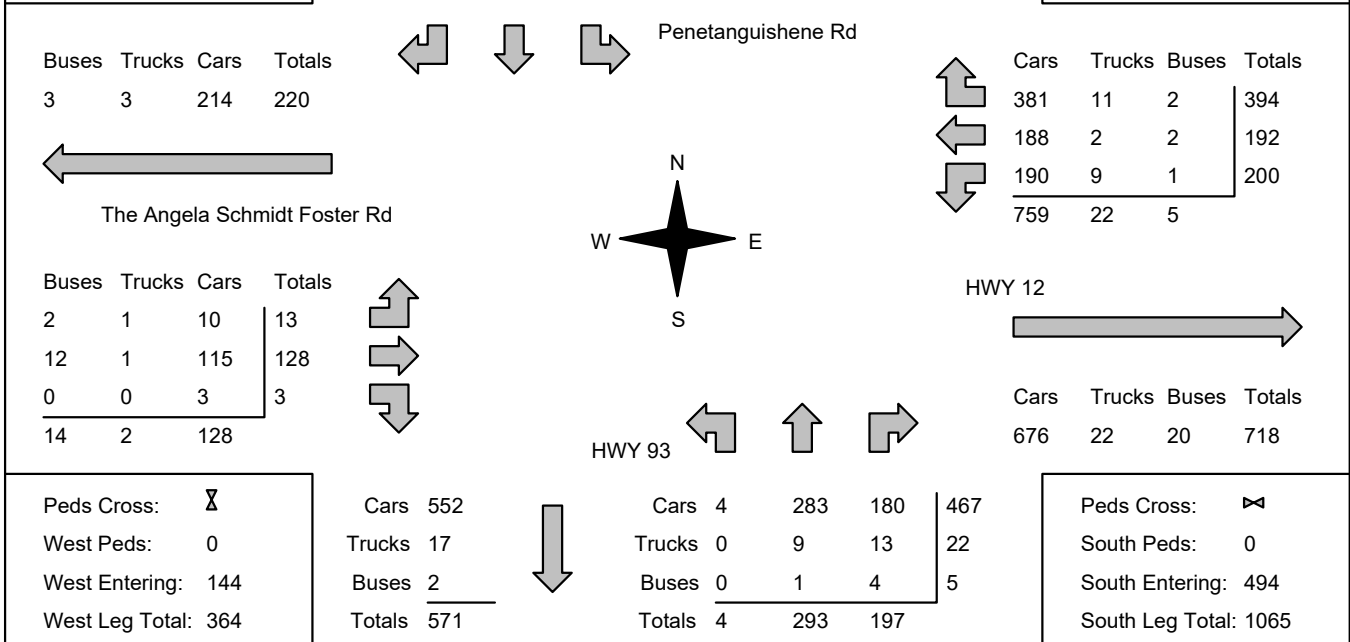
# Accu-Traffic Inc.

<b>Afternoon Peak Diagram</b>	<b>Specified Period</b> <b>From:</b> 16:00:00 <b>To:</b> 18:00:00	<b>One Hour Peak</b> <b>From:</b> 16:00:00 <b>To:</b> 17:00:00
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<b>Municipality:</b> Midland <b>Site #:</b> 1815100004 <b>Intersection:</b> HWY 93 & HWY 12 <b>TFR File #:</b> 1 <b>Count date:</b> 22-Nov-18	<b>Weather conditions:</b>  <b>Person counted:</b> <b>Person prepared:</b> <b>Person checked:</b>
---	---

<b>** Signalized Intersection **</b>	<b>Major Road:</b> HWY 93 runs N/S
--------------------------------------	------------------------------------

North Leg Total: 1485 North Entering: 785 North Peds: 0 Peds Cross: ☒	<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>1</td><td>1</td><td>4</td><td>6</td></tr> <tr><td>Trucks</td><td>1</td><td>8</td><td>8</td><td>17</td></tr> <tr><td>Cars</td><td>22</td><td>359</td><td>381</td><td>762</td></tr> <tr><td>Totals</td><td>24</td><td>368</td><td>393</td><td></td></tr> </table>	Buses	1	1	4	6	Trucks	1	8	8	17	Cars	22	359	381	762	Totals	24	368	393			<table style="border-collapse: collapse;"> <tr><td>Buses</td><td>5</td></tr> <tr><td>Trucks</td><td>21</td></tr> <tr><td>Cars</td><td>674</td></tr> <tr><td>Totals</td><td>700</td></tr> </table>	Buses	5	Trucks	21	Cars	674	Totals	700	East Leg Total: 1504 East Entering: 786 East Peds: 0 Peds Cross: ☒
Buses	1	1	4	6																												
Trucks	1	8	8	17																												
Cars	22	359	381	762																												
Totals	24	368	393																													
Buses	5																															
Trucks	21																															
Cars	674																															
Totals	700																															



## Comments

# Accu-Traffic Inc.

## Total Count Diagram

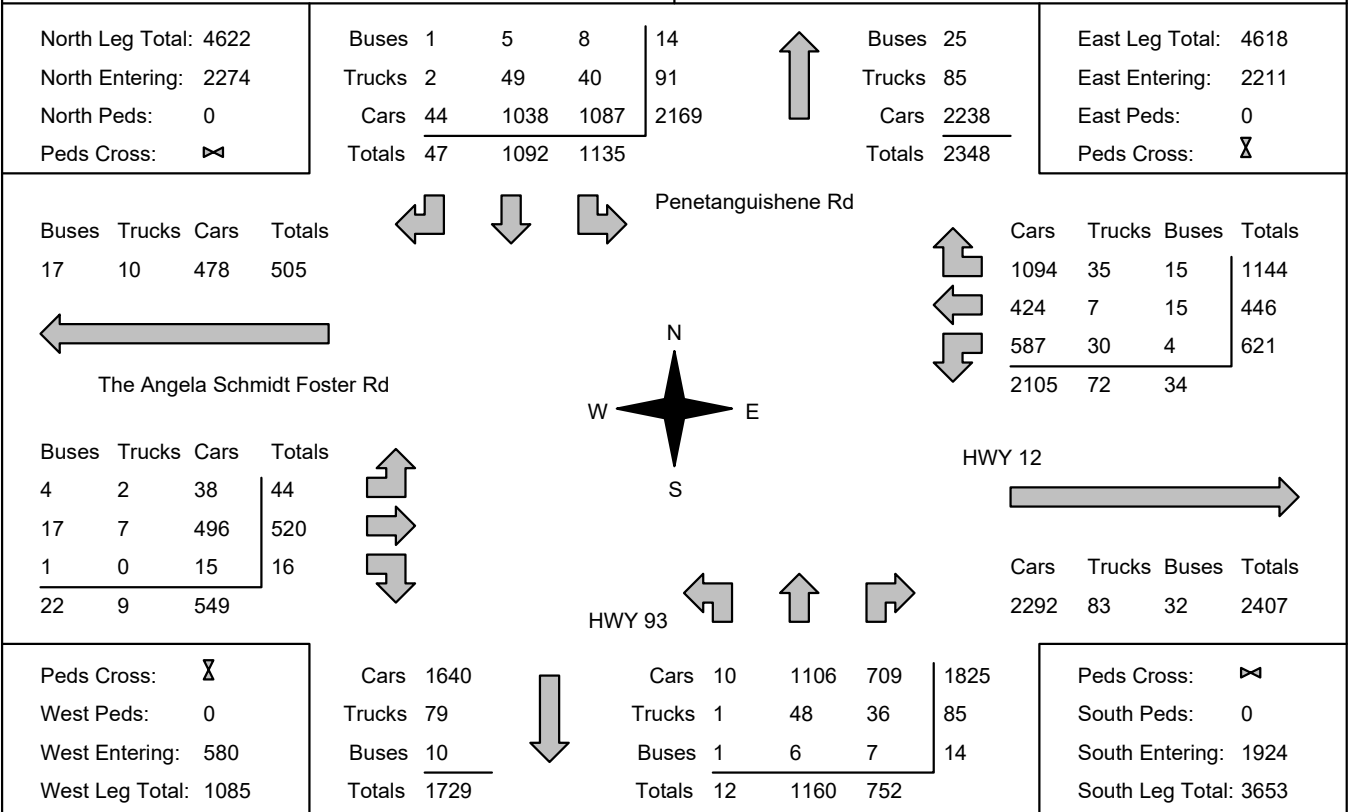
**Municipality:** Midland  
**Site #:** 1815100004  
**Intersection:** HWY 93 & HWY 12  
**TFR File #:** 1  
**Count date:** 22-Nov-18

**Weather conditions:**

**Person counted:**  
**Person prepared:**  
**Person checked:**

**\*\* Signalized Intersection \*\***

**Major Road:** HWY 93 runs N/S



### Comments



**Accu-Traffic Inc.**  
Traffic Monitoring & Data Analysis

# Accu-Traffic Inc. Traffic Count Summary

Intersection: HWY 93 & HWY 12

Count Date: 22-Nov-18

Municipality: Midland

<b>North Approach Totals</b>						North/South Total Approaches	<b>South Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	176	248	5	429	0	844	8:00:00	0	261	154	415	0
9:00:00	205	221	9	435	0	924	9:00:00	4	299	186	489	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	393	368	24	785	0	1279	17:00:00	4	293	197	494	0
18:00:00	361	255	9	625	0	1151	18:00:00	4	307	215	526	0
<b>Totals:</b>	1135	1092	47	2274	0	4198	<b>S Totals:</b>	12	1160	752	1924	0
<b>East Approach Totals</b>						East/West Total Approaches	<b>West Approach Totals</b>					
Hour Ending	Includes Cars, Trucks, & Buses				Total Peds		Hour Ending	Includes Cars, Trucks, & Buses				Total Peds
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total	
7:00:00	0	0	0	0	0	0	7:00:00	0	0	0	0	0
8:00:00	135	82	171	388	0	562	8:00:00	12	159	3	174	0
9:00:00	134	57	250	441	0	593	9:00:00	9	136	7	152	0
16:00:00	0	0	0	0	0	0	16:00:00	0	0	0	0	0
17:00:00	200	192	394	786	0	930	17:00:00	13	128	3	144	0
18:00:00	152	115	329	596	0	706	18:00:00	10	97	3	110	0
<b>Totals:</b>	621	446	1144	2211	0	2791	<b>W Totals:</b>	44	520	16	580	0
<b>Calculated Values for Traffic Crossing Major Street</b>												
Hours Ending:	7:00	8:00	9:00	16:00				17:00	18:00	0:00	0:00	
Crossing Values:	0	306	279	0				405	277	0	0	

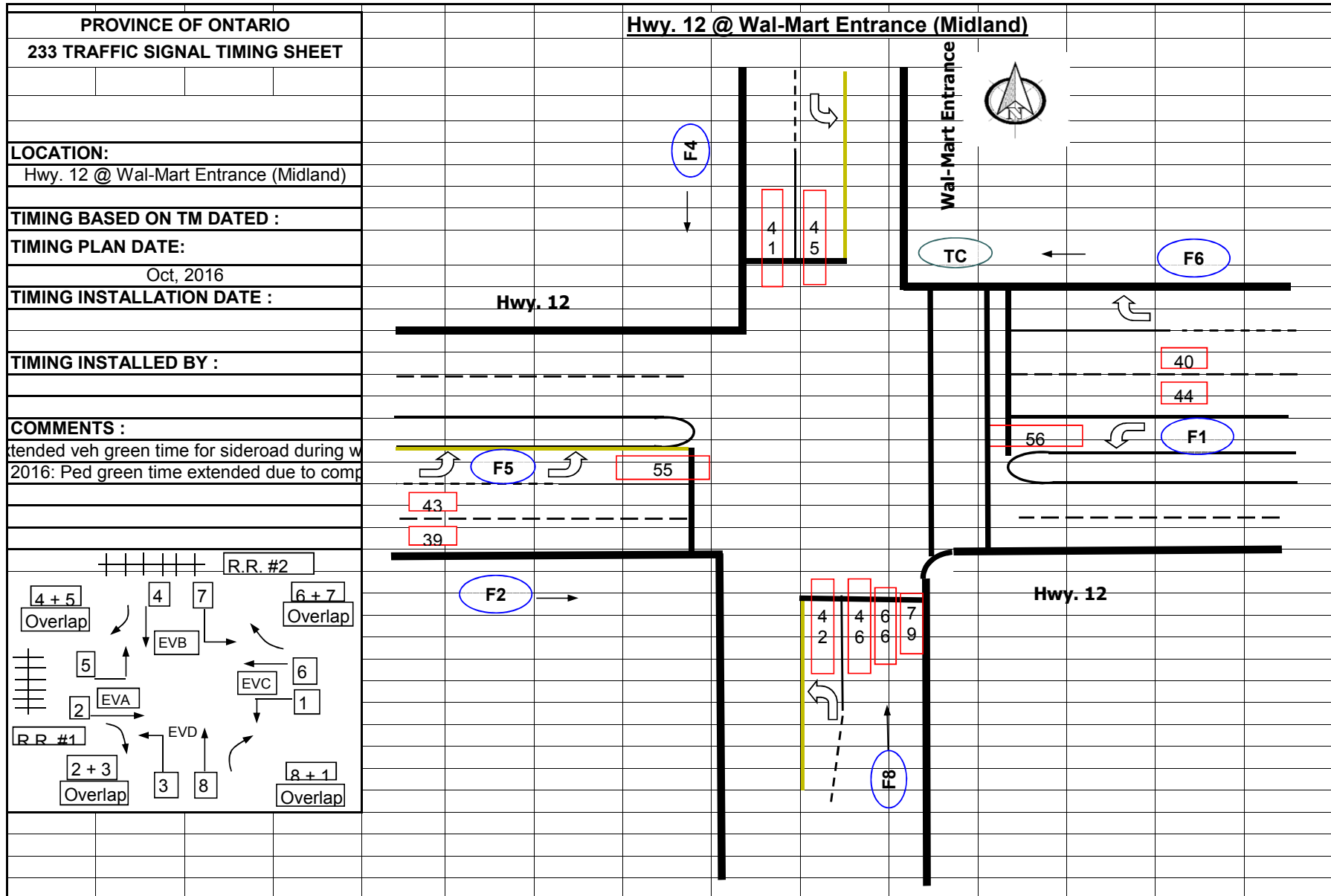














**PRETIMED ONTARIO 233 PROGRAM**

**T.O.D. FUNCTIONS**

	PHASE							
	1	2	3	4	5	6	7	8
WALK	-		-	15	-		-	15
DON'T WALK	-		-	34	-		-	34
MIN INITIAL	10	30		15	10	30		15
TYPE 3 LIMIT	-		-	-	-	-	-	-
ADD PER VEH	-		-	-	-	-	-	-
VEH EXT	3.0	3.6		3.0	2.0	3.6		3.0
MAX GAP	3.0	3.6		3.0	2.0	3.6		3.0
MIN GAP	3.0	3.6		3.0	2.0	3.6		3.0
MAX LIMIT	12	40		20	12	40		20
MAXIMUM 2	12	22	-	40	12	22	-	40
ADV / DLY WALK	-	-	-	-	-	-	-	-
SEQUENCE TO	-	-	-	-	4	-	-	-
COND SRV MIN	-	-	-	-	-	-	-	-
REDUCE EVERY	-	-	-	-	-	-	-	-
YELLOW	3.0	5.0		4.1	3.0	5.0		4.1
RED CLEAR		1.8		2.7		1.8		2.7

PHASE BANK # < C + O + F = 1 >

	Column F	PHASES							
		1	2	3	4	5	6	7	8
0	PERMIT	X	X		X	X	X		X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL	X	X		X	X	X		X
4	PED RECALL								
5	PEDESTRIANS								
6	REST IN WALK								
7	RED REST								
8	DOUBLE ENTRY		X		X		X		X
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	CORD SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X				X		
F	FIRST PHASES				X				X

< C + O + F = 1 >

TIME	HH	MM	FUN	DAY OF WEEK							Column 4	PHASES / BITS												
				S	M	T	W	T	F	S		1	2	3	4	5	6	7	8					
				1	2	3	4	5	6	7		1	2	3	4	5	6	7	8					
0	12:00		B							X								X	X	X	X	X	X	
1	23:59		B							X														
2	00:00		B	X	X						X							X	X	X	X	X	X	X
3	23:59		B	X	X						X													
4																								
5																								
6																								
7																								
8																								
9																								
A																								
B																								
C																								
D																								
E																								
F																								

< C + O + 7 = 1 >

< C + O + E = 27 >

**LOCATION: Hwy 12 at Walmart (Midland)**

**BI Tran Systems, Inc.**  
 510 Bercut Dr., Sacramento, Calif. 95814  
 916/441-0260  
 Traffic Signal Program 233 Ontario  
 Timing Sheet #2  
 Revised (02/95)

**Issued Date: Nov/02**

**Installed Date:**

**T.O.D. FUNCTIONS**

- 0 = PERMIT PHASES
- 1 = RED LOCK
- 2 = YELLOW LOCK
- 3 = VEH MIN RECALL
- 4 = PED RECALL
- 5 -
- 6 - REST IN WALK
- 7 = RED REST
- 8 = DOUBLE ENTRY
- 9 = VEH MAX RECALL
- A = VEH SOFT RECALL
- B = MAXIMUM 2
- C = CONDITIONAL SERVICE
- D = LAG PHASES
- E = BIT 1 - LOCAL OVERRIDE
- BIT 4 - DISABLE DET OFF MONITOR
- BIT 7 - DET COUNT MONITOR
- BIT 8 - REAL TIME SPLIT MONITOR
- F = OUTPUT BITS 1 THRU 4

Detector

STANDARD 332 CABINET LOCATION	column	1	3
		delay	carry over
I-2 U	0		
J-2 U	1		
I-6 U	2	5	
J-6 U	3	5	
1-2 L	4		
J-2 L	5		
1-6 L	6	5	
J-6 L	7	5	
I-4	8		
J-4	9		
I-8	A		
J-8	B		
J-1	C	5	
I-1	D	5	
J-5	E		
I-5	F		

< C + O + D = 0 >

STANDARD 332 CABINET LOCATION	column	2	4
		delay	carry over
J-9 U	0		
I-9 U	1		
I-9 L	2		
J-9 L	3		
I-3 U	4		
J-3 U	5		
I-7 U	6		
J-7 U	7	5	
I-12 U	8		
I-13 U	9		
I-12 L	A		
I-13 L	B		
I-3 L	C		
J-3 L	D		
I-7 L	E		
J-7 L	F	10	

< C + O + D = 0 >

Column 0 C1 pin #	Column 1 ATTRIBUTES								Column 2 PHASE(S)								Column 3 ASSIGNMENTS								
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
	0 39			X	X	X				X								X	X	X					
1 40			X	X	X							X					X	X	X						X
2 41			X	X	X						X						X	X	X						X
3 42			X	X	X											X	X	X	X						X
4 43			X	X	X				X								X	X	X						X
5 44			X	X	X								X				X	X	X						X
6 45			X	X	X						X						X	X	X						X
7 46			X	X	X											X	X	X	X						X
8 47																									
9 48																									
A 49																									
B 50																									
C 55				X	X		X					X					X	X	X						X
D 56				X	X		X		X								X	X	X						X
E 57																									
F 58																									

DETECTOR ASSIGNMENTS < C + O + E = 126 >

Column 4 C1 pin #	Column 5 ATTRIBUTES								Column 6 PHASE(S)								Column 7 ASSIGNMENTS								
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
	0 59																								
1 60																									
2 61																									
3 62																									
4 63																									
5 64																									
6 65																									
7 66				X	X		X									X	X	X	X						X
8 67																									
9 68			X									X					X	X	X						X
A 69			X													X	X	X	X						X
B 70																									
C 76																									
D 77																									
E																									
F 79				X	X		X									X	X	X	X						X

DETECTOR ASSIGNMENTS < C + O + E = 126 >

**DETECTOR ASSIGNMENT SHEET**  
**ONTARIO 233 PROGRAM**

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**LOCATION:**  
Hwy 12  
at Walmart (Midland)

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Issued Date: Nov/02

---

Installed Date:

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**DETECTOR ATTRIBUTES**  
 1 = FULL TIME DELAY  
 2 = PEDESTRIAN CALL  
 3 =  
 4 = COUNT  
 5 = EXTENSION  
 6 = TYPE 3  
 7 = CALLING  
 8 = ALTERNATE

---

**DETECTOR ASSIGNMENTS**  
 1 = DET. SET # 1  
 2 = DET. SET # 2  
 3 = DET. SET # 3  
 4 =  
 5 =  
 6 = MIN RECALL ON FAILURE  
 7 = MAX RECALL ON FAILURE  
 8 - REPORT ON FAILURE

---

**DETECTOR MONITOR**  
 MAX OFF: D/0+0+1=60  
 MAX ON: D/0+0+2=10

---

**ADVANCE WARNING BEACONS**  
 SIGN #1                  SIGN #2  
 PHASE NUMBER  
 (F/1+C+F)=                  (F/1+D+F)=  
 TIME BEFORE YELLOW  
 (F/1+C+E)=                  (F/1+D+E)=  
 OUTPUT PIN NUMBER  
 (E/127+E+8)=                  (E/127+E+9)=

## New Input

Input File  
Slot No. →

**"I"**  
**FILE**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	1 Ext, Cnt, Call <C1-56>	2 Ext, Cnt, Call <C1-39>	2 Ext, Cnt, Call <C1-63>	2 Type 3, Call <C1-47>	3 Ext, Cnt, Call <C1-58>	4 Ext, Cnt, Call <C1-41>	4 Ext, Cnt, Call <C1-65>	4 Type 3, Call <C1-49>	1 Ext, Cnt, Call <C1-60>	NOT WIRED	Not Assigned <C1-80>	2 Ped Call <C1-67>	6 Ped Call <C1-68>	Flash Sense <C1-81>
		2 Ext, Cnt, Call <C1-43>	2 Ext, Cnt, Call <C1-76>			4 Ext, Cnt, Call <C1-45>	4 Ext, Cnt, Call <C1-78>		3 Ext, Cnt, Call <C1-62>		Not Assigned <C1-53>	4 Ped Call <C1-69>	8 Ped Call <C1-70>	Stop Time <C1-82>

**"J"**  
**FILE**

	5	6	6	6	7	8	8	8	5	NOT WIRED	Not Assigned <C1-54>	EV A Preempt <C1-71>	EV B Preempt <C1-72>	Railroad 1 <C1-51>
	5 Ext, Cnt, Call <C1-55>	6 Ext, Cnt, Call <C1-40>	6 Ext, Cnt, Call <C1-64>	6 Type 3, Call <C1-48>	7 Ext, Cnt, Call <C1-57>	8 Ext, Cnt, Call <C1-42>	8 Ext, Cnt, Call <C1-66>	8 Type 3, Call <C1-50>	5 Ext, Cnt, Call <C1-59>		Not Assigned <C1-75>	EV C Ped Call <C1-73>	EV D Preempt <C1-74>	Railroad 2 <C1-52>
		6 Ext, Cnt, Call <C1-44>	6 Ext, Cnt, Call <C1-77>			8 Ext, Cnt, Call <C1-46>	8 Ext, Cnt, Call <C1-79>		7 Ext, Cnt, Call <C1-61>					

### DETECTOR TYPES

Ext = Extension Detector  
Detector is only active during the Phase's GREEN Intervals (ie, will NOT Call the Phase)  
Cnt = Count Detector  
Used in computing "Added Initial"  
Call = Calling Detector  
Detector is only active during the Phase's NON-GREEN Intervals (ie, will NOT Extend the Phase)  
Type 3 = Type 3 Disconnect  
Will allow a Calling Detector to Extend its Phase until the Call first drops or the "Type 3 Limit" is reached

**BI Tran Systems, Inc.**

**510 Bercut Dr., Sacramento, Calif. 95814**

**916/441-0260**

**Traffic Signal Program 233**

**Initialized Detector Assignments**

**(Revised 8/92) 332 Cabinet**

### Controller Intervals

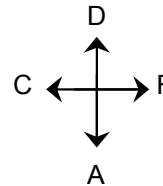
0 = Walk	8 = Red Rest
1 = FDW	9 = Preemption
2 = Min. Green	A = Stop Time
3 =	B = Red Revert
4 = Var. Initial	C = Yellow-Gap Termination
5 = Extension	D = Yellow-Max. Termination
6 =	E = Yellow-Forceoff Termination
7 = Reduce Gap	F = Red Clearance

### Continuous Memory Error Monitoring

The controller's RAM and EPROM memories are continuously checked for errors. If an error is found, the intersection will go into FLASH (via Watch Dog Timer), and one of the following will be shown on the controller's display:

- bAd A = An error was detected in the CPU's RAM, or a new program has been installed on the memory module.  
Often caused by a bad controller "gel-cell" battery.
- bAd b = An error was detected in the memory module's RAM.  
Often caused by a bad "lithium" battery on the memory module.

### Display Movement Codes



- A = Advance ROW
- D = Decrement ROW
- C = COLUMN Back
- F = Forward COLUMN

### Special Event Schedules

- Special Event #1: C + 0 + E = 27
- Special Event #2: C + 0 + E = 28

- Current Interval = E + 5 + 0
- Current Interval Timer = E + 5 + B
- Current Interval Clearance Phases = E + 5 + C

### Display Locations

**Plan Select      Offset Select**

- Manual = C/0 + A + 1      C/0 + B + 1
- Master = C/0 + A + 2      C/0 + B + 2
- Current = C/0 + A + 3      C/0 + B + 3
- Next = C/0 + A + 4      C/0 + B + 4
- TOD = C/0 + A + 5      C/0 + B + 5

- Master Cycle = C/0 + A + 0
- Ring A Cycle = C/0 + B + 0
- Ring B Cycle = C/0 + D + 0

- MIN Cycle = C/0 + A + E
- MAX Cycle = C/0 + B + E

- Phase Hold = C/0 + F + D
- Phase Next = C/0 + F + E
- Force Off = C/0 + F + F  
(with Ring A Cycle Timer)

- Current Calculated Cycle Length = C/0 + B + F
- Current Permitted Phases = E/0 + 7 + 8



bAd E = An error was detected in the 233 Program EPROM.  
bAd F = An error was detected in the Z-RAM (Dallas chip) on  
the memory module.

**412/C Memory Module**  
**Lithium Battery Condition**

To check the condition of the 3.6 volt Lithium  
Battery on the 412/C Memory Module:

If  $E/112 + 0 + A = 84$  - the battery is BAD  
If  $E/112 + 0 + A = 85$  - the battery is O.K.

**Monitor "Activate" Flags**  
(Also Requires T.O.D. Function "E" Flag)  
Detector Count Recording:  
 $E/2 + 0 + 9 =$  Not Zero  
Real Time Split Monitor:  
 $E/2 + 0 + E =$  Not Zero

**E Page Enable:  $F/1 + 9 + E =$  Not Zero**

**New Input**

**Time of Day Function (7 Key)**

Current T.O.D. "E Function"  
Control Bits =  $C/0 + E + E$   
Current T.O.D. "F Function"  
Output Bits =  $C/0 + E + F$

**Logic DELAY Gate**

**Delay Timer Display**

DELAY A Timer =  $C/0 + 9 + A$   
DELAY B Timer =  $C/0 + 9 + B$   
thru thru  
DELAY F Timer =  $C/0 + 9 + F$

**Interval Timer Display**

Ring A =  $F/0 + A +$  Interval Row  
Ring B =  $F/0 + B +$  (Interval Row From  
PHASE BANK data)

Current Phase  
Bank =  $F/0 + C + E$

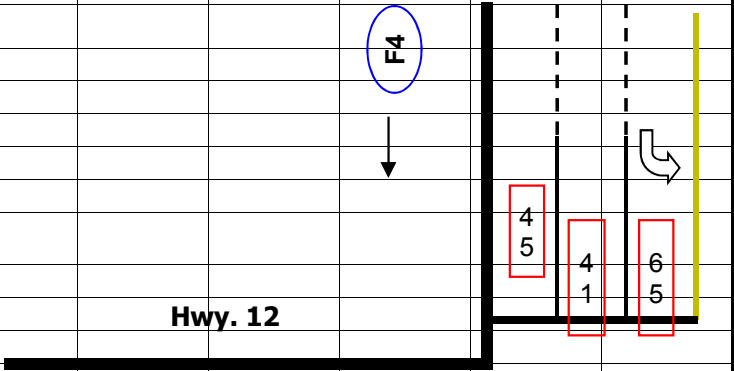



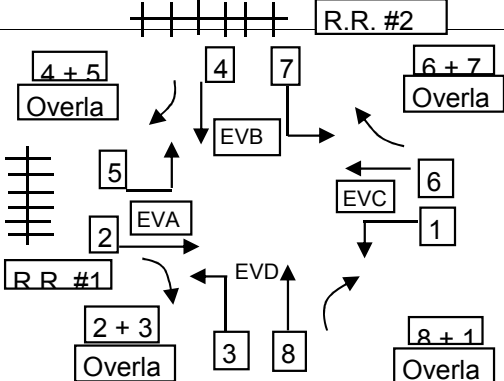
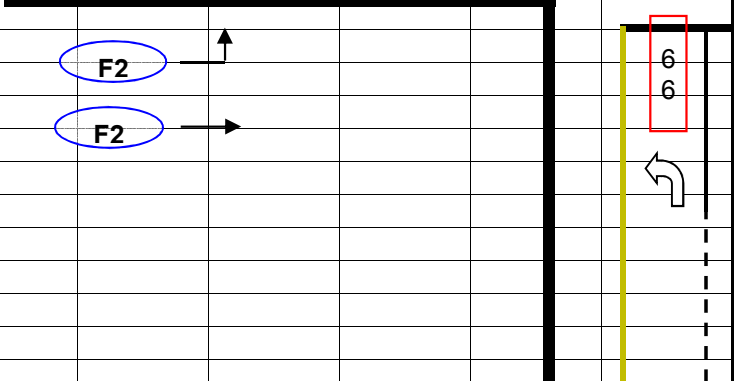
Last Power Failure:  
(HR-MIN-DOW) =  $8 + 4$   
(DOW-YR-MONTH) =  $8 + 5$

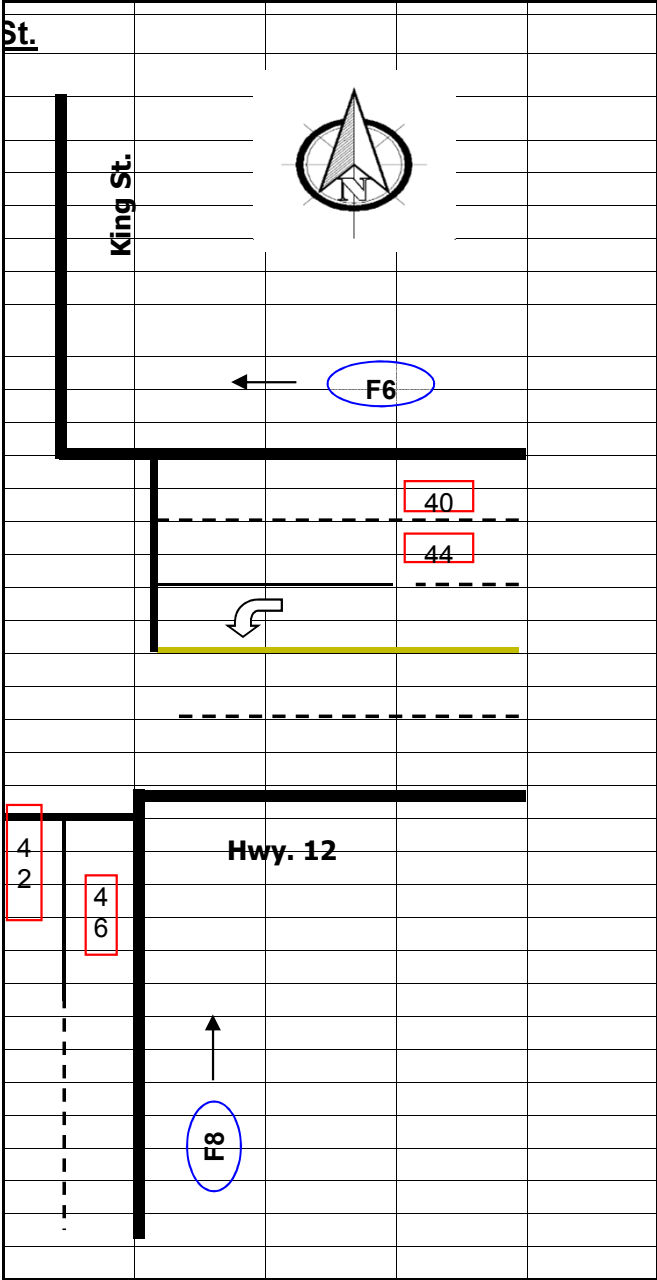
Last Cabinet Flash  
(HR-MIN-DOW) =  $8 + 6$   
(DOW-YR-MONTH) =  $8 + 7$

Power Fail Counts:  
(Long Failures) =  $F/1 + 0 + C$   
(Short Failures) =  $F/1 + 0 + D$

Current Time:  
(HR-MIN-DOW) =  $8 + 0$   
(DOW-YR-MONTH) =  $8 + 1$   
(MIN-SEC-1/10SEC) =  $8 + F$

***BI Tran Systems, Inc.***  
*510 Bercut Dr., Sacramento, Calif. 95814*  
*916/441-0260*  
**Traffic Signal Program 233**  
**"View" Locations**  
*(Revised 03/94)*

<p>PROVINCE OF ONTARIO 233 TRAFFIC SIGNAL TIMING SHEET</p>	<p>Hwy. 12 @ King St</p>				
<p>LOCATION: Hwy. 12 @ King St.</p>					
<p>TIMING BASED ON TM DATED :</p>					
<p>TIMING PLAN DATE: 24-Nov-10</p>					
<p>TIMING INSTALLATION DATE :</p>					
<p>TIMING INSTALLED BY :</p>					
<p>COMMENTS :</p>					
<p>Added Phase 5</p>					
<p>Increased Phase 2 &amp; 6 max green to 50</p>					
<p>Adjusted ped timing</p>					
					



**Cover Sheet**

Location: Hwy 12 & Hwy 93-Angela Schmidt Foster Rd

Area/District: 2

Timing Based On T.M. Dated: 26-Jul-16

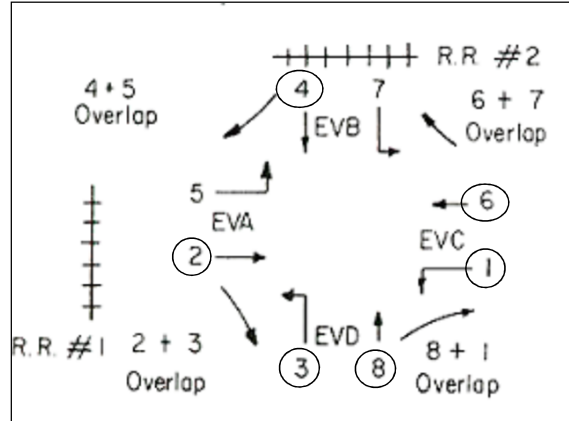
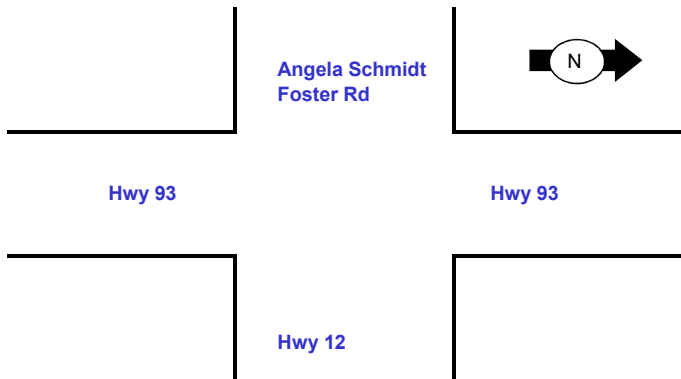
Traffic Signal \_\_\_\_\_

Timing Developed By: Tim Apostolopoulos

Approved By: Tim Apostolopoulos  
[tim.apostolopoulos@ontario.ca](mailto:tim.apostolopoulos@ontario.ca)

Installed By: \_\_\_\_\_

Installation Date: \_\_\_\_\_



Circle Movements and Operations

**COMMUNICATIONS ADDRESSING**

COMM ADDRESS  
(C/0+0+0) = 1

CELL #: \_\_\_\_\_

ZONE ADDRESS  
(C/0+0+1) = 1

UDP PORT: \_\_\_\_\_

AREA NUMBER  
(C/0+0+2) = 1

IP ADDRESS: \_\_\_\_\_

AREA ADDRESS  
(C/0+0+3) = \_\_\_\_\_

AMPLIFIER:  YES

PROGRAM: 233ON1.C

**DISABLE ALARM REPORTING**

		Column F							
		1	2	3	4	5	6	7	8
0	OMIT ALARMS					X			

< C + 0 + C = 5 >

- 1 = STOP TIME
- 2 = FLASH SENSE
- 3 = KEYBOARD ENTRY
- 4 = MANUAL PLAN SELECT
- 5 = ENABLE POLICE CNTRL (Not Used)
- 6 = EXTERNAL ALARM (Door Alarm)
- 7 = DETECTOR FAILURE

# APPENDIX

## C TERMS OF REFERENCE - OCTOBER 2018



**Proposed Mixed-Use Development at 16928 Highway #12, Town of Midland,  
Ontario – Proposed TIS Terms of Reference**

**1. Site Visit**

A site visit will be conducted to observe existing traffic and road conditions.

**2. Traffic Data Collection**

We will undertake turning movement counts (TMCs) at the following intersections for typical weekday a.m. and p.m. peak periods:

- Highway 12 at Beamish Street;
- Highway 12 at Jones Road;
- Highway 12 at King Street; and,
- Highway 12 / The Angela Schmidt Foster Road at Penetanguishene Road / Highway 93.

We will also obtain signal timing plans for the intersections that are signalized in the list above.

**3. Traffic Operations**

We will analyze the existing traffic conditions, as well as five-year horizons for future background and total future traffic conditions at the above intersections. Future background volumes will be derived based on the historical traffic growth rate plus all relevant background development information in the study area that we will request. We have assumed a 2.5% annual growth rate that will be considered for all through movements in the study area.

**4. Site Generated Traffic**

We will estimate the trip generation based on the trip rates outlined in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition. We will also consider the proponent's proposed parking supply.

**5. Trip Distribution and Assignment**

The net traffic will be assigned to the boundary road network based on the distribution of trips indicated by the existing traffic patterns, our extensive experience with similar developments and our knowledge of the local road network near this site.

**6. Parking and Loading Study**

We will complete a review of the Town's Zoning By-law standards, and based on our review, confirm that the proposed motor vehicle parking supply for your site satisfy the requirements of the Zoning By-law. Similarly, we will also confirm the loading space needed for this site.

**7. Circulation**

We will test the movements of passenger vehicles as well as fire, garbage, delivery and moving trucks throughout the site to determine if they can easily maneuver through the development.

# APPENDIX

**D**

SYNCHRO

WORKSHEETS

- EXISTING

CONDITIONS





Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	171	7	126	67	239	3	326	218	191	232	9
Future Volume (vph)	13	171	7	126	67	239	3	326	218	191	232	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.994				0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1792	0	1656	1743	1495	1347	1792	1524	1703	1754	0
Flt Permitted	0.706			0.505			0.586			0.354		
Satd. Flow (perm)	1082	1792	0	880	1743	1495	831	1792	1524	635	1754	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3				281			256			4
Link Speed (k/h)		80			80			80				80
Link Distance (m)		218.2			1632.3			668.8				164.2
Travel Time (s)		9.8			73.5			30.1				7.4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Adj. Flow (vph)	15	201	8	148	79	281	4	384	256	225	273	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	209	0	148	79	281	4	384	256	225	284	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	20.0	20.0		10.0	30.0	30.0	28.0	28.0	28.0	12.0	40.0	
Total Split (%)	28.6%	28.6%		14.3%	42.9%	42.9%	40.0%	40.0%	40.0%	17.1%	57.1%	
Maximum Green (s)	12.8	12.8		7.0	22.8	22.8	20.6	20.6	20.6	9.0	32.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	12.9	12.9		24.8	20.5	20.5	21.5	21.5	21.5	37.6	33.1	
Actuated g/C Ratio	0.19	0.19		0.37	0.31	0.31	0.32	0.32	0.32	0.57	0.50	
v/c Ratio	0.07	0.60		0.35	0.15	0.43	0.01	0.66	0.38	0.44	0.32	
Control Delay	24.1	33.0		16.6	16.9	4.7	17.3	27.2	4.7	11.0	12.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.1	33.0		16.6	16.9	4.7	17.3	27.2	4.7	11.0	12.0	
LOS	C	C		B	B	A	B	C	A	B	B	
Approach Delay		32.4			10.1			18.2			11.6	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	66.4
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.66
Intersection Signal Delay:	15.9
Intersection LOS:	B
Intersection Capacity Utilization:	71.0%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	15	209	148	79	281	4	384	256	225	284
v/c Ratio	0.07	0.60	0.35	0.15	0.43	0.01	0.66	0.38	0.44	0.32
Control Delay	24.1	33.0	16.6	16.9	4.7	17.3	27.2	4.7	11.0	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.1	33.0	16.6	16.9	4.7	17.3	27.2	4.7	11.0	12.0
Queue Length 50th (m)	1.7	26.0	13.0	7.4	0.0	0.4	46.1	0.0	15.0	22.6
Queue Length 95th (m)	6.1	43.5	23.3	15.3	12.3	2.3	69.6	12.5	24.8	35.9
Internal Link Dist (m)		194.2		1608.3			644.8			140.2
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	227	378	422	630	720	272	588	672	521	898
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.55	0.35	0.13	0.39	0.01	0.65	0.38	0.43	0.32

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	171	7	126	67	239	3	326	218	191	232	9
Future Volume (vph)	13	171	7	126	67	239	3	326	218	191	232	9
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1793		1656	1743	1495	1347	1792	1524	1703	1754	
Flt Permitted	0.71	1.00		0.50	1.00	1.00	0.59	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	1081	1793		880	1743	1495	830	1792	1524	634	1754	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	201	8	148	79	281	4	384	256	225	273	11
RTOR Reduction (vph)	0	2	0	0	0	192	0	0	174	0	2	0
Lane Group Flow (vph)	15	207	0	148	79	89	4	384	82	225	282	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	11.9	11.9		20.3	20.3	20.3	20.5	20.5	20.5	32.1	32.1	
Effective Green, g (s)	12.9	12.9		21.3	21.3	21.3	21.5	21.5	21.5	33.1	33.1	
Actuated g/C Ratio	0.19	0.19		0.32	0.32	0.32	0.32	0.32	0.32	0.49	0.49	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	208	345		353	554	475	266	575	489	466	866	
v/s Ratio Prot		c0.12		c0.04	0.05			c0.21		c0.07	0.16	
v/s Ratio Perm	0.01			0.09		0.06	0.00		0.05	0.17		
v/c Ratio	0.07	0.60		0.42	0.14	0.19	0.02	0.67	0.17	0.48	0.33	
Uniform Delay, d1	22.1	24.7		17.2	16.3	16.6	15.5	19.7	16.3	10.5	10.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	2.8		0.8	0.1	0.2	0.0	3.2	0.2	0.8	0.3	
Delay (s)	22.3	27.5		18.0	16.4	16.8	15.6	22.9	16.6	11.3	10.5	
Level of Service	C	C		B	B	B	B	C	B	B	B	
Approach Delay (s)		27.1			17.1			20.3			10.9	
Approach LOS		C			B			C			B	

### Intersection Summary

HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

02/23/2021

























Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	578	36	28	435	5	21	0	35	5	0	5
Future Volume (vph)	5	578	36	28	435	5	21	0	35	5	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1154	0	1770	1583	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1810	1188	1271	1759	1583	1308	1154	0	1770	1583	0
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		1632.3			639.3			85.1			66.9	
Travel Time (s)		73.5			28.8			6.1			4.8	
Peak Hour 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
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Adj. Flow (vph)	5	615	38	30	463	5	22	0	37	5	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	615	38	30	463	5	22	37	0	5	5	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	44.9%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 2: Beamish Road/Hanson Road & Highway 12

02/23/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	578	36	28	435	5	21	0	35	5	0	5
Future Volume (Veh/h)	5	578	36	28	435	5	21	0	35	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour 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
Hourly flow rate (vph)	5	615	38	30	463	5	22	0	37	5	0	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	468			653			1153	1153	615	1185	1186	463
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	468			653			1153	1153	615	1185	1186	463
tC, single (s)	4.1			4.5			7.5	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.6			3.8	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			96			85	100	91	97	100	99
cM capacity (veh/h)	1094			770			142	189	428	146	180	599
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2		
Volume Total	5	615	38	30	463	5	22	37	5	5		
Volume Left	5	0	0	30	0	0	22	0	5	0		
Volume Right	0	0	38	0	0	5	0	37	0	5		
cSH	1094	1700	1700	770	1700	1700	142	428	146	599		
Volume to Capacity	0.00	0.36	0.02	0.04	0.27	0.00	0.15	0.09	0.03	0.01		
Queue Length 95th (m)	0.1	0.0	0.0	1.0	0.0	0.0	4.2	2.3	0.8	0.2		
Control Delay (s)	8.3	0.0	0.0	9.9	0.0	0.0	34.9	14.2	30.4	11.1		
Lane LOS	A			A			D	B	D	B		
Approach Delay (s)	0.1			0.6			21.9		20.8			
Approach LOS							C		C			
<b>Intersection Summary</b>												
Average Delay			1.5									
Intersection Capacity Utilization			44.9%		ICU Level of Service				A			
Analysis Period (min)			15									

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

02/23/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	55.0		14.8			85.1
Travel Time (s)	4.0		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A



# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

























02/23/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

02/23/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	376	111	50	320	230	43	9	23	169	23	100
Future Volume (vph)	126	376	111	50	320	230	43	9	23	169	23	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99		1.00		
Frt			0.850			0.850		0.892				0.878
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1624	0	1736	1589	0
Flt Permitted	0.493			0.506			0.669			0.734		
Satd. Flow (perm)	927	3343	1455	961	3406	1553	978	1624	0	1338	1589	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			258			26			112
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)									3	3		
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
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Adj. Flow (vph)	142	422	125	56	360	258	48	10	26	190	26	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	142	422	125	56	360	258	48	36	0	190	138	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

02/23/2021

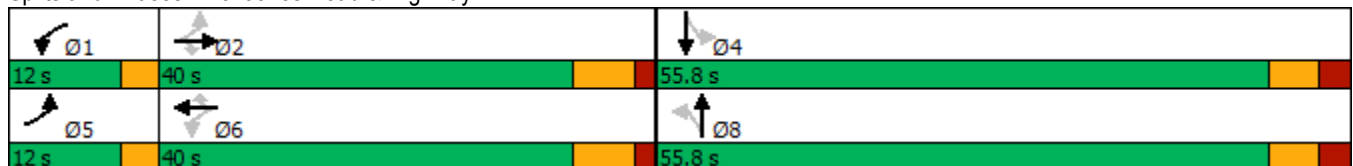


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	35.5	26.3	26.3	33.0	21.1	21.1	14.8	14.8		14.8		14.8
Actuated g/C Ratio	0.61	0.45	0.45	0.56	0.36	0.36	0.25	0.25		0.25		0.25
v/c Ratio	0.20	0.28	0.17	0.08	0.29	0.36	0.19	0.08		0.56		0.28
Control Delay	6.3	13.0	4.1	5.9	15.1	4.1	19.0	9.3		26.0		7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	6.3	13.0	4.1	5.9	15.1	4.1	19.0	9.3		26.0		7.4
LOS	A	B	A	A	B	A	B	A		C		A
Approach Delay		10.0			10.1			14.8				18.1
Approach LOS		B			B			B				B

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 58.6  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.56  
 Intersection Signal Delay: 11.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.3%  
 ICU Level of Service B  
 Analysis Period (min) 15

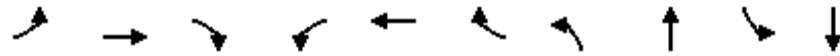
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	142	422	125	56	360	258	48	36	190	138
v/c Ratio	0.20	0.28	0.17	0.08	0.29	0.36	0.19	0.08	0.56	0.28
Control Delay	6.3	13.0	4.1	5.9	15.1	4.1	19.0	9.3	26.0	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.3	13.0	4.1	5.9	15.1	4.1	19.0	9.3	26.0	7.4
Queue Length 50th (m)	5.6	16.9	0.0	2.1	14.4	0.0	4.2	0.8	18.3	2.2
Queue Length 95th (m)	15.0	31.4	9.5	7.1	27.9	13.8	11.5	6.4	35.9	13.0
Internal Link Dist (m)		615.3			306.8			52.2		126.5
Turn Bay Length (m)	216.0		160.0	80.0		80.0				
Base Capacity (vph)	714	1960	905	718	1997	1017	838	1396	1147	1378
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.22	0.14	0.08	0.18	0.25	0.06	0.03	0.17	0.10

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

02/23/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↗		↘	↗	
Traffic Volume (vph)	126	376	111	50	320	230	43	9	23	169	23	100
Future Volume (vph)	126	376	111	50	320	230	43	9	23	169	23	100
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1624		1734	1589	
Flt Permitted	0.49	1.00	1.00	0.51	1.00	1.00	0.67	1.00		0.73	1.00	
Satd. Flow (perm)	927	3343	1455	960	3406	1553	978	1624		1339	1589	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	142	422	125	56	360	258	48	10	26	190	26	112
RTOR Reduction (vph)	0	0	70	0	0	161	0	20	0	0	84	0
Lane Group Flow (vph)	142	422	55	56	360	97	48	16	0	190	54	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	32.4	25.3	25.3	25.5	21.4	21.4	13.8	13.8		13.8	13.8	
Effective Green, g (s)	33.4	26.3	26.3	27.5	22.4	22.4	14.8	14.8		14.8	14.8	
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.37	0.37	0.25	0.25		0.25	0.25	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	647	1470	639	513	1275	581	242	401		331	393	
v/s Ratio Prot	c0.03	c0.13		0.01	0.11			0.01				0.03
v/s Ratio Perm	0.09		0.04	0.04		0.06	0.05			c0.14		
v/c Ratio	0.22	0.29	0.09	0.11	0.28	0.17	0.20	0.04		0.57	0.14	
Uniform Delay, d1	6.4	10.7	9.8	9.0	13.1	12.5	17.8	17.1		19.7	17.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.1	0.1	0.1	0.2	0.4	0.0		2.4	0.2	
Delay (s)	6.5	10.9	9.8	9.1	13.2	12.6	18.2	17.1		22.1	17.7	
Level of Service	A	B	A	A	B	B	B	B		C	B	
Approach Delay (s)		9.8			12.7			17.8			20.3	
Approach LOS		A			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			13.2			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.38									
Actuated Cycle Length (s)			59.8			Sum of lost time (s)			13.6			
Intersection Capacity Utilization			62.3%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	234	268	67	80	385	250	25	42	27	97	78	190
Future Volume (vph)	234	268	67	80	385	250	25	42	27	97	78	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.99			0.99	1.00		
Frt		0.970				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3267	0	1805	3374	1583	1805	1759	1615	1736	1845	1553
Flt Permitted	0.469			0.524			0.699			0.726		
Satd. Flow (perm)	856	3267	0	996	3374	1563	1328	1759	1594	1325	1845	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		50				287			78			218
Link Speed (k/h)		60			60			50				50
Link Distance (m)		330.8			413.9			201.9				591.8
Travel Time (s)		19.8			24.8			14.5				42.6
Confl. Peds. (#/hr)	1					1			1	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Adj. Flow (vph)	269	308	77	92	443	287	29	48	31	111	90	218
Shared Lane Traffic (%)												
Lane Group Flow (vph)	269	385	0	92	443	287	29	48	31	111	90	218
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
6: King Street & Highway 12

02/23/2021

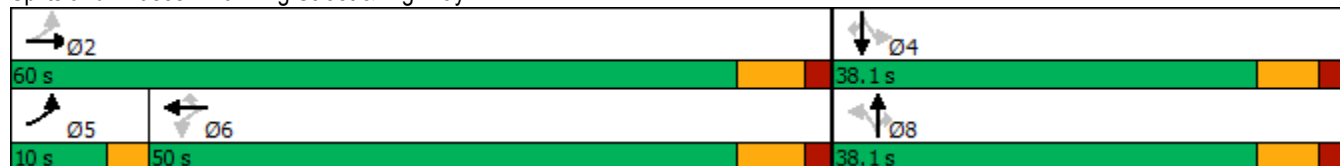


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		43.0	43.0	43.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.1	46.0		36.0	36.0	36.0	13.1	13.1	13.1	13.1	13.1	13.1
Actuated g/C Ratio	0.70	0.65		0.50	0.50	0.50	0.18	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.38	0.18		0.18	0.26	0.31	0.12	0.15	0.09	0.45	0.26	0.47
Control Delay	5.9	4.9		11.6	10.9	2.5	25.0	25.1	0.7	32.2	26.8	7.6
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	5.9	4.9		11.6	10.9	2.5	25.0	25.1	0.7	32.2	26.8	7.6
LOS	A	A		B	B	A	C	C	A	C	C	A
Approach Delay		5.3			8.1			18.1			18.2	
Approach LOS		A			A			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	98.1
Actuated Cycle Length:	71.3
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.47
Intersection Signal Delay:	9.8
Intersection LOS:	A
Intersection Capacity Utilization:	73.0%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

02/23/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	269	385	92	443	287	29	48	31	111	90	218
v/c Ratio	0.38	0.18	0.18	0.26	0.31	0.12	0.15	0.09	0.45	0.26	0.47
Control Delay	5.9	4.9	11.6	10.9	2.5	25.0	25.1	0.7	32.2	26.8	7.6
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	5.9	4.9	11.6	10.9	2.5	25.0	25.1	0.7	32.2	26.8	7.6
Queue Length 50th (m)	10.1	8.0	6.4	16.8	0.0	3.4	5.7	0.0	14.1	11.0	0.0
Queue Length 95th (m)	22.9	15.7	16.1	28.6	10.8	9.6	13.6	0.5	27.3	21.9	14.7
Internal Link Dist (m)		306.8		389.9			177.9			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	699	2489	615	2084	1075	596	790	759	595	828	817
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	0.38	0.15	0.15	0.21	0.27	0.05	0.06	0.04	0.19	0.11	0.27

Intersection Summary



HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

02/23/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	234	268	67	80	385	250	25	42	27	97	78	190
Future Volume (vph)	234	268	67	80	385	250	25	42	27	97	78	190
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1735	3267		1805	3374	1563	1805	1759	1594	1734	1845	1553
Flt Permitted	0.47	1.00		0.52	1.00	1.00	0.70	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)	857	3267		995	3374	1563	1327	1759	1594	1325	1845	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	269	308	77	92	443	287	29	48	31	111	90	218
RTOR Reduction (vph)	0	18	0	0	0	142	0	0	25	0	0	178
Lane Group Flow (vph)	269	367	0	92	443	145	29	48	6	111	90	40
Confl. Peds. (#/hr)	1					1			1	1		
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.1	12.1	12.1	12.1	12.1	12.1
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.1	13.1	13.1	13.1	13.1	13.1
Actuated g/C Ratio	0.65	0.65		0.51	0.51	0.51	0.18	0.18	0.18	0.18	0.18	0.18
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	652	2112		503	1708	791	243	323	292	243	338	285
v/s Ratio Prot	c0.05	0.11			c0.13			0.03			0.05	
v/s Ratio Perm	0.22			0.09		0.09	0.02		0.00	c0.08		0.03
v/c Ratio	0.41	0.17		0.18	0.26	0.18	0.12	0.15	0.02	0.46	0.27	0.14
Uniform Delay, d1	5.3	5.0		9.6	10.0	9.6	24.3	24.4	23.8	25.9	25.0	24.4
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.1		0.3	0.1	0.2	0.2	0.2	0.0	1.4	0.4	0.2
Delay (s)	5.7	5.1		9.9	10.1	9.8	24.5	24.6	23.9	27.3	25.4	24.6
Level of Service	A	A		A	B	A	C	C	C	C	C	C
Approach Delay (s)		5.4			10.0			24.4			25.5	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.5				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.32									
Actuated Cycle Length (s)			71.3				Sum of lost time (s)				14.1	
Intersection Capacity Utilization			73.0%				ICU Level of Service				C	
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
 10: Beamish Road & Phase 2 driveway

02/23/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	38	50	0
Future Volume (vph)	0	0	0	38	50	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1145	1242	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1145	1242	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	46.1			34.8	14.8	
Travel Time (s)	3.3			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	66%	53%	2%
Adj. Flow (vph)	0	0	0	41	54	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	41	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
<b>Two way Left Turn Lane</b>						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

<b>Intersection Summary</b>	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3% ICU Level of Service A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

02/23/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	38	50	0
Future Volume (Veh/h)	0	0	0	38	50	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	41	54	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	95	54	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95	54	54			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	905	1013	1551			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	41	54			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1551	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 18: Beamish Road & Prospect Boulevard

02/23/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	25	6	0	25
Future Volume (vph)	6	0	25	6	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.950					
Satd. Flow (prot)	902	0	923	0	0	950
Flt Permitted	0.950					
Satd. Flow (perm)	902	0	923	0	0	950
Link Speed (k/h)	50	50		50		
Link Distance (m)	95.4	55.5		40.5		
Travel Time (s)	6.9	4.0		2.9		
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	2%	100%	100%	2%	100%
Adj. Flow (vph)	7	0	27	7	0	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	34	0	0	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	0.0		0.0		
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 18: Beamish Road & Prospect Boulevard

02/23/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	25	6	0	25
Future Volume (Veh/h)	6	0	25	6	0	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	27	7	0	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	78	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	78	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	719	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	7	34	27			
Volume Left	7	0	0			
Volume Right	0	7	0			
cSH	719	1700	1551			
Volume to Capacity	0.01	0.02	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	10.1	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.1	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			1.0			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings  
20: Beamish Road & Phase 1 driveway

02/23/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	25	27	0
Future Volume (vph)	0	0	0	25	27	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	950	950	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	950	950	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	48.4			40.5	49.5	
Travel Time (s)	3.5			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	100%	100%	2%
Adj. Flow (vph)	0	0	0	27	29	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	27	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

02/23/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	25	27	0
Future Volume (Veh/h)	0	0	0	25	27	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	27	29	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	76	49	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	76	49	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	912	1003	1558			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	27	29			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1558	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 26: Beamish Road & Bourgeois Midland Nissan Access

02/23/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	56.1		49.5			34.8
Travel Time (s)	4.0		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	19.0%		ICU Level of Service A			
Analysis Period (min)	15					



HCM Unsignalized Intersection Capacity Analysis  
 26: Beamish Road & Bourgeois Midland Nissan Access

02/23/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	128	3	205	192	404	4	300	202	403	377	24
Future Volume (vph)	13	128	3	205	192	404	4	300	202	403	377	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.997				0.850			0.850		0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1710	0	1719	1845	1553	1805	1827	1482	1736	1822	0
Flt Permitted	0.632			0.575			0.518			0.437		
Satd. Flow (perm)	968	1710	0	1040	1845	1553	984	1827	1482	798	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				421			210			6
Link Speed (k/h)		80			80			80				80
Link Distance (m)		534.9			1632.3			668.8				320.5
Travel Time (s)		24.1			73.5			30.1				14.4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Adj. Flow (vph)	14	133	3	214	200	421	4	313	210	420	393	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	136	0	214	200	421	4	313	210	420	418	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	20.0	20.0		10.0	30.0	30.0	28.0	28.0	28.0	12.0	40.0	
Total Split (%)	28.6%	28.6%		14.3%	42.9%	42.9%	40.0%	40.0%	40.0%	17.1%	57.1%	
Maximum Green (s)	12.8	12.8		7.0	22.8	22.8	20.6	20.6	20.6	9.0	32.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	12.1	12.1		26.3	22.1	22.1	21.3	21.3	21.3	37.7	33.3	
Actuated g/C Ratio	0.18	0.18		0.39	0.32	0.32	0.31	0.31	0.31	0.55	0.49	
v/c Ratio	0.08	0.45		0.44	0.33	0.53	0.01	0.55	0.35	0.73	0.47	
Control Delay	24.5	29.9		17.9	19.2	4.8	17.0	24.0	4.8	18.6	13.7	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.5	29.9		17.9	19.2	4.8	17.0	24.0	4.8	18.6	13.7	
LOS	C	C		B	B	A	B	C	A	B	B	
Approach Delay		29.4			11.6			16.3			16.2	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	68
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	15.4
Intersection LOS:	B
Intersection Capacity Utilization:	77.4%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



# Queues

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	136	214	200	421	4	313	210	420	418
v/c Ratio	0.08	0.45	0.44	0.33	0.53	0.01	0.55	0.35	0.73	0.47
Control Delay	24.5	29.9	17.9	19.2	4.8	17.0	24.0	4.8	18.6	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.5	29.9	17.9	19.2	4.8	17.0	24.0	4.8	18.6	13.7
Queue Length 50th (m)	1.6	16.2	19.2	19.8	0.0	0.4	33.7	0.0	29.2	33.3
Queue Length 95th (m)	6.1	32.1	34.9	35.9	17.7	2.4	59.7	13.8	#58.0	58.8
Internal Link Dist (m)		510.9		1608.3			644.8			296.5
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	196	348	482	646	817	312	580	614	579	904
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.39	0.44	0.31	0.52	0.01	0.54	0.34	0.73	0.46

### Intersection Summary

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

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

02/23/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	128	3	205	192	404	4	300	202	403	377	24
Future Volume (vph)	13	128	3	205	192	404	4	300	202	403	377	24
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	1736	1822	
Flt Permitted	0.63	1.00		0.58	1.00	1.00	0.52	1.00	1.00	0.44	1.00	
Satd. Flow (perm)	969	1710		1041	1845	1553	984	1827	1482	798	1822	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	133	3	214	200	421	4	312	210	420	393	25
RTOR Reduction (vph)	0	1	0	0	0	284	0	0	144	0	3	0
Lane Group Flow (vph)	14	135	0	214	200	137	4	313	66	420	415	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	11.1	11.1		21.1	21.1	21.1	20.2	20.2	20.2	32.2	32.2	
Effective Green, g (s)	12.1	12.1		22.1	22.1	22.1	21.2	21.2	21.2	33.2	33.2	
Actuated g/C Ratio	0.18	0.18		0.33	0.33	0.33	0.31	0.31	0.31	0.49	0.49	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	172	304		418	600	505	307	570	462	528	890	
v/s Ratio Prot		c0.08		c0.06	0.11			c0.17		c0.12	0.23	
v/s Ratio Perm	0.01			0.11		0.09	0.00		0.04	0.27		
v/c Ratio	0.08	0.44		0.51	0.33	0.27	0.01	0.55	0.14	0.80	0.47	
Uniform Delay, d1	23.3	24.9		17.7	17.3	16.9	16.1	19.4	16.8	12.5	11.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.0		1.1	0.3	0.3	0.0	1.4	0.2	8.1	0.5	
Delay (s)	23.5	25.9		18.7	17.7	17.2	16.1	20.7	17.0	20.7	12.0	
Level of Service	C	C		B	B	B	B	C	B	C	B	
Approach Delay (s)		25.7			17.7			19.2			16.3	
Approach LOS		C			B			B			B	

### Intersection Summary

HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	16.6
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	707	28	43	789	5	34	0	51	5	0	5
Future Volume (vph)	5	707	28	43	789	5	34	0	51	5	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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
Frt			0.850			0.850		0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1324	0	1770	1583	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1770	1792	1205	1517	1827	1583	1467	1324	0	1770	1583	0
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		1632.3			639.3			84.6			63.5	
Travel Time (s)		73.5			28.8			6.1			4.6	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Adj. Flow (vph)	5	729	29	44	813	5	35	0	53	5	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	5	729	29	44	813	5	35	53	0	5	5	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Free			Free			Stop			Stop	























Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	56.7%
ICU Level of Service	B
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

02/23/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	707	28	43	789	5	34	0	51	5	0	5
Future Volume (Veh/h)	5	707	28	43	789	5	34	0	51	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	5	729	29	44	813	5	35	0	53	5	0	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None					None						
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	818		758			1645		1645	729	1693	1669	813
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	818		758			1645		1645	729	1693	1669	813
tC, single (s)	4.1		4.3			7.3		6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2		2.4			3.7		4.0	3.5	3.5	4.0	3.3
p0 queue free %	99		94			47		100	86	92	100	99
cM capacity (veh/h)	810		782			67		93	391	61	90	378
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2		
Volume Total	5	729	29	44	813	5	35	53	5	5		
Volume Left	5	0	0	44	0	0	35	0	5	0		
Volume Right	0	0	29	0	0	5	0	53	0	5		
cSH	810	1700	1700	782	1700	1700	67	391	61	378		
Volume to Capacity	0.01	0.43	0.02	0.06	0.48	0.00	0.53	0.14	0.08	0.01		
Queue Length 95th (m)	0.1	0.0	0.0	1.4	0.0	0.0	17.2	3.7	2.1	0.3		
Control Delay (s)	9.5	0.0	0.0	9.9	0.0	0.0	108.0	15.6	69.7	14.6		
Lane LOS	A		A			F		C	F	B		
Approach Delay (s)	0.1		0.5			52.4		42.2				
Approach LOS						F		E				
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			56.7%			ICU Level of Service				B		
Analysis Period (min)			15									

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

02/23/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	49.9		15.3			84.6
Travel Time (s)	3.6		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A



# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

02/23/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings

4: Beamish Road & Bourgeois Midland Nissan Access

02/23/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	51.4		50.1			34.6
Travel Time (s)	3.7		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 4: Beamish Road & Bourgeois Midland Nissan Access

02/23/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	498	93	106	516	294	122	31	172	290	38	194
Future Volume (vph)	167	498	93	106	516	294	122	31	172	290	38	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98		0.99		1.00		
Frt			0.850			0.850		0.873				0.874
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3312	1583	1805	3471	1568	1770	1625	0	1787	1625	0
Flt Permitted	0.373			0.467			0.585			0.625		
Satd. Flow (perm)	708	3312	1549	887	3471	1532	1090	1625	0	1174	1625	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94			297		174				196
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Adj. Flow (vph)	169	503	94	107	521	297	123	31	174	293	38	196
Shared Lane Traffic (%)												
Lane Group Flow (vph)	169	503	94	107	521	297	123	205	0	293	234	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

02/23/2021

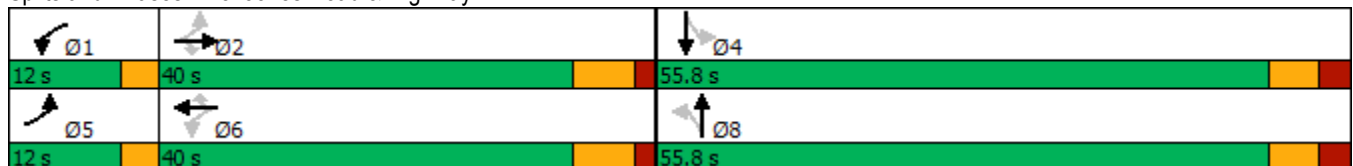


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	37.0	25.6	25.6	35.5	22.6	22.6	24.5	24.5		24.5		24.5
Actuated g/C Ratio	0.52	0.36	0.36	0.50	0.32	0.32	0.35	0.35		0.35		0.35
v/c Ratio	0.33	0.42	0.15	0.19	0.47	0.43	0.33	0.30		0.72		0.34
Control Delay	12.2	21.2	6.1	11.3	22.5	5.2	19.0	5.2		30.6		5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	12.2	21.2	6.1	11.3	22.5	5.2	19.0	5.2		30.6		5.3
LOS	B	C	A	B	C	A	B	A		C		A
Approach Delay		17.4			15.7			10.4				19.4
Approach LOS		B			B			B				B

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 70.6  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 16.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 75.0%  
 ICU Level of Service D  
 Analysis Period (min) 15

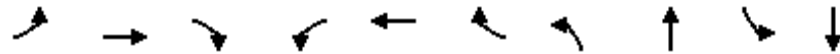
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	169	503	94	107	521	297	123	205	293	234
v/c Ratio	0.33	0.42	0.15	0.19	0.47	0.43	0.33	0.30	0.72	0.34
Control Delay	12.2	21.2	6.1	11.3	22.5	5.2	19.0	5.2	30.6	5.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.2	21.2	6.1	11.3	22.5	5.2	19.0	5.2	30.6	5.3
Queue Length 50th (m)	10.5	27.6	0.0	6.4	29.5	0.0	11.9	2.7	33.5	3.3
Queue Length 95th (m)	30.0	55.8	11.0	20.1	57.1	18.4	26.7	15.8	66.1	17.4
Internal Link Dist (m)		615.3			306.8			52.2		126.5
Turn Bay Length (m)	216.0		160.0	80.0		80.0				
Base Capacity (vph)	533	1645	817	594	1724	910	791	1227	852	1233
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.31	0.12	0.18	0.30	0.33	0.16	0.17	0.34	0.19

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

02/23/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑		↰	↑	
Traffic Volume (vph)	167	498	93	106	516	294	122	31	172	290	38	194
Future Volume (vph)	167	498	93	106	516	294	122	31	172	290	38	194
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	3312	1550	1805	3471	1532	1770	1626		1785	1626	
Flt Permitted	0.37	1.00	1.00	0.47	1.00	1.00	0.58	1.00		0.63	1.00	
Satd. Flow (perm)	708	3312	1550	888	3471	1532	1089	1626		1175	1626	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	169	503	94	107	521	297	123	31	174	293	38	196
RTOR Reduction (vph)	0	0	60	0	0	199	0	114	0	0	128	0
Lane Group Flow (vph)	169	503	34	107	521	98	123	91	0	293	106	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.1	24.6	24.6	28.5	22.3	22.3	23.5	23.5		23.5	23.5	
Effective Green, g (s)	34.8	25.6	25.6	30.5	23.3	23.3	24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.49	0.36	0.36	0.43	0.33	0.33	0.35	0.35		0.35	0.35	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	494	1195	559	475	1140	503	376	561		406	561	
v/s Ratio Prot	c0.05	c0.15		0.02	0.15			0.06				0.07
v/s Ratio Perm	0.12		0.02	0.07		0.06	0.11			c0.25		
v/c Ratio	0.34	0.42	0.06	0.23	0.46	0.19	0.33	0.16		0.72	0.19	
Uniform Delay, d1	10.3	17.1	14.8	12.2	18.8	17.1	17.1	16.1		20.2	16.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.3	0.1	0.2	0.4	0.2	0.5	0.1		6.2	0.2	
Delay (s)	10.8	17.4	14.9	12.5	19.2	17.3	17.6	16.2		26.4	16.4	
Level of Service	B	B	B	B	B	B	B	B		C	B	
Approach Delay (s)		15.6			17.8			16.8			22.0	
Approach LOS		B			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			17.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.55									
Actuated Cycle Length (s)			70.9			Sum of lost time (s)			13.6			
Intersection Capacity Utilization			75.0%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

02/23/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	590	29	30	479	184	98	110	46	235	52	339
Future Volume (vph)	340	590	29	30	479	184	98	110	46	235	52	339
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3360	0	1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.433			0.407			0.722			0.683		
Satd. Flow (perm)	807	3360	0	773	3438	1583	1372	1881	1615	1260	1900	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				192			85			353
Link Speed (k/h)		60			60			60				60
Link Distance (m)		330.8			413.9			498.1				591.8
Travel Time (s)		19.8			24.8			29.9				35.5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Adj. Flow (vph)	354	615	30	31	499	192	102	115	48	245	54	353
Shared Lane Traffic (%)												
Lane Group Flow (vph)	354	645	0	31	499	192	102	115	48	245	54	353
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4



Lanes, Volumes, Timings  
6: King Street & Highway 12

02/23/2021

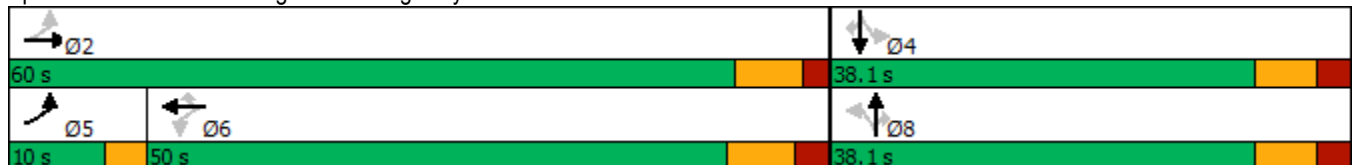


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		34.4	34.4	34.4	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		42.4	42.4	42.4	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.3	46.3		35.6	35.6	35.6	21.7	21.7	21.7	21.7	21.7	21.7
Actuated g/C Ratio	0.63	0.58		0.44	0.44	0.44	0.27	0.27	0.27	0.27	0.27	0.27
v/c Ratio	0.59	0.33		0.09	0.33	0.24	0.27	0.23	0.10	0.72	0.11	0.51
Control Delay	13.5	10.3		16.4	16.4	3.6	24.1	22.9	1.8	38.7	21.2	5.3
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	13.5	10.3		16.4	16.4	3.6	24.1	22.9	1.8	38.7	21.2	5.3
LOS	B	B		B	B	A	C	C	A	D	C	A
Approach Delay		11.5			13.0			19.6			19.2	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 80.2  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 14.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 81.2%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

02/23/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	354	645	31	499	192	102	115	48	245	54	353
v/c Ratio	0.59	0.33	0.09	0.33	0.24	0.27	0.23	0.10	0.72	0.11	0.51
Control Delay	13.5	10.3	16.4	16.4	3.6	24.1	22.9	1.8	38.7	21.2	5.3
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	13.5	10.3	16.4	16.4	3.6	24.1	22.9	1.8	38.7	21.2	5.3
Queue Length 50th (m)	23.0	25.2	2.7	25.9	0.0	12.8	14.2	0.0	35.3	6.4	0.0
Queue Length 95th (m)	52.1	47.6	9.7	46.3	12.8	25.0	26.5	2.7	59.9	14.4	17.8
Internal Link Dist (m)		306.8		389.9			474.1			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	603	2280	421	1873	950	551	756	699	506	763	853
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	0.59	0.28	0.07	0.27	0.20	0.19	0.15	0.07	0.48	0.07	0.41

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

02/23/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	590	29	30	479	184	98	110	46	235	52	339
Future Volume (vph)	340	590	29	30	479	184	98	110	46	235	52	339
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3361		1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.43	1.00		0.41	1.00	1.00	0.72	1.00	1.00	0.68	1.00	1.00
Satd. Flow (perm)	806	3361		773	3438	1583	1371	1881	1615	1260	1900	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	354	615	30	31	499	192	102	115	48	245	54	353
RTOR Reduction (vph)	0	3	0	0	0	106	0	0	35	0	0	257
Lane Group Flow (vph)	354	642	0	31	499	86	102	115	13	245	54	96
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	45.3	45.3		34.7	34.7	34.7	20.7	20.7	20.7	20.7	20.7	20.7
Effective Green, g (s)	46.3	46.3		35.7	35.7	35.7	21.7	21.7	21.7	21.7	21.7	21.7
Actuated g/C Ratio	0.58	0.58		0.45	0.45	0.45	0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	562	1942		344	1532	705	371	509	437	341	514	433
v/s Ratio Prot	c0.06	c0.19			0.15			0.06			0.03	
v/s Ratio Perm	0.30			0.04		0.05	0.07		0.01	c0.19		0.06
v/c Ratio	0.63	0.33		0.09	0.33	0.12	0.27	0.23	0.03	0.72	0.11	0.22
Uniform Delay, d1	9.1	8.8		12.8	14.4	13.0	23.0	22.7	21.5	26.4	21.9	22.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.2		0.2	0.2	0.1	0.4	0.2	0.0	7.1	0.1	0.3
Delay (s)	11.3	9.0		13.0	14.6	13.1	23.4	22.9	21.5	33.5	22.0	22.9
Level of Service	B	A		B	B	B	C	C	C	C	C	C
Approach Delay (s)		9.8			14.2			22.8			26.8	
Approach LOS		A			B			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			16.5									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			80.1									Sum of lost time (s) 14.7
Intersection Capacity Utilization			81.2%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings  
10: Beamish Road & Phase 2 driveway

02/23/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	63	54	0
Future Volume (vph)	0	0	0	63	54	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	30.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1173	1284	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1173	1284	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	51.3			34.6	15.3	
Travel Time (s)	3.7			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	62%	48%	2%
Adj. Flow (vph)	0	0	0	68	59	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	68	59	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

02/23/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	63	54	0
Future Volume (Veh/h)	0	0	0	63	54	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	68	59	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	127	59	59			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	127	59	59			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	868	1007	1545			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	68	59			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1545	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 17: Beamish Road & Prospect Boulevard

02/23/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	39	10	0	25
Future Volume (vph)	6	0	39	10	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.950					
Satd. Flow (prot)	1107	0	1133	0	0	1166
Flt Permitted	0.950					
Satd. Flow (perm)	1107	0	1133	0	0	1166
Link Speed (k/h)	50	50		50		
Link Distance (m)	98.0	54.6		39.8		
Travel Time (s)	7.1	3.9		2.9		
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	63%	2%	63%	63%	2%	63%
Adj. Flow (vph)	7	0	42	11	0	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	53	0	0	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	0.0		0.0		
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
	ICU Level of Service A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 17: Beamish Road & Prospect Boulevard

02/23/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	39	10	0	25
Future Volume (Veh/h)	6	0	39	10	0	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	42	11	0	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	94	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	94	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	763	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	7	53	27			
Volume Left	7	0	0			
Volume Right	0	11	0			
cSH	763	1700	1527			
Volume to Capacity	0.01	0.03	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	9.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	9.8	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.8			
Intersection Capacity Utilization		19.0%		ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 20: Beamish Road & Phase 1 driveway

02/23/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	39	27	0
Future Volume (vph)	0	0	0	39	27	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1166	1166	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1166	1166	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.4			39.8	50.1	
Travel Time (s)	4.7			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	63%	63%	2%
Adj. Flow (vph)	0	0	0	42	29	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	42	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15



# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

02/23/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	39	27	0
Future Volume (Veh/h)	0	0	0	39	27	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	42	29	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	91	49	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	91	49	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	894	1003	1558			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	42	29			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1558	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%			ICU Level of Service	A	
Analysis Period (min)	15					

# APPENDIX

## E ITE MANUAL PASS-BY & INTERNAL LINKED TRIP TABLES



**Table E.9 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period  
Land Use Code 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
53	Port Orange, FL	1993	162	2:00–6:00 p.m.	59	—	—	41	—	—	TPD Inc.
9	Kissimmee, FL	1994	107	2:00–6:00 p.m.	66	20	14	34	—	—	TPD Inc.
77	Edgewater, FL	1992	365	2:00–6:00 p.m.	46	—	—	54	—	—	TPD Inc.
82	Deltona, FL	1992	336	2:00–6:00 p.m.	34	—	—	66	—	—	TPD Inc.
78	Orlando, FL	1991	702	2:00–6:00 p.m.	55	23	22	45	—	—	TPD Inc.
45	Orlando, FL	1992	844	2:00–6:00 p.m.	56	24	20	44	—	—	TPD Inc.
50	Orlando, FL	1992	555	2:00–6:00 p.m.	41	41	18	59	—	—	TPD Inc.
52	Orlando, FL	1995	665	2:00–6:00 p.m.	42	33	25	58	—	—	TPD Inc.
17	Orlando, FL	1994	196	2:00–6:00 p.m.	66	—	—	34	—	—	TPD Inc.
60	Orlando, FL	1995	1,583	3:00–7:00 p.m.	40	38	22	60	—	—	TPD Inc.
158	Crestwood, KY	June 1993	129	4:00–6:00 p.m.	36	39	25	64	759	—	Barton-Aschman Assoc.
118	Louisville area, KY	June 1993	133	4:00–6:00 p.m.	22	51	27	78	3,555	—	Barton-Aschman Assoc.
74	Louisville, KY	June 1993	187	4:00–6:00 p.m.	30	43	27	70	922	—	Barton-Aschman Assoc.
59	Louisville area, KY	June 1993	247	4:00–6:00 p.m.	31	52	17	69	2,659	—	Barton-Aschman Assoc.
145	Louisville area, KY	June 1993	210	4:00–6:00 p.m.	53	30	17	47	2,636	—	Barton-Aschman Assoc.
104	Louisville area, KY	June 1993	281	4:00–6:00 p.m.	28	50	22	72	2,111	—	Barton-Aschman Assoc.
235	Louisville, KY	June 1993	211	4:00–6:00 p.m.	35	29	36	65	2,593	—	Barton-Aschman Assoc.
71	Louisville, KY	June 1993	109	4:00–6:00 p.m.	25	42	33	75	1,559	—	Barton-Aschman Assoc.
350	Worcester, MA	Apr. 1994	224	4:00–6:00 p.m.	18	45	37	82	2,112	—	ICSC
738	East Brunswick, NJ	Apr. 1994	283	4:00–6:00 p.m.	14	79	7	86	8,059	—	ICSC
294	Philadelphia, PA	Apr. 1994	213	4:00–6:00 p.m.	25	51	24	75	4,055	—	ICSC
256	Hamden, CT	Apr. 1994	208	4:00–6:00 p.m.	27	51	22	73	3,422	—	ICSC
418	Glen Burnie, MD	Apr. 1994	281	4:00–6:00 p.m.	20	51	29	80	5,610	—	ICSC
560	Harrisonburg, VA	Apr. 1994	437	4:00–6:00 p.m.	19	49	32	81	3,051	—	ICSC

**Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday,  
PM Peak Period Land Use Code 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
361	Glen Allen, VA	Apr. 1994	315	4:00–6:00 p.m.	17	54	29	83	2,034	—	ICSC
375	Sholby, NC	May 1994	214	4:00–6:00 p.m.	30	48	22	70	3,053	—	ICSC
413	Texas City, TX	May 1994	228	4:00–6:00 p.m.	28	52	20	72	589	—	ICSC
488	Texas City, TX	May 1994	257	4:00–6:00 p.m.	12	75	13	88	1,094	—	ICSC
293	Berwyn, IL	May 1994	282	4:00–6:00 p.m.	24	70	6	76	4,606	—	ICSC
667	Bourbonais, IL	May 1994	200	4:00–6:00 p.m.	16	53	31	84	2,770	—	ICSC
225	Bellevue, IL	May 1994	264	4:00–6:00 p.m.	35	32	33	65	1,970	—	ICSC
255	Bettendorf, IA	May 1994	222	4:00–6:00 p.m.	24	37	39	76	3,706	—	ICSC
808	Laguna Hills, CA	June 1994	240	4:00–6:00 p.m.	13	73	14	87	4,035	—	ICSC
450	Hanford, CA	May 1994	321	4:00–6:00 p.m.	23	49	28	77	2,787	—	ICSC
800	San Jose, CA	May 1994	205	4:00–6:00 p.m.	21	51	28	79	7,474	—	ICSC
598	Greeley, CO	May 1994	205	4:00–6:00 p.m.	17	55	28	83	3,840	—	ICSC
581	Pueblo, CO	May 1994	296	4:00–6:00 p.m.	18	53	29	82	2,939	—	ICSC
476	Bellevue, WA	May 1994	234	4:00–6:00 p.m.	26	54	20	74	3,427	—	ICSC
720	Framingham, MA	Dec. 1982	92	3:30–7:00 p.m.	23	39	38	77	—	73,628	Raymond Keyes Assoc.
890	Newark, DE	July 1984	179	3:00–8:00 p.m.	12	49	39	88	—	—	Raymond Keyes Assoc.
402	Manassas, VA	June 1984	87	4:00–6:00 p.m.	48	25	27	52	—	—	Raymond Keyes Assoc.
462	Ross, PA	June 1980	175	5:30–7:00 p.m.	36	—	—	64	—	27,200	Raymond Keyes Assoc.
234	Huntington LI, NY	Nov. 1985	181	4:00–7:00 p.m.	46	21	33	54	—	34,630	Raymond Keyes Assoc.
658	Wayne, NJ	Sept. 1984	243	3:00–6:00 p.m.	27	61	12	73	—	85,600	Raymond Keyes Assoc.
1,200	Washington, DC	1980	364	4:00–6:00 p.m.	25	35	40	75	—	—	Gorove-Slade
800	Southern CA	—	1,000	4:00–6:00 p.m.	12	45	43	88	—	—	Frischer
451	Portland, OR	—	—	5:00–6:00 p.m.	25	—	—	75	—	—	Buttke
113	Portland, OR	—	—	5:00–6:00 p.m.	17	—	—	83	—	—	Buttke

**Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM  
Peak Period Land Use Code 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
622	Ramsey, MN	Nov. 1985	46	4:00–9:00 p.m.	44	26	30	56	—	36,370	Raymond Keyes Assoc.
736	Pensacola, FL	Oct. 1985	383	3:00–7:00 p.m.	26	35	39	74	—	—	Raymond Keyes Assoc.
84	Dover, DE	July 1985	218	3:30–7:00 p.m.	50	6	44	50	—	—	Raymond Keyes Assoc.
500	Meriden, CT	Apr. 1985	—	4:00–6:00 p.m.	8	—	—	92	—	—	Connecticut DOT
660	Enfield, CT	Apr. 1985	—	4:00–6:00 p.m.	22	—	—	78	—	—	Connecticut DOT
845	Waterford, CT	Apr. 1985	—	4:00–6:00 p.m.	14	—	—	86	—	—	Connecticut DOT
1,060	West Hartford, CT	Apr. 1985	—	4:00–6:00 p.m.	17	—	—	83	—	—	Connecticut DOT
131	Pr. Georges Co., MD	1982/83	88	4:00–6:00 p.m.	74	—	—	26	—	—	JHK
181	Pr. Georges Co., MD	1982/83	105	4:00–6:00 p.m.	36	—	—	64	—	—	JHK
100	Pr. Georges Co., MD	1982/83	93	4:00–6:00 p.m.	36	—	—	64	—	—	JHK
475	Pr. Georges Co., MD	1982/83	130	4:00–6:00 p.m.	20	—	—	80	—	—	JHK
60	Pr. Georges Co., MD	1982/83	72	4:00–6:00 p.m.	72	—	—	28	—	—	JHK
90	Pr. Georges Co., MD	1982/83	91	4:00–6:00 p.m.	58	—	—	42	—	—	JHK
78	Pr. Georges Co., MD	1982/83	113	4:00–6:00 p.m.	59	—	—	41	—	—	JHK
44	Pr. Georges Co., MD	1982/83	97	4:00–6:00 p.m.	51	—	—	49	—	—	JHK
467	Pr. Georges Co., MD	1982/83	99	4:00–6:00 p.m.	56	—	—	44	—	—	JHK
352	W. Orange, NJ	Mar. 1986	149	4:00–6:00 p.m.	38	19	43	62	—	21,520	Raymond Keyes Assoc.
176	Tarpon Springs, FL	May 1986	124	3:00–7:00 p.m.	37	28	35	63	—	34,080	Raymond Keyes Assoc.
762	Orlando, FL	Fall 1985	182	4:00–6:00 p.m.	25	52	23	75	—	—	Kimley-Horn and Assoc. Inc.
166	Orlando, FL	Fall 1985	124	4:00–6:00 p.m.	27	48	25	73	—	—	Kimley-Horn and Assoc. Inc.
129	Orlando, FL	Fall 1985	116	4:00–6:00 p.m.	28	50	22	72	—	—	Kimley-Horn and Assoc. Inc.
71	Orlando, FL	Fall 1985	81	4:00–6:00 p.m.	50	44	6	50	—	—	Kimley-Horn and Assoc. Inc.

**Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
921	Albany, NY	July & Aug. 1985	196	4:00–6:00 p.m.	23	42	35	77	—	60,950	Raymond Keyes Assoc.
108	Overland Park, KS	July 1988	111	4:30–5:30 p.m.	26	61	13	74	—	34,000	—
118	Overland Park, KS	Aug. 1988	123	4:30–5:30 p.m.	25	55	20	75	—	—	—
256	Greece, NY	June 1988	120	4:00–6:00 p.m.	38	62	—	62	—	23,410	Sear Brown
160	Greece, NY	June 1988	78	4:00–6:00 p.m.	29	71	—	71	—	57,306	Sear Brown
550	Greece, NY	June 1988	117	4:00–6:00 p.m.	48	52	—	52	—	40,763	Sear Brown
51	Boca Raton, FL	Dec. 1987	110	4:00–6:00 p.m.	33	34	33	67	—	42,225	Kimley-Horn and Assoc. Inc.
1,090	Ross Twp, PA	July 1988	411	2:00–8:00 p.m.	34	56	10	66	—	51,500	Wilbur Smith and Assoc.
97	Upper Dublin Twp, PA	Winter 1988/89	—	4:00–6:00 p.m.	41	—	—	59	—	34,000	McMahon Associates
118	Tredyffrin Twp, PA	Winter 1988/89	—	4:00–6:00 p.m.	24	—	—	76	—	10,000	Booz Allen & Hamilton
122	Lawnside, NJ	Winter 1988/89	—	4:00–6:00 p.m.	37	—	—	63	—	20,000	Pennoni Associates
126	Boca Raton, FL	Winter 1988/89	—	4:00–6:00 p.m.	43	—	—	57	—	40,000	McMahon Associates
150	Willow Grove, PA	Winter 1988/89	—	4:00–6:00 p.m.	39	—	—	61	—	26,000	Booz Allen & Hamilton
153	Broward Cnty., FL	Winter 1988/89	—	4:00–6:00 p.m.	50	—	—	50	—	85,000	McMahon Associates
153	Arden, DE	Winter 1988/89	—	4:00–6:00 p.m.	30	—	—	70	—	26,000	Orth-Rodgers & Assoc. Inc.
154	Doylestown, PA	Winter 1988/89	—	4:00–6:00 p.m.	32	—	—	68	—	29,000	Orth-Rodgers & Assoc. Inc.
164	Middletown Twp, PA	Winter 1988/89	—	4:00–6:00 p.m.	33	—	—	67	—	25,000	Booz Allen & Hamilton
166	Haddon Twp, NJ	Winter 1988/89	—	4:00–6:00 p.m.	20	—	—	80	—	6,000	Pennoni Associates
205	Broward Cnty., FL	Winter 1988/89	—	4:00–6:00 p.m.	55	—	—	45	—	62,000	McMahon Associates

**Table E.9 (Cont'd) Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 820—Shopping Center**

SIZE (1,000 SQ. FT. GLA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIP (%)			ADJ. STREET PEAK HOUR VOLUME	AVERAGE 24-HOUR TRAFFIC	SOURCE
						PRIMARY	DIVERTED	TOTAL			
237	W. Windsor Twp, NJ	Winter 1988/89	—	4:00–6:00 p.m.	48	—	—	52	—	46,000	Booz Allen & Hamilton
242	Willow Grove, PA	Winter 1988/89	—	4:00–6:00 p.m.	37	—	—	63	—	26,000	McMahon Associates
297	Whitehall, PA	Winter 1988/89	—	4:00–6:00 p.m.	33	—	—	67	—	26,000	Orth-Rodgers & Assoc. Inc.
360	Broward Cnty., FL	Winter 1988/89	—	4:00–6:00 p.m.	44	—	—	56	—	73,000	McMahon Associates
370	Pittsburgh, PA	Winter 1988/89	—	4:00–6:00 p.m.	19	—	—	81	—	33,000	Wilbur Smith
150	Portland, OR	—	519	4:00–6:00 p.m.	68	6	26	32	—	25,000	Kittelson and Associates
150	Portland, OR	—	655	4:00–6:00 p.m.	65	7	28	35	—	30,000	Kittelson and Associates
760	Calgary, Alberta	Oct.-Dec. 1987	15,436	4:00–6:00 p.m.	20	39	41	80	—	—	City of Calgary DOT
178	Bordentown, NJ	Apr. 1989	154	2:00–6:00 p.m.	35	—	—	65	—	37,980	Raymond Keyes Assoc.
144	Manalapan, NJ	July 1990	176	3:30–6:15 p.m.	32	44	24	68	—	69,347	Raymond Keyes Assoc.
549	Natick, MA	Feb. 1989	—	4:45–5:45 p.m.	33	26	41	67	—	48,782	Raymond Keyes Assoc.

Average Pass-By Trip Percentage: 34  
 “—” means no data were provided

**Table E.31 Pass-By and Non-Pass-By Trips Weekday, AM Peak Period  
Land Use Code 934—Fast-Food Restaurant with Drive-Through Window**

SEATS	SIZE (1,000 SQ. FT. GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
							PRIMARY	DIVERTED	TOTAL		
—	<5	Chicago suburbs, IL	1987	84	7:00–9:00 a.m.	44	—	—	56	—	Kenig, O'Hara, Humes, Flock
88	1.4	Louisville area, KY	1993	—	7:00–9:00 a.m.	62	22	16	38	1,407	Barton-Aschman Assoc.
100	3.6	Louisville, KY	1993	—	7:00–9:00 a.m.	32	47	21	68	437	Barton-Aschman Assoc.
87	4.2	New Albany, IN	1993	—	7:00–9:00 a.m.	46	23	31	54	1,049	Barton-Aschman Assoc.
150	3.0	Louisville area, KY	1993	—	7:00–9:00 a.m.	43	14	43	57	2,903	Barton-Aschman Assoc.
—	3.3	varies	1996	—	6:00–9:00 a.m.	68	—	—	32	—	Oracle Engineering

Average Pass-By Trip Percentage: 49

“—” means no data were provided



**Table E.32 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period  
Land Use Code 934—Fast-Food Restaurant with Drive-Through Window**

SEATS	SIZE (1,000 SQ. FT. GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS- BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
							PRIMARY	DIVERTED	TOTAL		
—	~2.6	Minn-St. Paul, MN	1987	50	3:00–7:00 p.m.	25	27	48	75	—	—
—	<5.0	Chicago suburbs, IL	1987	80	3:00–6:00 p.m.	38	—	—	62	—	Kenig, O'Hara, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	100	3:00–6:00 p.m.	55	—	—	45	—	Kenig, O'Hara, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	159	3:00–6:00 p.m.	56	—	—	44	—	Kenig, O'Hara, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	225	3:00–6:00 p.m.	48	—	—	52	—	Kenig, O'Hara, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	88	3:00–6:00 p.m.	35	—	—	65	—	Kenig, O'Hara, Humes, Flock
—	<5.0	Chicago suburbs, IL	1987	84	3:00–6:00 p.m.	44	—	—	56	—	Kenig, O'Hara, Humes, Flock
88	1.3	Louisville area, KY	1993	—	4:00–6:00 p.m.	68	22	10	32	2,055	Barton- Aschman Assoc.
120	1.9	Louisville area, KY	1993	33	4:00–6:00 p.m.	67	24	9	33	2,447	Barton- Aschman Assoc.
87	4.2	New Albany, IN	1993	—	4:00–6:00 p.m.	56	25	19	44	1,632	Barton- Aschman Assoc.
150	3.0	Louisville area, KY	1993	—	4:00–6:00 p.m.	31	31	38	69	4,250	Barton- Aschman Assoc.
—	3.1	Kissimmee, FL	1995	28	2:00–6:00 p.m.	71	—	—	29	—	TPD Inc.
—	3.1	Apopka, FL	1996	29	2:00–6:00 p.m.	38	—	—	62	—	TPD Inc.
—	2.8	Winter Springs, FL	1995	47	2:00–6:00 p.m.	66	—	—	34	—	TPD Inc.
—	4.3	Longwood, FL	1994	304	2:00–6:00 p.m.	62	—	—	38	—	TPD Inc.
—	3.2	Altamonte Springs, FL	1996	202	2:00–6:00 p.m.	40	39	21	60	—	TPD Inc.
—	2.9	Winter Park, FL	1996	271	2:00–6:00 p.m.	41	41	18	59	—	TPD Inc.
—	3.3*	several	1996	varies	4:00–6:00 p.m.	62	—	—	38	—	Oracle Engineering

\*Average of several combined studies.

Average Pass-By Trip Percentage: 50

“—” means no data were provided

**Table E.33 Pass-By and Non-Pass-By Trips Weekday  
Land Use Code 938—Coffee/Donut Shop with Drive-Through Window  
and No Indoor Seating (Coffee/Esspresso Stand)**

SIZE (1,000 SQ. FT. GFA)	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			SOURCE
						PRIMARY	DIVERTED	TOTAL	
0.1	Vancouver, WA	Nov. 1997	69	6:00 a.m.–6:00 p.m.	83	—	—	17	Kittelson & Associates Inc.

“—” means no data were provided

**Table E.34 Pass-By and Non-Pass-By Trips Weekday  
Land Use Code 938—Coffee/Donut Shop with Drive-Through Window  
and No Indoor Seating (Coffee/Esspresso Stand)**

EMPLOYEES	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			SOURCE
						PRIMARY	DIVERTED	TOTAL	
1	Vancouver, WA	Nov. 1997	70	6:00 a.m.–6:00 p.m.	83	—	—	17	Kittelson & Associates Inc.
1	Woodburn, OR	Feb. 1998	109	6:00 a.m.–6:00 p.m.	95	—	—	5	Kittelson & Associates Inc.
1	Vancouver, WA	Feb. 1998	83	6:00 a.m.–1:00 p.m.	89	—	—	11	Kittelson & Associates Inc.

Average Pass-By Trip Percentage: 89

“—” means no data were provided

**Table E.35 Pass-By and Non-Pass-By Trips Weekday, AM Peak Period  
Land Use Code 944—Gasoline/Service Station**

SIZE (1,000 SQ. FT. GFA)	VEHICLE FUELING POSITIONS	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	NON-PASS-BY TRIPS (%)			ADJ. STREET PEAK HOUR VOLUME	SOURCE
							PRIMARY	DIVERTED	TOTAL		
2.3	6	Gaithersburg, MD	1992	37	7:00–9:00 a.m.	32	41	27	68	2,080	RBA
2.1	6	Bethesda, MD	1992	26	7:00–9:00 a.m.	58	23	19	42	2,080	RBA
1.7	6	Wheaton, MD	1992	21	7:00–9:00 a.m.	67	14	19	33	900	RBA
2.0	8	Gaithersburg, MD	1992	46	7:00–9:00 a.m.	87	13	0	13	2,235	RBA
1.2	6	Damascus, MD	1992	21	7:00–9:00 a.m.	43	28	29	57	870	RBA
0.3	12	Wheaton, MD	1992	36	7:00–9:00 a.m.	61	8	31	39	3,480	RBA

Average Pass-By Trip Percentage: 58

“—” means no data were provided

# New Internal Trip Capture Methodology for Multi-Use Developments

Based on NCHRP Project 8-51

Note: Saturday is assumed to be the same as PM Peak Hour for Multi-Use Reductions, if Saturday Multi-Use is assumed, this must be disclosed  
Do not modify values in Grey Cells

## INPUTS

### Volumes

Use	AM Volumes		PM Volumes		Saturday Volumes	
	Entering	Exiting	Entering	Exiting	Entering	Exiting
Retail	116	71	204	221	248	229
Restaurant	200	192	140	132	250	243
Hotel	47	33	86	83	85	85

### Proximity of Uses

Use	Separation Distance (In Feet)					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Retail		0	0	0	0	0
Restaurant		200	200	0	0	400
Hotel		400	400		0	0

## OUTPUTS

### AM Peak Hour Multi-Use Reduction Summary

	Retail	Restaurant	Hotel	In	In%
Retail	0	9	5	14	12%
Restaurant	9	0	3	12	6%
Hotel	0	2	0	2	4%
<b>Out</b>	<b>9</b>	<b>11</b>	<b>8</b>		
<b>Out %</b>	<b>13%</b>	<b>6%</b>	<b>23%</b>		

### PM Peak Hour Multi-Use Reduction Summary (Contains Proximity Factors)

	Retail	Restaurant	Hotel	In	In%
Retail	0	54	4	58	29%
Restaurant	41	0	7	48	34%
Hotel	11	9	0	20	24%
<b>Out</b>	<b>52</b>	<b>63</b>	<b>11</b>		
<b>Out %</b>	<b>23%</b>	<b>48%</b>	<b>13%</b>		

### Saturday Peak Hour Multi-Use Reduction Summary (Contains Proximity Factors)

	Retail	Restaurant	Hotel	In	In%
Retail				0	0%
Restaurant				0	0%
Hotel				0	0%
<b>Out</b>	<b>0</b>	<b>0</b>	<b>0</b>		
<b>Out %</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>		

## Supporting Data

Percentages from ITE Journal August 2010: "Improved Estimation of Internal Trip Capture for Mixed-Use Developments"

### AM From-To Percentages Matrix

To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		29%	31%		2%	75%

Retail	28%		14%		1%	14%
Restaurant	63%	13%			20%	9%
Cinema/ Entertainment						
Residential	1%	14%	4%			0%
Hotel	0%	0%	3%		0%	

**AM To-From Percentages Matrix**

To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		4%	14%		3%	3%
Retail	32%		8%		17%	4%
Restaurant	23%	50%			20%	6%
Cinema/ Entertainment						
Residential	0%	2%	5%			0%
Hotel	0%	0%	4%		0%	

**PM From-To Percentages Matrix**

To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		2%	3%	2%	4%	0%
Retail	20%		41%	21%	42%	16%
Restaurant	4%	29%		31%	21%	68%
Cinema/ Entertainment	0%	4%	8%		0%	68%
Residential	2%	26%	18%	8%		0%
Hotel	0%	5%	7%	2%	3%	2%

**PM To-From Percentages Matrix**

To	From					
	Office	Retail	Restaurant	Cinema/ Entertainment	Residential	Hotel
Office		31%	30%	6%	57%	0%
Retail	8%		50%	4%	10%	2%
Restaurant	2%	29%		3%	14%	5%
Cinema/ Entertainment	1%	26%	32%		0%	0%
Residential	4%	46%	16%	4%		0%
Hotel	0%	17%	71%	1%	12%	

# APPENDIX

**F**

HANSON

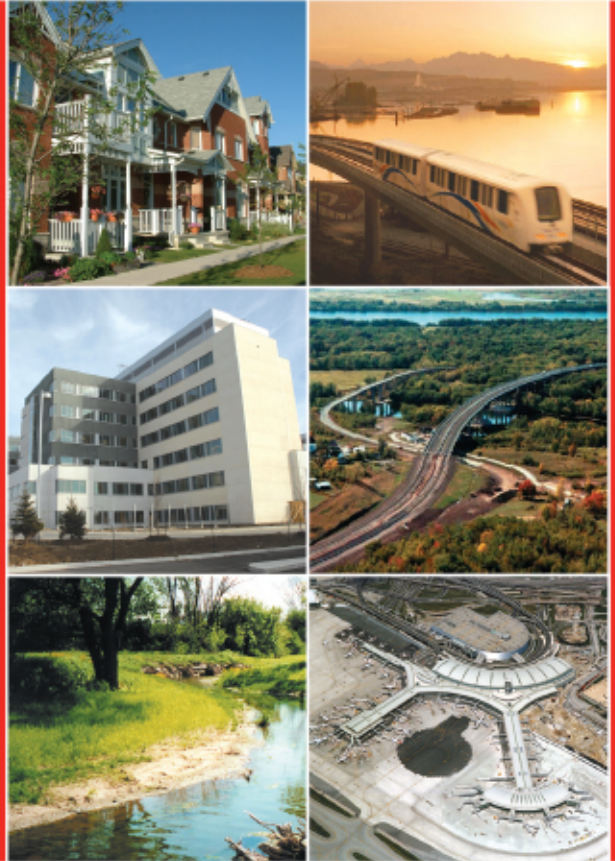
BACKGROUND

DEVELOPMENTS

T TIS REPORT



# MMM Group Limited



Hanson Development,  
Town of Midland

Traffic Impact Study

COMMUNITIES  
TRANSPORTATION  
BUILDINGS  
INFRASTRUCTURE



August 2016 | 10-04062

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## EXECUTIVE SUMMARY

### Introduction

MMM Group has prepared this Traffic Impact Study (TIS) for the Hanson Development in Midland, Ontario. The report, which was prepared in July 2012 and was revised in May 2014 and September 2015, has been revised to address comments received from the Ministry of Transportation (MTO) dated on November 20, 2015 and clarified in the meeting held on April 7, 2016 at the MTO offices. The TIS report addresses the requirements for a Traffic Impact Study as outlined in MTO's *General Guidelines for the Preparation of Traffic Impact Studies* (September 2014).

### Proposed Development

The proposed development is located within the Town of Midland, north of Highway 12, south of Little Lake, east of Highway 93 and west of King Street. The development proposal is divided into the following phases and includes the following land uses:

#### Phases 1A and 1B

- 254 residential units, comprised of:
  - 227 townhouses; and
  - 27 semi-detached residential units.
- 1,918 m<sup>2</sup> (20,650 ft<sup>2</sup>) neighbourhood commercial space

#### Phase 1 (all sub-phases 1A, 1B, 1C, 1D and 1E)

- 690 residential units, comprised of:
  - 162 apartments;
  - 431 townhouses; and
  - 97 semi-detached residential units.
- 3,252 m<sup>2</sup> (35,000 ft<sup>2</sup>) neighbourhood commercial space

#### Phases 2 and 3

- 1,013 residential units, comprised of:
  - 199 apartments;
  - 475 townhouses;
  - 103 single family residential units; and
  - 236 semi-detached residential units.

Phase 1A and 1B of the development are assumed to be constructed and fully occupied by the year 2020. All sub-phases of Phase 1 of the development are assumed to be constructed and fully occupied by the year 2025. Complete build out of the development, including Phases 1, 2 and 3, is assumed to be constructed and fully occupied by the year 2030. All phases analyzed represent the maximum number of units that will be constructed. The maximum number of units was analyzed in order to consider a worst case scenario from a traffic perspective. The actual number of units constructed could be less.

Access to the site for Phases 1A and 1B of the development would be provided with a northern extension of the existing intersection of Beamish Road and Highway 12. As part of the Phase 1 build out, a new intersection at a location on King Street north of Highway 12 will be constructed. Access to the site for Phases 2 and 3 of the development would be provided at the existing intersection of Sumac Lane and Highway 12.

Vehicular access between the Hanson development and the SmartCentres commercial block has been discussed. The design of the Hanson development facilitates vehicular access at a northern location of the SmartCentres site. The analysis in this report indicates that Hanson development and the SmartCentres each would be expected to operate adequately from a traffic perspective with or without this road connection. This connection also would provide a pedestrian and cyclist connection to the SmartCentres development.

## Existing Conditions

The six existing intersections analyzed in this study all operate at an adequate (LOS D or better) level of service during the weekday AM and PM and Saturday peak hours, with the exception of the Highway 12 intersection at Les Barber Boulevard, which experiences some delays in the northbound approach during the PM peak hour. This delay reflects a very small number of vehicles having to wait for an appropriate gap in the east – west Highway 12 traffic before accessing Highway 12. There is adequate capacity at all intersections in all three peak hours to accommodate existing traffic volumes.

## Traffic Related to the Proposed Development

Trips for the Hanson development were generated using the Institute of Transportation Engineer's *Trip Generation* handbook. The forecast vehicle trips for the Hanson development are shown in **Table 1**.

**Table 1: Trip Generation of the Hanson Development**

Component	AM Peak Hour			PM Peak Hour			Saturday Peak Hour		
	In	Out	Total	In	Out	Total	In	Out	Total
<b>Phases 1A + 1B</b>	61	127	188	199	159	358	239	215	455
<b>Phase 1 (A,B,C,D,E)</b>	115	294	409	410	295	705	418	372	790
<b>Phases 2 + 3</b>	102	368	470	367	202	569	281	240	521
<b>Total Development</b>	217	662	879	777	497	1274	699	612	1311

These trips were then distributed and assigned to the road network.

### **Future Background Conditions**

Future background traffic conditions were determined by increasing existing data from 2013, 2015 and 2016 by 1.25% per year to project future background traffic in the horizon years. This increase was agreed with MTO and the Town at the April 7, 2016 meeting and is in line with recent traffic volumes trends.

### **Analysis of Future Traffic Conditions in the Years 2020, 2025, 2030, 2035 and 2040**

Analysis of future traffic conditions was conducted using the Synchro traffic analysis software for the AM, PM and Saturday peak hours for the years 2020, 2025, 2030, 2035 and 2040 for background traffic-only and total traffic scenarios. Based on these analyses, the intersection improvements needed for each horizon year and each scenario (without or with the Hanson development) were identified. Intersection improvements include:

- Signalization of the Beamish Road / Street 'C' and Highway 12 intersection, in the year 2020;
  - Exclusive northbound left, southbound left, eastbound left and westbound right turning lanes;
- Signalization of the Street 'A' at King Street intersection, in the year 2025; and
- Signalization of the Sumac Lane at Highway 12 intersection in the year 2030;
  - Exclusive eastbound left and westbound right turning lanes.

## Storage Lengths

Storage lengths were calculated for the recommended new right and left turn lanes, given the full build out of the development (Phases 1, 2 and 3). The recommended storage lengths are shown in **Table 2**.

**Table 2: Recommended Storage Lengths**

Intersection	Control Type	Exclusive Lane	Recommended Lane Length (m)
Highway 12 at Beamish Rd / Street C	Signalized	NB-L	30
		SB-L	45
		EB-L	30
		WB-R	30
King Street at Street A	Signalized	EB-L	60
Sumac Lane / Les Barber Boulevard / Street 'B' at Highway 12	Signalized	SB-L	30
		EB-L	30
		WB-R	30

## Highway 12 Capacity Analysis

The capacity of Highway 12 also was studied to determine if and when the Highway might need to be widened. Using the capacity calculations found in MTO's Geometric Design Manual, it was determined that Highway 12 would begin to approach capacity in the eastbound direction only in the weekday PM peak hour in 2030 upon full build out and occupancy of the Hanson development. Traffic volumes in the AM peak hour are not expected to approach capacity for any of the horizon years studied. With the growth of background traffic volumes, Highway 12 is forecast to approach capacity eastbound and westbound in the PM peak hour in the year 2035. By 2040, the Saturday westbound peak hour begins to approach capacity.

Widening of Highway 12 should be considered in 2035 and likely would be needed by 2040 if all of the assumptions in this report hold true.

## Internal Traffic Circulation

Public streets within the Hanson development are designed with "complete streets" in mind and will have a natural traffic calming effect. Public streets will include dedicated facilities for pedestrians, cyclists and vehicles. On-street parking is provided along select public streets. Traffic calming measures are not expected to be required on public streets, private roads or driveways within the development.

## Highway 12 Illumination

Illumination warrants were conducted for Highway 12 in the study area. While illumination will be provided at the Hanson Development intersections, continuous illumination is not warranted.

## Conclusions

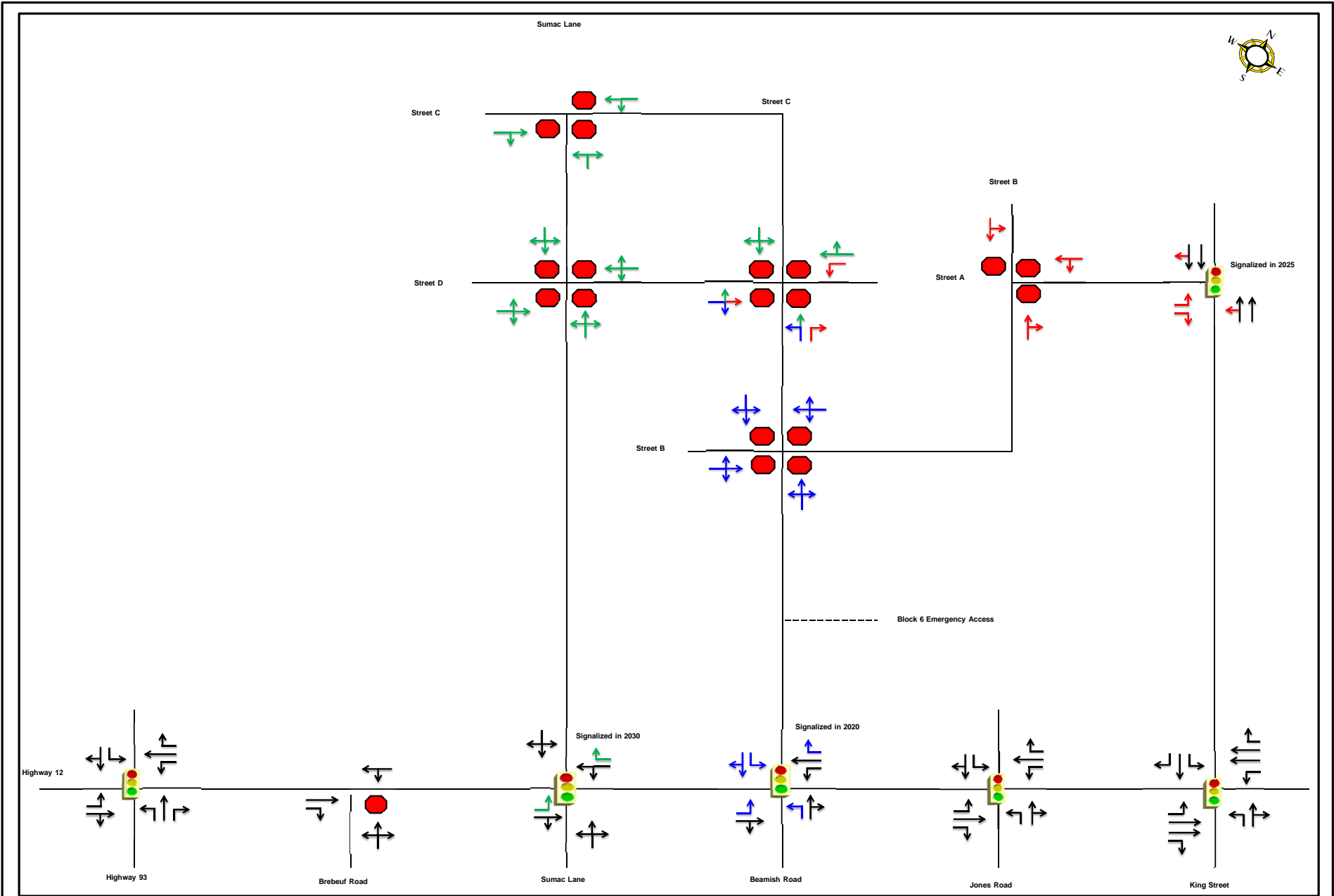
The recommended road improvements are listed in **Table 3** and shown diagrammatically on **Figure 1**.

These improvements would only be needed if construction of the Hanson development, the BIN Management site and background traffic volumes increase as assumed in this report. If the timing of development or the amount of development differs from what is assumed in this report, then the need for and timing of road improvements also could change.

**Table 3: Road Improvements Needed by Horizon Year and Development Scenario**

Intersections	2020		2025		2030		2035 / 2040	
	Background Traffic	Total Traffic	Background Traffic	Total Traffic	Background Traffic	Total Traffic	Background Traffic	Total Traffic
Highway 93 at Highway 12	--	--	--	--	--	--	--	--
Brebeuf Road at Highway 12	--	--	--	--	--	--	--	--
Sumac Lane / Les Barber Boulevard / Street 'B' at Highway 12	--	--	--	--	--	Signalize Exclusive EB-L, WB-R lanes	--	--
Beamish Road / Street 'C' at Highway 12	--	Signalize Exclusive NB-L, SB-L, EB-L, WB-R lanes	--	--	--	--	--	--
Jones Road at Highway 12	Exclusive WB-L lane	--	--	--	--	--	--	--
King Street at Highway 12	--	--	--	--	--	--	--	--
King Street at Street 'A'	--	--	--	Signalize Exclusive EB-L	--	--	--	--
Highway 12 Corridor	--	--	--	--	--	--	--	Consider Widening





- LEGEND**
- Existing Movements
  - Improved Movements in 2020
  - Improved Movements in 2025
  - Improved Movements in 2030
  - ⬡ Stop-Controlled Intersection
  - ⬡ Signalized Intersection

**FIGURE 1**  
Road Improvements by Horizon Year

## 1.0 INTRODUCTION

MMM Group has been working on the proposed Hanson Development in the Town of Midland for a number of years. This June 2016 Traffic Impact Study (TIS) updates a September 2015 TIS, in order to address comments received from the Ministry of Transportation (MTO) on November 20, 2015 (MTO comments are included in **Appendix A**). The TIS is based upon the requirements cited in MTO's General Guidelines for the Preparation of *Traffic Impact Studies* (September 2014).

The Hanson development plan is divided into 3 main phases, with sub-phases identified for Phase 1. **Figure 2** illustrates the site location and **Figure 3** shows a concept of the entire draft plan related to full build-out of the development. Blocks 1-6, 8, 18, 20-25, 27, 30-31, 33-35, 41, and 44-45 are considered to be Phase 1 for the purposes of this TIS. Blocks 7, 9-17, 19, 26, 28-29, 32, 35-40, 42-43, and 46-49 are considered to be Phases 2 and 3 for the purposes of this TIS.

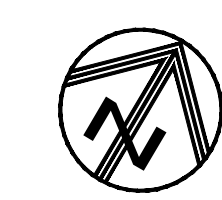
Transportation operations were assessed for the busiest traffic periods on the adjacent roads. These periods on weekdays were assumed to be between 7 AM and 10 AM and between 3 PM and 6 PM. On Saturdays, the busiest periods were assumed to be occurring between 12 noon and 5 PM.

The construction of the proposed development will be in phases (shown in Figure 3). For the purposes of this report, Phases 1A and 1B of the development are assumed to be constructed and fully occupied by the year 2020. All sub-phases of Phase 1 of the development are assumed to be constructed and fully occupied by the year 2025. Complete build out of the development, including Phases 1, 2 and 3, is assumed to be constructed and fully occupied by the year 2030. Following the MTO guidelines, the study has two additional horizon years, 2035 and 2040.

The assessment of intersections in terms of capacity and Level of Service (LOS) was performed using the Synchro 8 software. This assessment provides an indication of traffic operations based on calculation of volume-to-capacity ratios ( $v/c$ ) and expected vehicle delays for each movement at an intersection.

The report documents the expected traffic impacts of background traffic and the proposed development and provides conclusions and recommendations with respect to any improvements that may be required to mitigate potential impacts.





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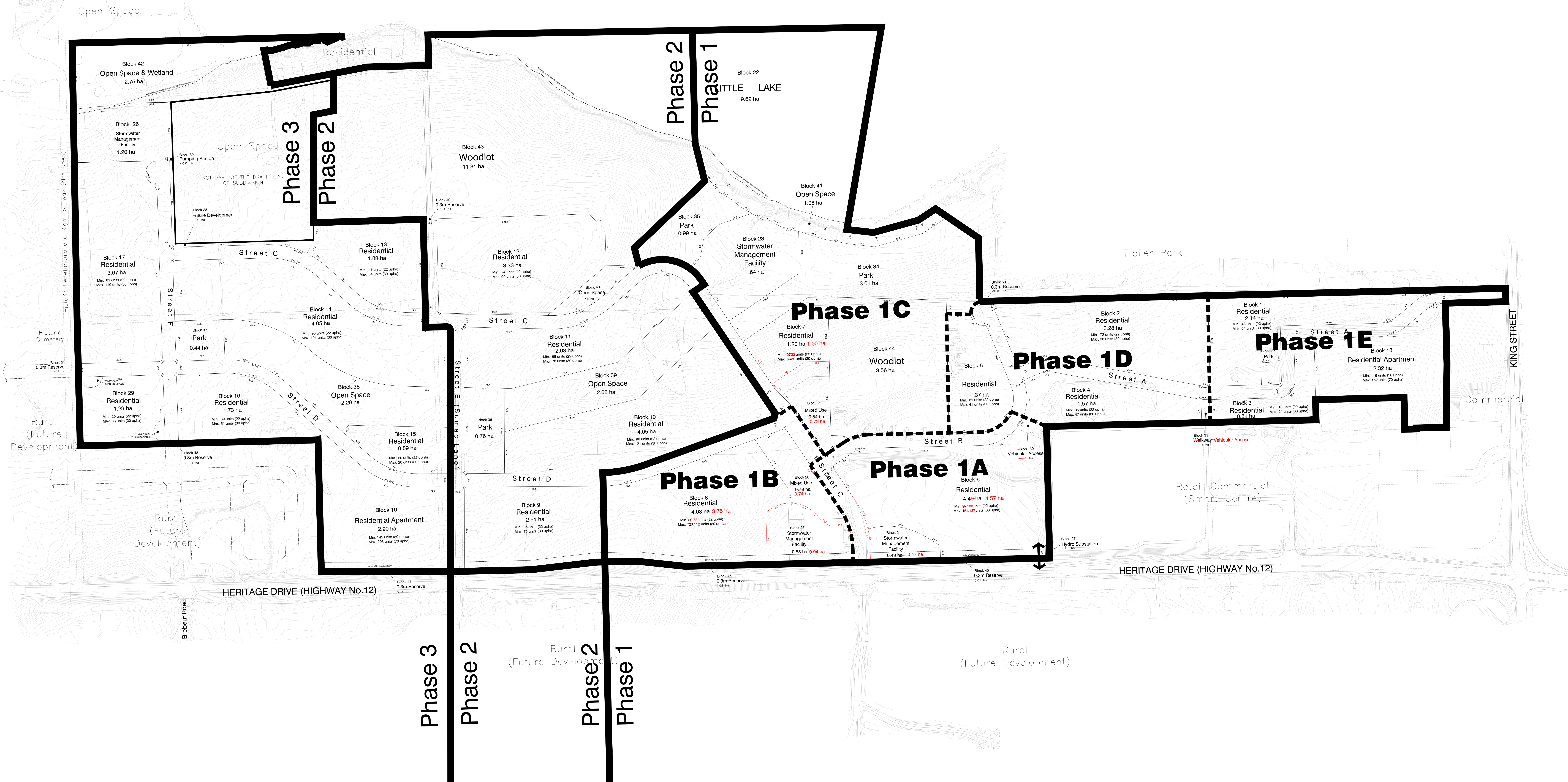


Figure 3: Traffic Impact Study Phasing Plan

43T-95021

June 1, 2016



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## 2.0 PROPOSED DEVELOPMENT

This chapter describes the land uses that make up the proposed development and the proposed access to the development from the existing road network. The traffic impact phasing plan showing the land uses and locations of Phases 1, 2 and 3 was shown on the previous page in Figure 3. As described in the Introduction, Blocks 1-6, 8, 18, 20-25, 27, 30-31, 33-35, 41, and 44-45 are included in Phase 1. Blocks 7, 9-17, 19, 26, 28-29, 32, 35-40, 42-43, and 46-49 are included in Phases 2 and 3. The land uses assigned to the various blocks of the development are indicated along with the land use description for Phases 1A and 1B (Section 2.1), Phase 1 in its entirety (Section 2.2) and Phases 2 and 3 (Section 2.3).

### 2.1 Phases 1A and 1B Land Uses

Phases 1A and 1B are expected to be constructed and fully occupied by the year 2020. These sub-phases of Phase 1 contain the following land uses:

- 254 residential units, comprised of:
  - 227 townhouses; and
  - 27 semi-detached residential units; and
- 1,918 m<sup>2</sup> (20,650 ft<sup>2</sup>) neighbourhood commercial space (Blocks 20 – 21).

### 2.2 Phase 1 Land Uses

Phase 1 in its entirety (sub-phases 1A, 1B, 1C, 1D and 1E) is expected to be constructed and fully occupied by the year 2025. The development proposal for Phase 1 includes the following land uses:

- 690 residential units, comprised of:
  - 162 apartments (Block 18);
  - 431 townhouses (Blocks 1 – 5, 8) ; and
  - 97 single family residential units (indicated by symbols: circle, square or triangle depending on lot size); and
- 3,300 m<sup>2</sup> (35,000 ft<sup>2</sup>) neighbourhood commercial space (Blocks 20 – 21).

## **2.2 Phases 2 and 3 Land Uses**

Phases 2 and 3 are expected to be constructed and fully occupied by the year 2030. The development proposal for Phases 2 and 3 includes the following land uses:

- 1,013 residential units, comprised of:
  - 199 apartments (Block 18);
  - 475 townhouses (Blocks 7, 9 – 12); and
  - 339 single family residential units.

The amount of development proposed for Phases 1, 2 and 3 is the maximum number of units that will be constructed. The maximum number of units was analyzed to consider a worst case scenario from the traffic perspective. The actual number of units constructed could be less.

## **2.3 Site Access**

Two access points to the subject site have been proposed from the adjacent roadways for Phase 1, with an additional access point introduced with Phase 2. For Phase 1, the main access point will be Street “C” on Highway 12. This street will align with the existing Beamish Road to the south and would be constructed as part of Phases 1A and 1B. A secondary access point is provided at Street “A” on King Street. The secondary access would be constructed as part of the full build out of Phase 1.

With the construction of Phases 2 and 3, a third access point would be added on Street “E” on Highway 12. Street “E” would incorporate Sumac Lane and would align with the existing Les Barber Boulevard to the south.

### **2.3.1 Connection to SmartCentres**

Vehicle access to the SmartCentres commercial block is through the signalized intersection of Jones Road and Highway 12. No internal connection between the Hanson development and the commercial block currently exists.

The master concept plan for the Hanson development includes the provision of a vehicle connection from the Hanson development to the SmartCentres site along the northern edge of the SmartCentres site. This vehicle connection is envisioned to be for emergency vehicle use only and would not be used regularly for everyday traffic.

The connection to the SmartCentres commercial block also could be used by pedestrians and cyclists and would provide an opportunity for active modes of transportation between the Hanson development and the shopping centre.

### 3.0 EXISTING CONDITIONS

This section describes the existing road network and existing traffic conditions at the intersections in the study area.

#### 3.1 Road Network

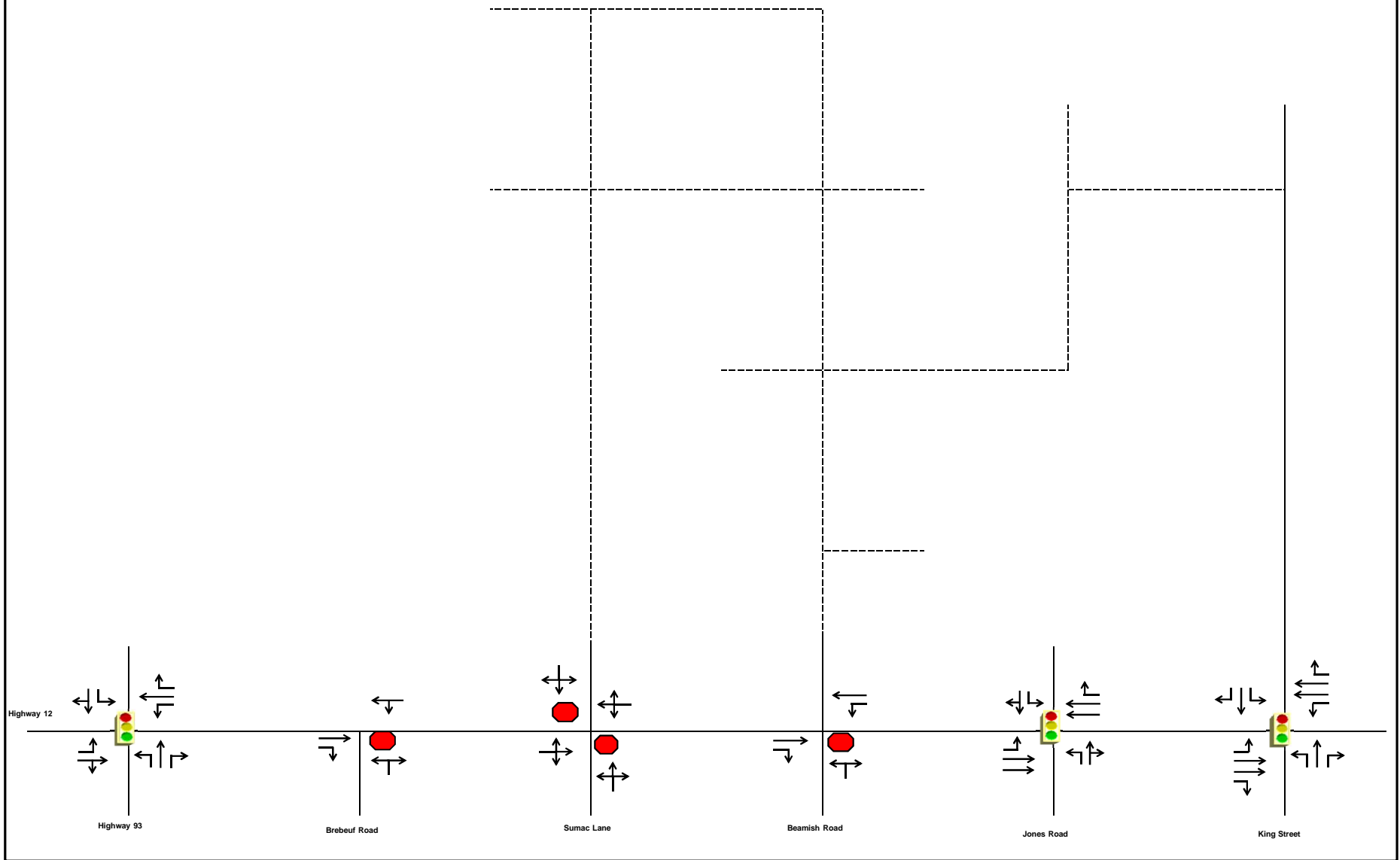
Highway 12 is a provincial highway under the jurisdiction of the Ontario Ministry of the Transportation (MTO). In the vicinity of the subject site, it is referred to as Heritage Drive and it functions as a special controlled access highway. Exclusive turn lanes are provided at the intersections with King Street, Jones Road and Highway 93. In the vicinity of the subject site, the posted speed westbound is 80 kilometres per hour (kph), while the eastbound posted speed limit reduces from 80kph to 60kph while approaching King Street. Just east of the Street C driveway, Highway 12 widens to two through lanes in each direction, with allowance for a two-way centre left turn lane and additional right turning lanes.

Highway 93 is a two-lane road under the jurisdiction of the County of Simcoe to the north of Highway 12 and under the jurisdiction of MTO to the south of Highway 12. Exclusive and channelized turn lanes are provided at the intersection with Highway 12. The posted speed limit is 80 kph both north and south of Highway 12 except in the immediate vicinity of Highway 12, where the speed limit reduces to 60kph.

King Street is a four lane arterial road under the jurisdiction of the Town of Midland. The posted speed north and south of Highway 12 is 50 kph. **Figure 4** illustrates the existing lane configurations in the vicinity of the subject site.

The study area includes the following six existing intersections:

- Highway 93 at Highway 12 (Heritage Drive): signalized;
- Highway 12 at Brebeuf Road (three legged): unsignalized;
- Highway 12 at Les Barber Boulevard / Sumac Lane: unsignalized;
- Highway 12 at Beamish Road (three legged): unsignalized;
- Highway 12 at Jones Road: signalized; and
- Highway 12 at King Street: signalized.



**LEGEND**

- Movements
- Improved Movements

- Stop-Controlled Intersection
- 🚦 Signalized Intersection

**Figure 4**  
Existing Lane Configurations



### 3.2 Data Collection

Traffic turning movement counts were received from MTO for the AM and PM weekday peak hours at the following locations:

- Highway 93 at Highway 12;
- Beamish Road at Highway 12;
- Jones Road at Highway 12; and
- King Street at Highway 12.

These counts were supplemented by turning movement counts collected in January 2016 at the intersections of:

- Brebeuf Road at Highway 12; and
- Les Barber Boulevard at Highway 12.

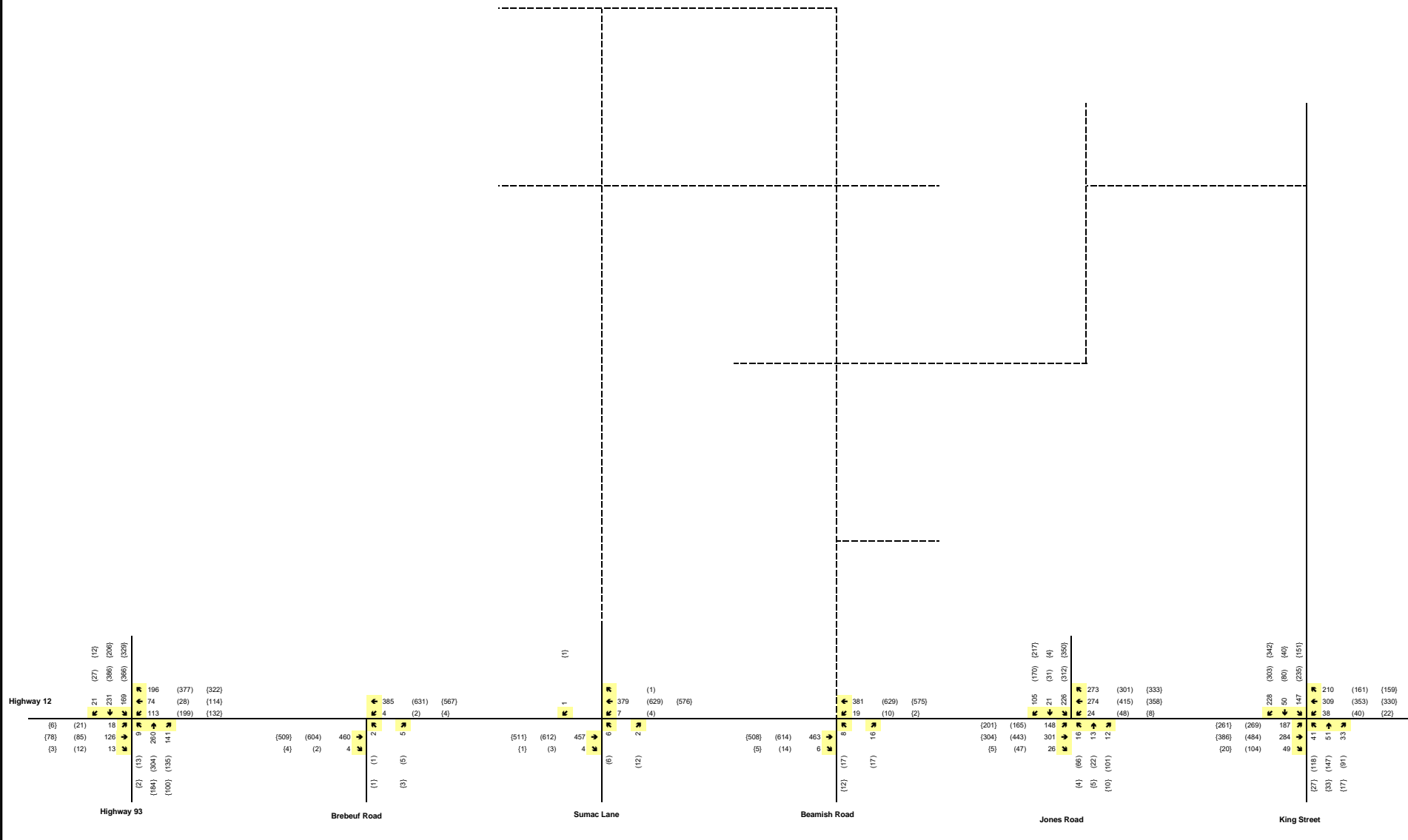
Additionally, Saturday traffic counts were collected on January 23, 2016 for all six existing intersections in the study area.

The data provided by the MTO was from 2013 and 2015. A growth rate of 1.25% was applied to all movements, except those entering/exiting the SmartCentres development and BIN management site on Jones Road, to bring all data to the 2016 Existing Year. The SmartCentres site is considered fully built out. The BIN Management site traffic is discussed in further detail in section 5.2. Through traffic volumes were then balanced. Signal timing sheets were obtained from the MTO for the three signalized intersections in the study area. All turning movement counts and signal timing sheets can be found in **Appendix B**. Upon review of the traffic count volumes, the peak hours were found to occur as shown in **Table 4**.

**Table 4: Intersection Peak Demand Hours**

<b>Intersection</b>	<b>Weekday AM</b>	<b>Weekday PM</b>	<b>Saturday</b>
Highway 93 at Highway 12	7:30 to 8:30	16:00 to 17:00	14:45 to 15:45
Highway 12 at Brebeuf Road	7:45 to 8:45	15:45 to 16:45	12:45 to 13:45
Highway 12 at Les Barber Boulevard	7:45 to 8:45	15:45 to 16:45	12:45 to 13:45
Highway 12 at Beamish Road	8:15 to 9:15	16:00 to 17:00	12:45 to 13:45
Highway 12 at Jones Road	9:00 to 10:00	16:15 to 17:15	13:00 to 14:00
Highway 12 at King Street	9:00 to 10:00	16:15 to 17:15	12:30 to 13:30

The weekday AM, PM and Saturday peak hour existing traffic volumes are shown in **Figure 5**.



**LEGEND**

- xx AM Peak Hour Volumes
- (xx) PM Peak Hour Volumes
- {xx} Saturday Peak Hour Volumes

**FIGURE 5**  
Existing Traffic Volumes



### 3.3 Existing Traffic Operations

Traffic operations were analyzed to determine the existing Level of Service (LOS) during the AM and PM peak hours on a weekday and the Saturday peak hour at each of the intersections in the study area.

The results of the intersection LOS calculations and delays for existing traffic conditions are summarized in **Table 5**. LOS 'A' through 'D' represents satisfactory traffic operations. LOS 'E' and 'F' represent congested traffic operations. The LOS definitions are presented in **Appendix C**. Detailed intersection capacity analysis calculations for existing traffic conditions are included in **Appendix D**.

**Table 5: Level of Service Analysis for Existing Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (15)	--	B (15)	--	B (13)	--
Brebeuf Road at Highway 12	Unsignalized	B (13)	--	C (15)	--	B (15)	--
Sumac Lane / Les Barber Boulevard at Highway 12	Unsignalized	C (22)	--	C (23)	--	B (13)	--
Beamish Road at Highway 12	Unsignalized	B (15)	--	D (25)	--	C (25)	--
Jones Road at Highway 12	Signalized <sup>3</sup>	B (14)	--	B (16)	--	B (15)	--
King Street at Highway 12	Signalized	B (13)	--	B (16)	--	B (13)	--

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. SB-LTR = southbound left-through-right  
3. Splits optimized

Analysis of the data presented in Table 5 indicates that all of the intersections currently operate at acceptable levels of service during the three peak hours.

## 4.0 TRAFFIC RELATED TO THE PROPOSED DEVELOPMENT

### 4.1 Trip Generation

The Institute of Transportation Engineers' *Trip Generation* (9<sup>th</sup> Edition) was consulted to determine the most appropriate trip rates for the Hanson development proposed land uses. The trip generation considers the maximum number of residential units that will be constructed. The maximum number of residential units was analyzed to consider a worst case scenario from the traffic perspective. The actual number of residential units constructed could be less.

Multi-use share factors were incorporated into the trip generation calculations, which were different for each phase. The multi-use factor is calculated based on the National Cooperative Highway Research Program (NCHRP) Project 8-51: Enhancing Internal Trip Capture Estimation for Mixed-Use Developments and percentages cited in the August 2010 ITE Journal. The methodology calculates the multi-use reduction percentage based on a number of factors including; the initial trip generation of all uses, the number of different uses in a development and their proximity to each other.

The commercial development, included in the Hanson development is designed for the Hanson development residents but is open to the general public. With this design intent and likely retail establishments, it can be expected that a portion of the trips generated from these facilities will be captured by residents who walk or cycle from their home, in the Hanson development.

The trips assumed to be internal capture are shown for the AM, PM and Saturday peak hours for Phases 1A and 1B, all of Phase 1 and full built out (Phases 1, 2, 3) in **Table 6**.

**Table 6: Trips Reduced Due to Multi-use Share Factors**

Phase	AM Peak		PM Peak		Sat Peak	
	Residential	Retail	Residential	Retail	Residential	Retail
Phases 1A and 1B	0 (1)	1 (0)	24 (7)	7 (24)	10 (8)	8 (11)
Phase 1	1 (3)	3 (1)	35 (10)	10 (35)	18 (12)	11 (15)
Full Build Out	4 (5)	6 (3)	26 (8)	9 (31)	13 (9)	11 (15)

Note: Inbound Trips - XX    Outbound Trips - (XX)

#### 4.1.1 Phase 1A and 1B Trip Generation

The ITE classifications used to determine the trip generation of the land uses in Phases 1A and 1B included:

- Single Family Residential (Category 210);
- Apartments (Category 220);
- Residential Townhouse/Condominium (Category 230); and
- Shopping Centre (Category 820).

The trip generation for these two sub-phases is shown in **Table 7**.

#### 4.1.2 Phase 1 Trip Generation

The total development of Phase 1 (Phases 1A, 1B, 1C, 1D, 1E) included the same land uses as Phases 1A and 1B, with the number of units increasing. The Phase 1 trip generation is shown in **Table 8**.

#### 4.1.3 Phases 2 and 3 Trip Generation

ITE classifications used to determine the Phases 2 and 3 land use trip generation included:

- Single Family Residential Use (Category 210);
- Apartments (Category 220); and
- Residential Townhouse/Condominium Use (Category 230).

Combining trip generation for Phases full build out (Phases 1, 2 and 3) resulted in the total development trip generation, summarized in **Table 9** for the AM, PM and Saturday peak hours.

**Table 7: Phases 1A and 1B Trip Generation**

Unit Type		Residential Condominium / Townhouses	Single-Family Detached Housing	Shopping Centre	Apartment	
<b>ITE Land Use Category</b>		Townhouses (230)	Semi-Detached (210)	General Retail (820)	Apartments (220)	
<b>Rate Uses</b>	<b>AM</b>	Eq.	Eq.	Eq.	Eq.	
	<b>PM</b>	Eq.	Eq.	Eq.	Eq.	
	<b>SAT</b>	Eq.	Eq.	Eq.	Eq.	
<b>Average Trip Rates</b>	<b>AM</b>	0.44	0.75	0.96	0.51	
	<b>PM</b>	0.52	1.00	3.71	0.62	
	<b>SAT</b>	0.47	0.93	4.82	0.52	
<b>Equation</b>	<b>AM</b>	$\ln T = 0.8 \ln X + 0.26$	$T = 0.7 X + 9.74$	$\ln T = 0.61 \ln X + 2.24$	$T = 0.49 X + 3.73$	
	<b>PM</b>	$\ln T = 0.82 \ln X + 0.32$	$\ln T = 0.9 \ln X + 0.51$	$\ln T = 0.67 \ln X + 3.31$	$T = 0.55 X + 17.65$	
	<b>SAT</b>	$T = 0.29 X + 42.63$	$T = 0.89 X + 8.77$	$\ln T = 0.65 \ln X + 3.78$	$T = 0.41 X + 19.23$	
<b>Variable</b>		Units	Units	Square Feet	Units	
<b>Count</b>		227	27	20,650	0	
<b>Inbound (Outbound) Splits</b>	<b>AM</b>	17% (83%)	25% (75%)	62% (38%)	20% (80%)	
	<b>PM</b>	67% (33%)	63% (37%)	48% (52%)	65% (35)	
	<b>SAT</b>	54% (46%)	54% (46%)	52% (48%)	54% (46%)	
<b>Initial Site- Generated Traffic Volumes</b>	<b>AM</b>	17 (83)	7 (21)	37 (23)	0 (0)	
	<b>PM</b>	79 (39)	20 (12)	100 (108)	0 (0)	
	<b>SAT</b>	59 (50)	18 (15)	163 (151)	0 (0)	
<b>Multi-Use Share</b>	<b>AM</b>	<b>%</b>	2% (1%)	2% (1%)	3% (2%)	--
		<b>Trips</b>	0 (1)	0 (0)	1 (0)	0 (0)
	<b>PM</b>	<b>%</b>	25% (14%)	25% (14%)	7% (23%)	--
		<b>Trips</b>	19 (5)	5 (2)	7 (24)	0 (0)
	<b>SAT</b>	<b>%</b>	14% (13%)	14% (13%)	5% (7%)	--
		<b>Trips</b>	8 (6)	2 (2)	8 (11)	0 (0)
<b>Net Site – Generated Traffic Volumes</b>	<b>AM</b>	17 (82)	7 (21)	37 (23)	0 (0)	
	<b>PM</b>	59 (34)	20 (12)	100 (108)	0 (0)	
	<b>SAT</b>	50 (44)	18 (15)	163 (151)	0 (0)	

Note: Minor differences in summation of trips may occur due to rounding.

**Table 8: Trip Generation for Phase 1**

Unit Type		Residential Condominium / Townhouses	Single-Family Detached Housing	Shopping Centre	Apartment	
<b>ITE Land Use Category</b>		Townhouses (230)	Semi-Detached (210)	General Retail (820)	Apartments (220)	
<b>Rate Uses</b>	<b>AM</b>	Eq.	Eq.	Eq.	Eq.	
	<b>PM</b>	Eq.	Eq.	Eq.	Eq.	
	<b>SAT</b>	Eq.	Eq.	Eq.	Eq.	
<b>Average Trip Rates</b>	<b>AM</b>	0.44	0.75	0.96	0.51	
	<b>PM</b>	0.52	1.00	3.71	0.62	
	<b>SAT</b>	0.47	0.93	4.82	0.52	
<b>Equation</b>	<b>AM</b>	$\text{Ln } T = 0.8 \text{ Ln } X + 0.26$	$T = 0.7 X + 9.74$	$\text{Ln } T = 0.61 \text{ Ln } X + 2.24$	$T = 0.49 X + 3.73$	
	<b>PM</b>	$\text{Ln } T = 0.82 \text{ Ln } X + 0.32$	$\text{Ln } T = 0.9 \text{ Ln } X + 0.51$	$\text{Ln } T = 0.67 \text{ Ln } X + 3.31$	$T = 0.55 X + 17.65$	
	<b>SAT</b>	$T = 0.29 X + 42.63$	$T = 0.89 X + 8.77$	$\text{Ln } T = 0.65 \text{ Ln } X + 3.78$	$T = 0.41 X + 19.23$	
<b>Variable</b>		Units	Units	Square Feet	Units	
<b>Count</b>		431	97	35,000	162	
<b>Inbound (Outbound) Splits</b>	<b>AM</b>	17% (83%)	25% (75%)	62% (38%)	20% (80%)	
	<b>PM</b>	67% (33%)	63% (37%)	48% (52%)	65% (35)	
	<b>SAT</b>	54% (46%)	54% (46%)	52% (48%)	54% (46%)	
<b>Initial Site- Generated Traffic Volumes</b>	<b>AM</b>	28 (138)	19 (58)	51 (31)	17 (66)	
	<b>PM</b>	133 (66)	64 (38)	142 (154)	69 (37)	
	<b>SAT</b>	91 (77)	51 (44)	230 (212)	46 (39)	
<b>Multi-Use Share</b>	<b>AM</b>	<b>%</b>	2% (1%)	2% (1%)	5% (4%)	2% (1%)
		<b>Trips</b>	1 (1)	0 (1)	3 (1)	0 (1)
	<b>PM</b>	<b>%</b>	13% (7%)	13% (7%)	7% (23%)	13% (7%)
		<b>Trips</b>	17 (5)	8 (3)	10 (35)	9 (3)
	<b>SAT</b>	<b>%</b>	8% (7%)	8% (7%)	5% (7%)	8% (7%)
<b>Trips</b>	7 (6)	4 (3)	11 (15)	7 (3)		
<b>Net Site – Generated Traffic Volumes</b>	<b>AM</b>	28 (137)	19 (58)	48 (30)	16 (66)	
	<b>PM</b>	116 (61)	56 (35)	132 (119)	60 (35)	
	<b>SAT</b>	83 (72)	47 (41)	218 (197)	43 (3)	

Note: Minor differences in summation of trips may occur due to rounding.

**Table 9: Trip Generation for Full Build Out**

Unit Type		Residential Condominium / Townhouses	Single-Family Detached Housing	Shopping Centre	Apartment	
<b>ITE Land Use Category</b>		Townhouses (230)	Semi-Detached (210)	General Retail (820)	Apartments (220)	
<b>Rate Uses</b>	<b>AM</b>	Eq.	Eq.	Eq.	Eq.	
	<b>PM</b>	Eq.	Eq.	Eq.	Eq.	
	<b>SAT</b>	Eq.	Eq.	Eq.	Eq.	
<b>Average Trip Rates</b>	<b>AM</b>	0.44	0.75	0.96	0.51	
	<b>PM</b>	0.52	1.00	3.71	0.62	
	<b>SAT</b>	0.47	0.93	4.82	0.52	
<b>Equation</b>	<b>AM</b>	$\ln T = 0.8 \ln X + 0.26$	$T = 0.7 X + 9.74$	$\ln T = 0.61 \ln X + 2.24$	$T = 0.49 X + 3.73$	
	<b>PM</b>	$\ln T = 0.82 \ln X + 0.32$	$\ln T = 0.9 \ln X + 0.51$	$\ln T = 0.67 \ln X + 3.31$	$T = 0.55 X + 17.65$	
	<b>SAT</b>	$T = 0.29 X + 42.63$	$T = 0.89 X + 8.77$	$\ln T = 0.65 \ln X + 3.78$	$T = 0.41 X + 19.23$	
<b>Variable</b>		Units	Units	Square Feet	Units	
<b>Count</b>		906	436	35,000	361	
<b>Inbound (Outbound) Splits</b>	<b>AM</b>	17% (83%)	25% (75%)	62% (38%)	20% (80%)	
	<b>PM</b>	67% (33%)	63% (37%)	48% (52%)	65% (35)	
	<b>SAT</b>	54% (46%)	54% (46%)	52% (48%)	54% (46%)	
<b>Initial Site- Generated Traffic Volumes</b>	<b>AM</b>	51 (250)	79 (236)	51 (31)	36 (144)	
	<b>PM</b>	245 (121)	249 (146)	142 (154)	141 (76)	
	<b>SAT</b>	165 (140)	214 (183)	230 (212)	90 (77)	
<b>Multi-Use Share</b>	<b>AM</b>	<b>%</b>	2% (1%)	2% (1%)	12% (11%)	2% (1%)
		<b>Trips</b>	1 (2)	2 (2)	6 (3)	1 (1)
	<b>PM</b>	<b>%</b>	5% (3%)	5% (3%)	6% (20%)	5% (3%)
		<b>Trips</b>	7 (2)	12 (4)	9 (31)	7 (2)
	<b>SAT</b>	<b>%</b>	3% (3%)	3% (3%)	5% (7%)	3% (3%)
<b>Trips</b>	3 (2)	7 (5)	11 (15)	3 (2)		
<b>Net Site – Generated Traffic Volumes</b>	<b>AM</b>	50 (247)	77 (234)	45 (28)	35 (143)	
	<b>PM</b>	233 (118)	233 (118)	134 (123)	134 (74)	
	<b>SAT</b>	160 (136)	160 (136)	218 (197)	87 (75)	

Note: Minor differences in summation of trips may occur due to rounding.

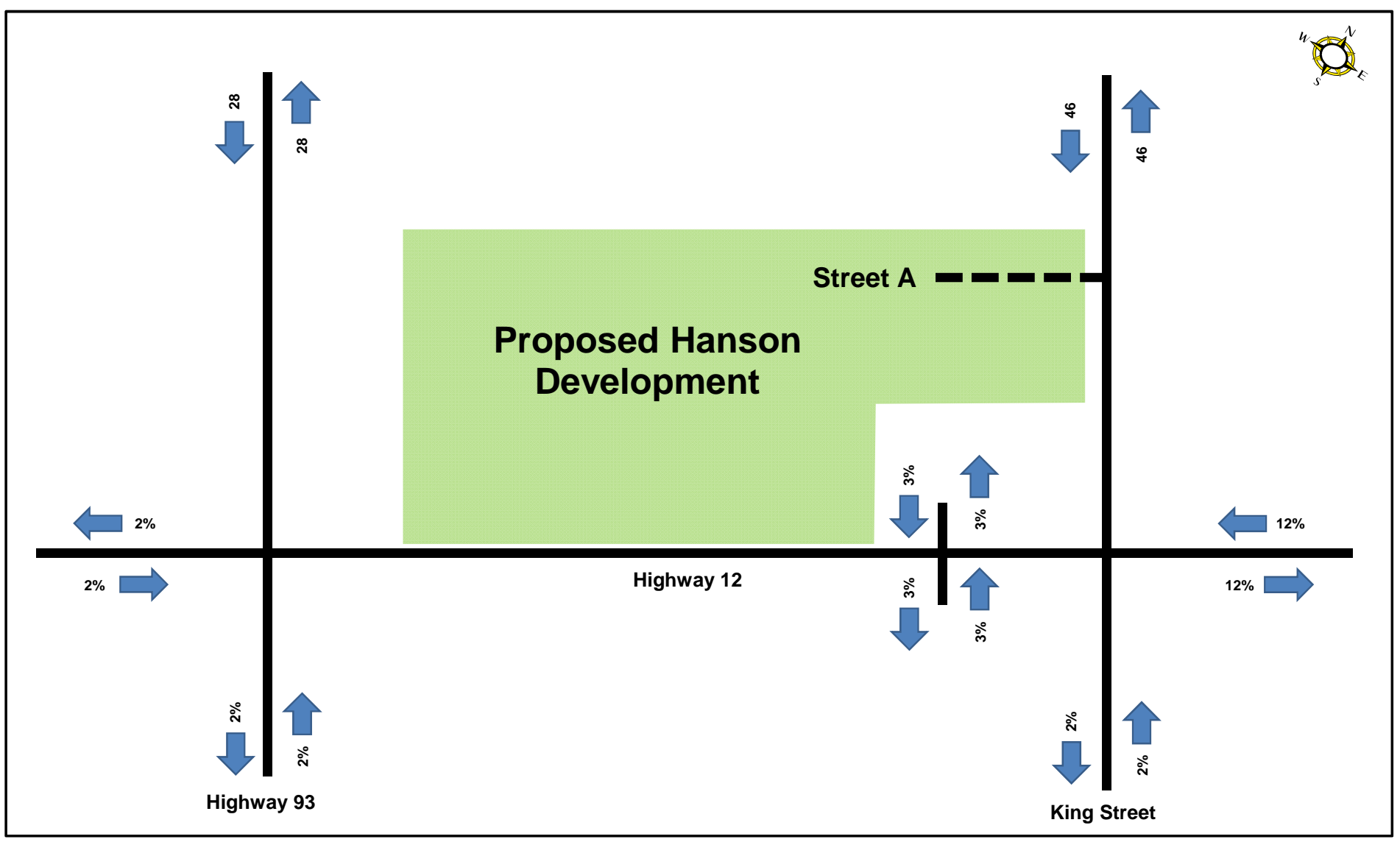


## 4.2 Trip Distribution

The trip distribution has been prepared recognizing that the different land uses serve different populations and could have different trip distributions. The anticipated trip distribution for residential and retail trips is shown in **Figure 6** and **Figure 7**. The trip distribution has been revised from previous versions of the TIS to better balance trips between the three site access points. Trips have been distributed to right and left turn inbound and outbound movements at all three site access points. Adjustments have also been made to the retail trip distribution. It has been assumed that 50% of retail trips will remain on site while the other 50% was distributed on the surround road network.

## 4.3 Trip Assignment

Vehicle trips were assigned to the road network. Phases 1A and 1B and Phase 1 (all sub-phases) are shown in **Figure 8** and **Figure 9** respectively. The trip assignment for the full Hanson development (Phases 1, 2 and 3) is shown in **Figure 10**.



**LEGEND**

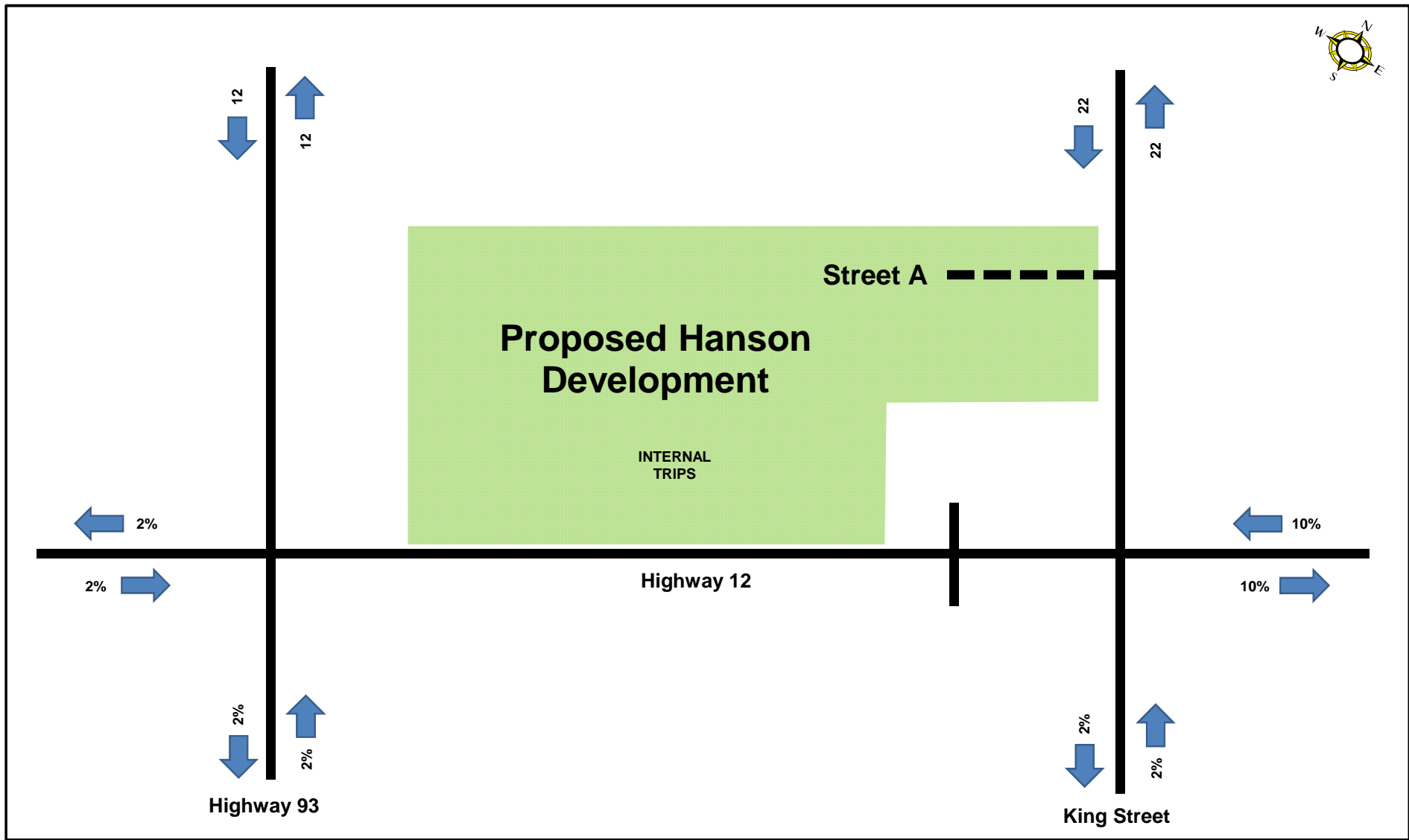


Direction of Travel

###% Traffic Distribution



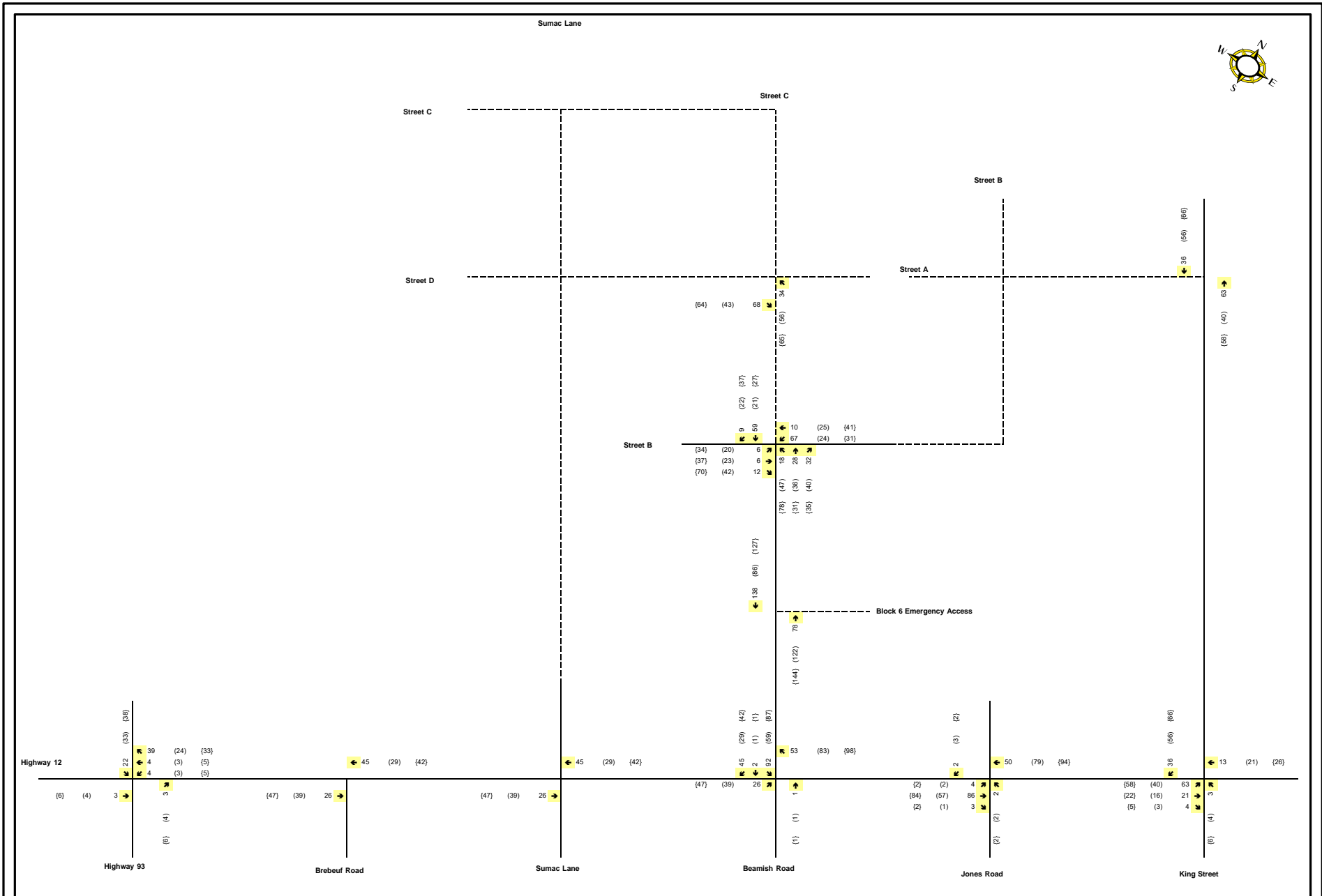
**FIGURE 6**  
Residential Trip Distribution



**LEGEND**

 Direction of Travel      ##% Traffic Distribution

**FIGURE 7**  
Retail Trip Distribution

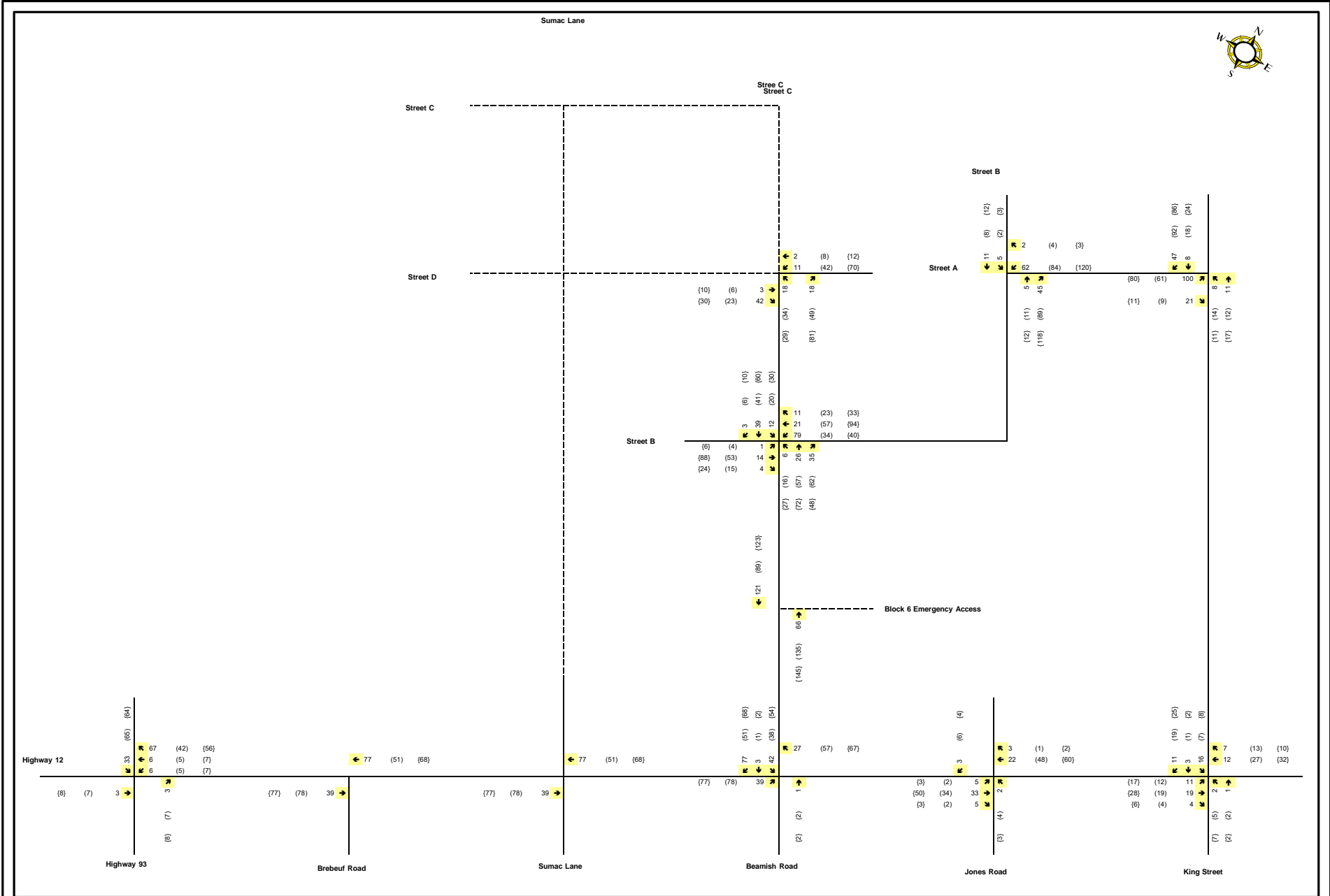


**LEGEND**

- XX AM Peak Hour Volumes
- (XX) PM Peak Hour Volumes
- [XX] Saturday Peak Hour Volumes

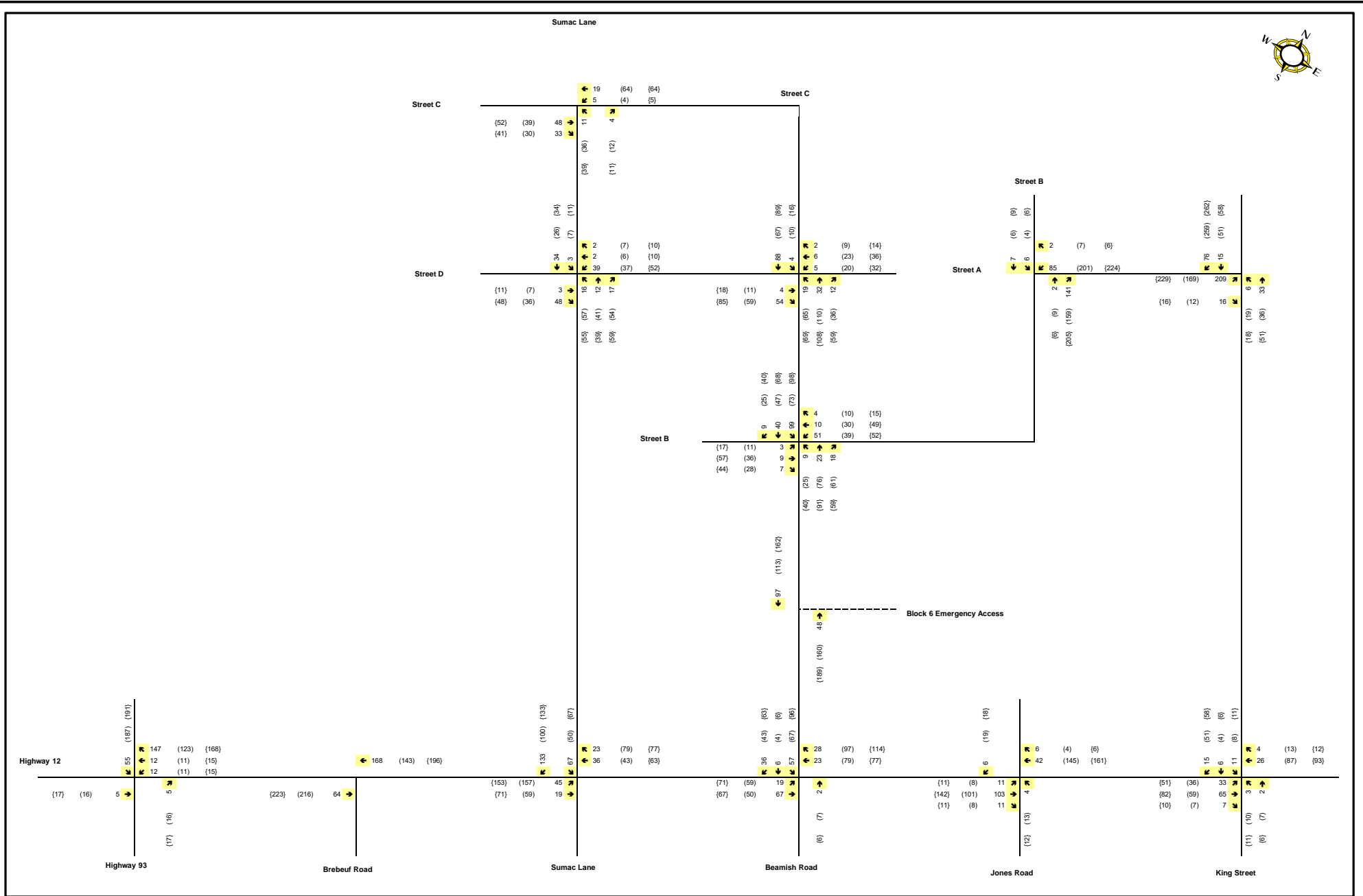
**FIGURE 8**

Trip Assignment for Phases 1 A & B



**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 (XX) Saturday Peak Hour Volumes

**FIGURE 9**  
 Trip Assignment for Phase 1



**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 {XX} Saturday Peak Hour Volumes

**FIGURE 10**  
 Trip Assignment for Phases 1, 2 and 3

## 5.0 FUTURE BACKGROUND CONDITIONS

Background traffic accounts for traffic growth in the study area that is not related to the Hanson development. The construction of the proposed development is assumed to be completed and fully occupied by the year 2020 for Phases 1A and 1B, 2025 for Phase 1 and 2030 for full build out (Phases 1, 2 and 3). Traffic conditions were analyzed for these horizon years without the Hanson development, in addition to two future horizon years, 2035 and 2040.

### 5.1 Background Traffic Growth

Historical two-way traffic data for Highway 12 and Highway 93 in the vicinity of the Hanson development were reviewed with MTO. In agreement with MTO and the Town of Midland, east-west directional movements and north-south directional movements all are projected to increase by 1.25 percent per year. This growth is assumed to include traffic growth related to any other developments in the vicinity of the study area.

Traffic volumes associated with the SmartCentres development on Jones Road were not adjusted as this development is constructed and fully occupied. Traffic volumes associated with the BIN Management development are addressed in section 5.2.

### 5.2 Background Development

The BIN Management development on Jones Road on the southern side of Highway 12 is approximately 60% constructed. The Traffic Impact Study prepared for the BIN Management site was obtained and the development-related trips were added to the analysis. The trip assignment of BIN Management trips is provided in **Appendix E**. No other proposed developments are known that would contribute to traffic volumes in this study area.

## 6.0 INTERSECTION ANALYSIS OF FUTURE TRAFFIC CONDITIONS IN HORIZON YEARS 2020, 2025, 2030, 2035 and 2040

This chapter presents the intersection analysis of future traffic conditions in five horizon years:

- 2020 – upon construction and full occupancy of the Phases 1A and 1B of the development;
- 2025 – upon construction and full occupancy of all of Phase 1;
- 2030 – upon construction and full occupancy of all Phases (1, 2 and 3);
- 2035 – the 5-year horizon (including full build out (Phases 1, 2 and 3) of the Hanson development); and
- 2040 – the 10-year horizon (including full build out of the Hanson development).

For each of these five horizon years, analysis has been undertaken for background traffic conditions and for total traffic conditions, which includes the Hanson development. All background development analyses exclude all Hanson-related traffic. For all scenarios, traffic conditions have been analyzed for the weekday AM and PM peak hours and the Saturday peak hour, using a peak hour factor of 1.

### 6.1 Horizon Year 2020 – Background Traffic Conditions

Traffic operations for the 2020 background conditions were analyzed to determine the expected Level of Service (LOS) during the three peak periods. In conjunction with the recommendations made in the Highway 12 Commercial Development TIS (dated January 2012), a southbound left turn advanced green arrow and an exclusive westbound left turn lane were added to the Synchro model during the analysis of the intersection of Jones Road at Highway 12.

The results of the intersection capacity analysis are shown in **Table 10**. The signalized intersections use optimized signal timing plans that are different than those used in the existing conditions analysis (Section 3.3). Detailed intersection capacity analysis sheets are included in **Appendix F** and 2020 background traffic volumes across the study area are shown in **Figure 11**. Traffic volumes used for the Highway 12 Commercial Development (BIN Management site) are shown in **Figure 12**.

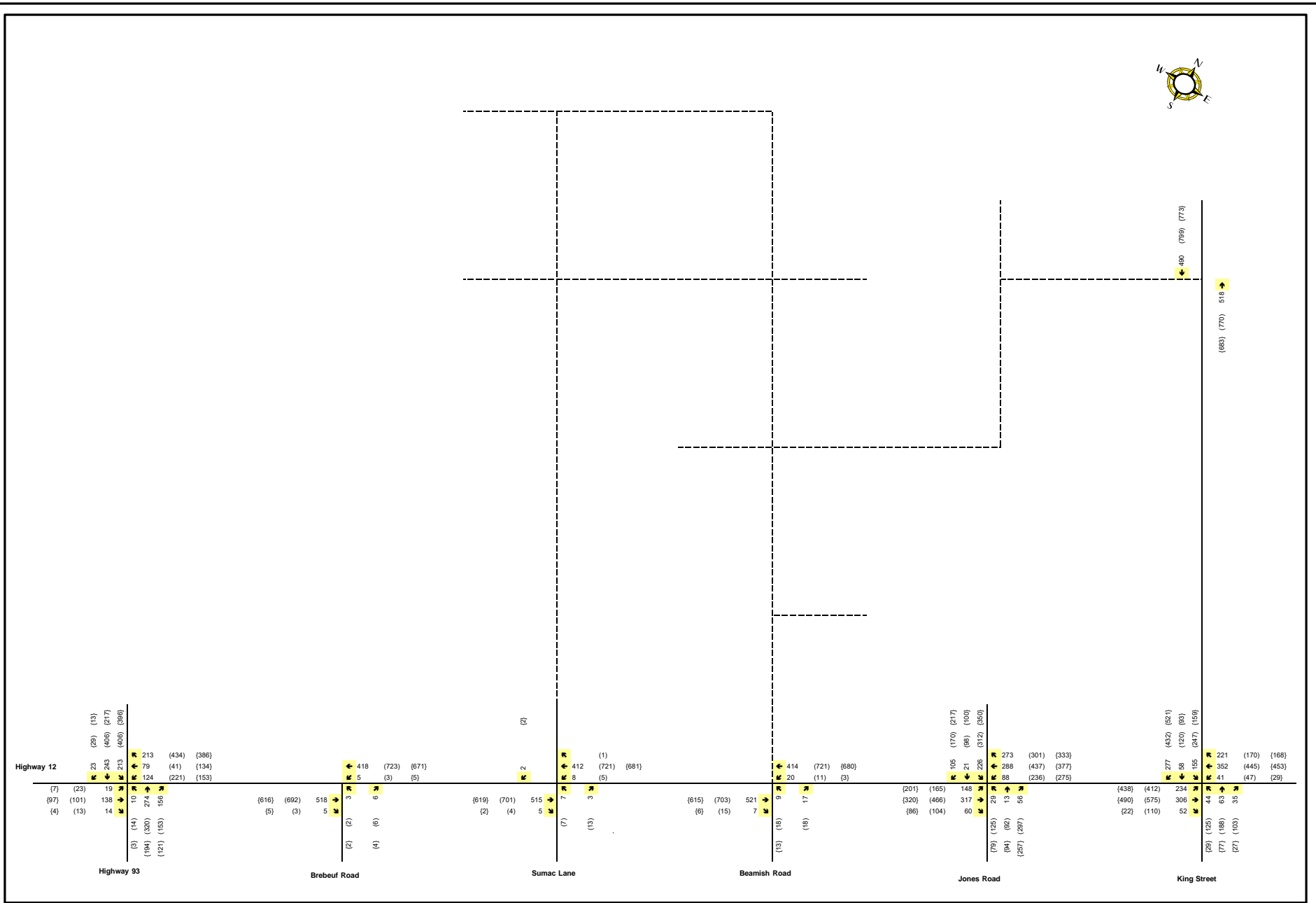


**Table 10: Intersection Capacity Analysis – 2020 Background Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (17)	--	B (14)	--	B (14)	--
Brebeuf Road at Highway 12	Unsignalized	B (14)	--	C (17)	--	C (18)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	C (22)	--	D (25)	--	B (14)	--
Beamish Road at Highway 12	Unsignalized	C (15)	--	D (27)	--	D (32)	--
Jones Road at Highway 12	Signalized	B (15)	--	C (23)	--	C (22)	--
King Street at Highway 12	Signalized	B (15)	--	B (18)	--	B (17)	--

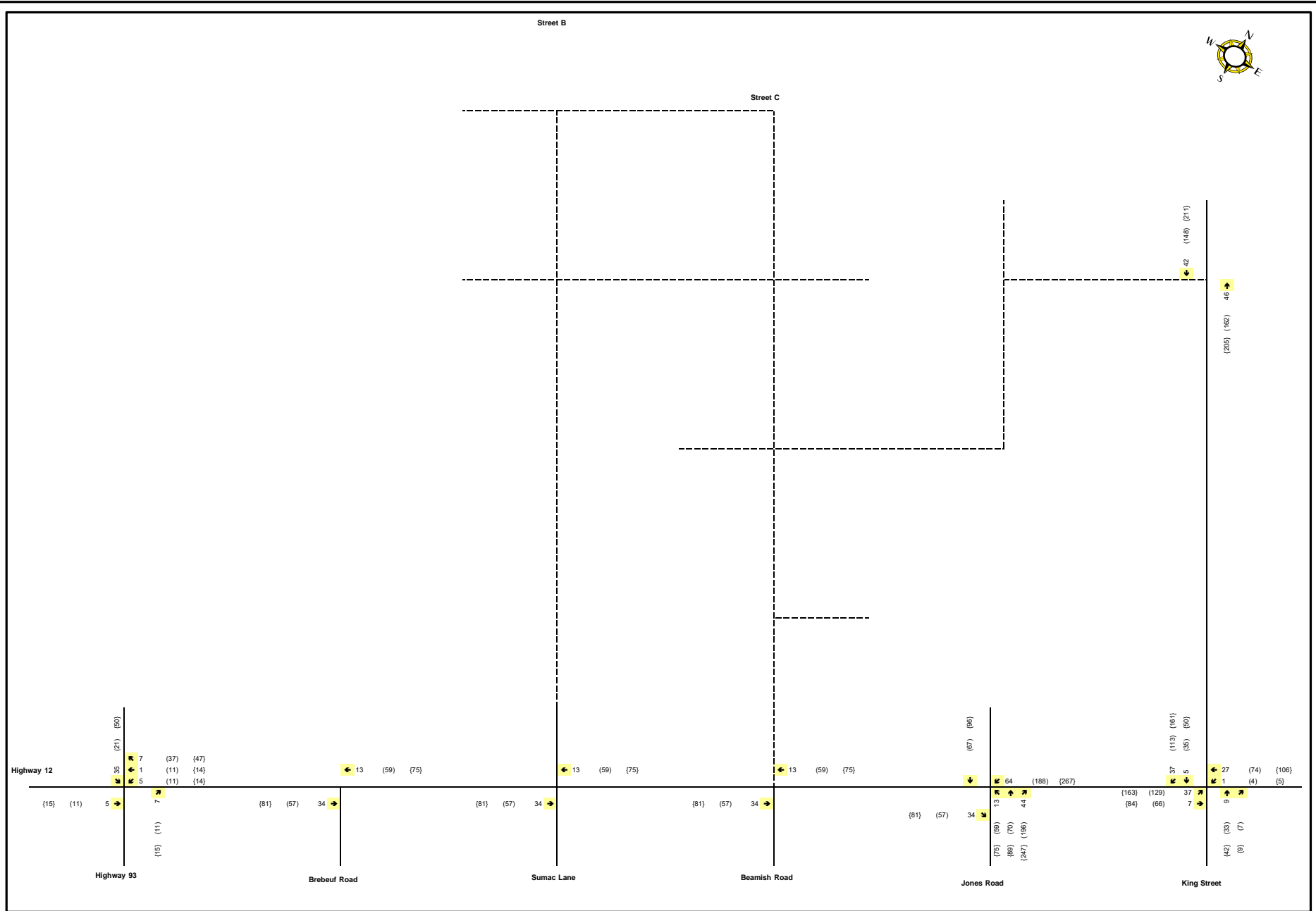
- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection.

The analysis shows an adequate level of service, acceptable delays and no critical movements at all intersections during all peak hours in the year 2020.



**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 [XX] Saturday Peak Hour Volumes

**FIGURE 11**  
 Horizon Year 2020  
 Background Traffic Volumes



**LEGEND**

- XX AM Peak Hour Volumes
- (XX) PM Peak Hour Volumes
- {XX} Saturday Peak Hour Volumes

**FIGURE 12**

Highway 12 Commercial  
BIN Management Development Site

## 6.2 Horizon Year 2020 – Total Traffic Conditions

Total traffic conditions in the year 2020 represent the background traffic plus the traffic that would be expected to be generated by construction and occupancy of Phases 1A and 1B of the Hanson development. There is one access to the Hanson development in this scenario, via Street 'C' at its intersection with Highway 12 (opposite the existing intersection with Beamish Road). The intersection capacity analysis of this scenario is summarized in **Table 11**. Detailed intersection capacity analysis sheets are included in **Appendix G** and 2020 total traffic volumes are shown in **Figure 13**.

**Table 11: Intersection Capacity Analysis – 2020 Total Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (17)	--	B (15)	--	B (13)	--
Brebeuf Road at Highway 12	Unsignalized	B (15)	--	C (18)	--	C (18)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	C (25)	--	D (27)	--	B (14)	--
Street 'C' / Beamish Road at Highway 12	Unsignalized	E (43)	SB-LTR (0.63)	F (135)	NB-LTR (0.31) SB-LTR (0.90)	F (124)	NB-LTR (0.16) SB-LTR (0.94)
	<b>Signalized</b> <sup>3</sup>	B (10)	--	B (12)	--	C (24)	--
Jones Road at Highway 12	Signalized	B (16)	--	C (25)	SB-L (0.88)	C (24)	WB-L (0.92)
King Street at Highway 12	Signalized	B (15)	--	B (18)	--	C (24)	EB-L (0.94)
Street 'C' at Street 'D'	Unsignalized	A (8)	--	A (8)	--	A (8)	--
Street 'B' at Street 'C'	Unsignalized	B (10)	--	B (11)	--	B (13)	--

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. NB-LTR = northbound left-through-right; SB-LTR = southbound left-through-right; SB-L = southbound left; NB-LTR = northbound left-through-right.  
3. Also includes dedicated turn lanes (NB-L, SB-L, EB-L, WB-R)  
\* Signal splits optimized

The access point to the development, Street 'C' / Beamish Road at Highway 12 was first tested as unsignalized intersection. As an unsignalized intersection, the intersection is forecast to have a lengthy delay and poor level of service for traffic exiting the Hanson site and traffic exiting Beamish Road.

Highway 12 in this location is an MTO-managed highway. To determine if a traffic signal would be warranted at this intersection to address north- and southbound delays, MTO traffic signal warrants were calculated using the signal warrant methodology in Ontario Traffic Manual Book 12. The analysis sheets, provided in **Appendix H**, indicate that the intersection reaches 86% of the warrant, which falls short of the 100% threshold to warrant a traffic signal.

Further analysis of the warrant data showed that if 20 additional vehicle movements from the southbound or northbound approaches were added to the analysis, the signal warrant would be met.

Given that Street 'C' will be the only access point to the Hanson development for Phases 1A and 1B, that vehicle delays are forecast to be excessive and that the warrant is almost met, a signalized intersection is recommended. The signalized intersection will be carried through to the remaining "with development" scenario analyses.

In addition to signalization, the Street 'C' / Beamish Road at Highway 12 intersection should include northbound left, southbound left, eastbound left and westbound right dedicated turning lanes.

The intersection of Jones Road and Highway 12 is expected to exhibit delays and critical movements during the PM and Saturday peak hours. The intersection of King Street and Highway 12 and the internal intersection of Street 'C' and Street 'B' experiences delay during the Saturday peak hour. The Hanson development traffic patterns through these intersections will change with the full development of Phase 1 and the opening of the King Street and Street A intersection. With this in mind, no improvements are recommended at these two intersections for the year 2020.

The remaining intersections in the study area are expected to exhibit adequate level of service and adequate capacity for all three peak hours.

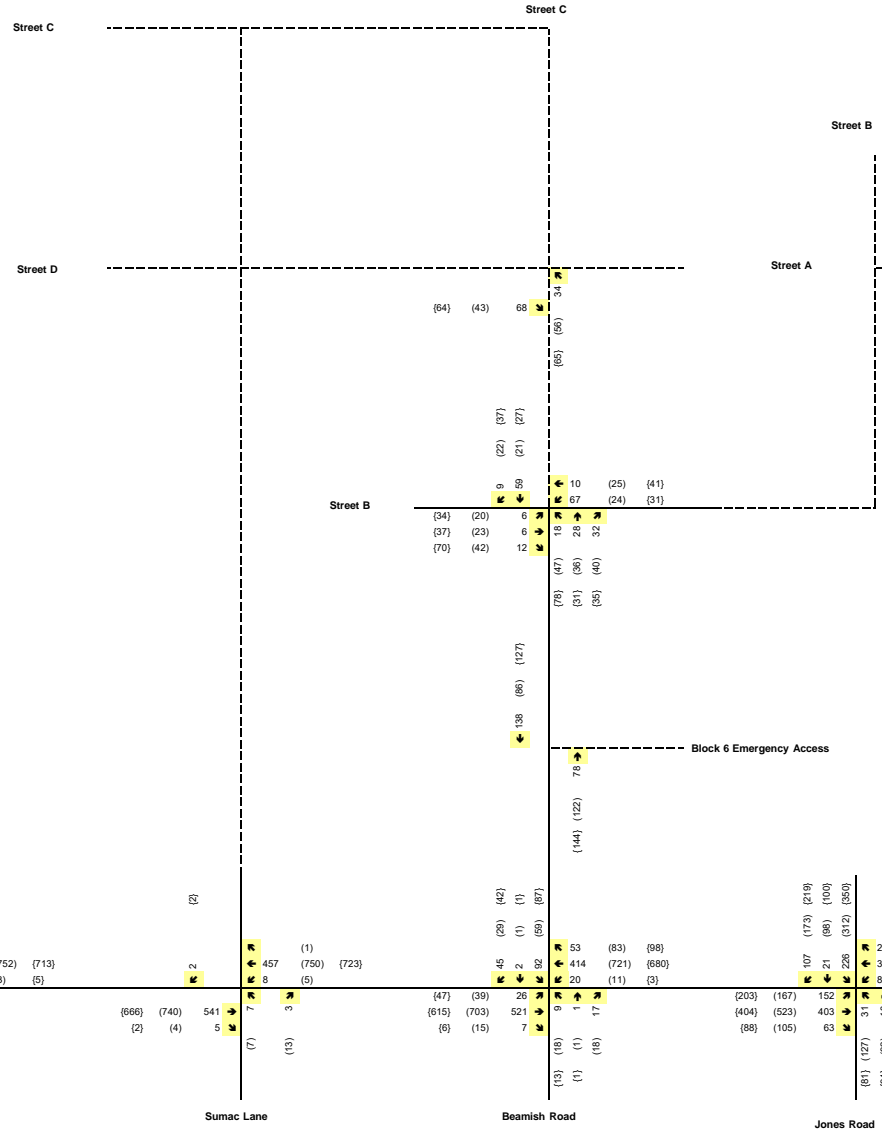
For the year 2020, recommended improvements include:

- 1) The addition of a northbound left, southbound left, eastbound left and westbound right turning lanes at the intersection of Highway 12 and Street 'C' to facilitate access to the Phase 1 Hanson development;

- 2) Signalize Street 'C' /Beamish Road and Highway 12, with a cycle time of 90 seconds; and
- 3) Include a westbound left turn advanced green arrow at Highway 12 and Jones Road, in conjunction with the recommendations in the Highway 12 Commercial TIS.

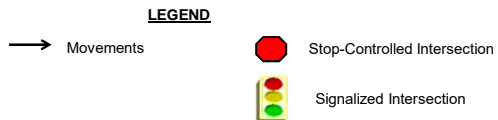
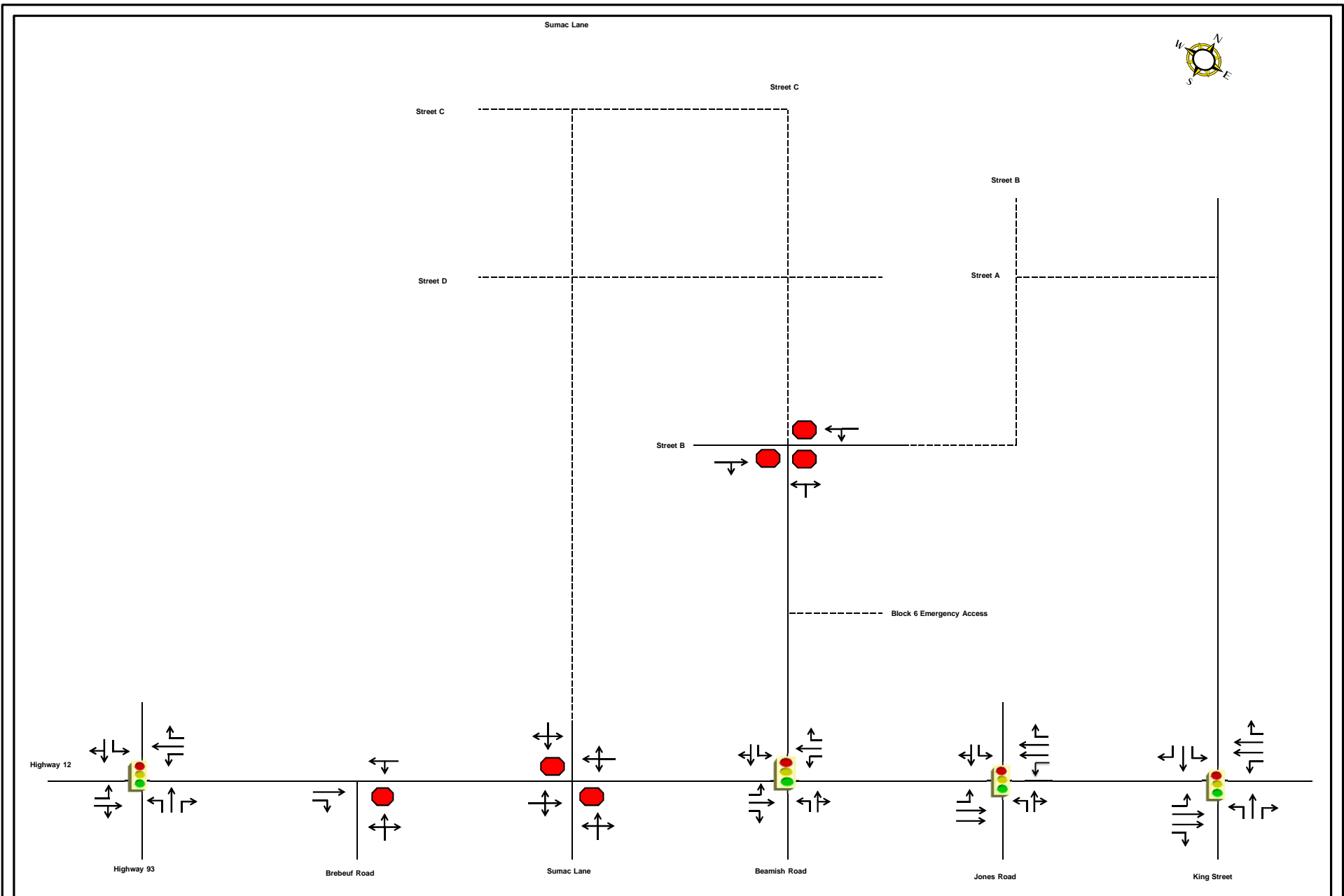
Horizon year 2020 lane configurations, including improvements for total traffic conditions, are shown in **Figure 14**.

Sumac Lane



**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 [XX] Saturday Peak Hour Volumes

**FIGURE 13**  
 Horizon Year 2020  
 Total Traffic Volumes



**FIGURE 14**  
 Horizon Year 2020 Lane Configurations  
 with Road Improvements for Total Traffic



### 6.2.1 Roundabout Analysis

The MTO TIS Guidelines require that a roundabout option be assessed and considered when new developments warrant signalization of an intersection on a provincial highway. Based on this requirement the intersection of Street 'C' / Beamish Road at Highway 12 was tested as a roundabout. Analysis results are found in **Table 12**. Detailed intersection capacity analysis sheets are included in **Appendix I**.

**Table 12: Roundabout Analysis - 2020 Total Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Street 'C' / Beamish Road at Highway 12	Roundabout	A (4)	--	A (4)	--	A (4)	--

Based on the above results, it is clear that the intersection would be expected to operate well as a signalized intersection or as a roundabout. However, there is not the physical space needed to construct a roundabout at this intersection due to an existing stormwater pond on the northwest corner and an existing well on the southwest corner of the intersection. Because of the existing physical constraints, a signalized intersection is recommended at this location.

### 6.3 Horizon Year 2025 Background Traffic Conditions

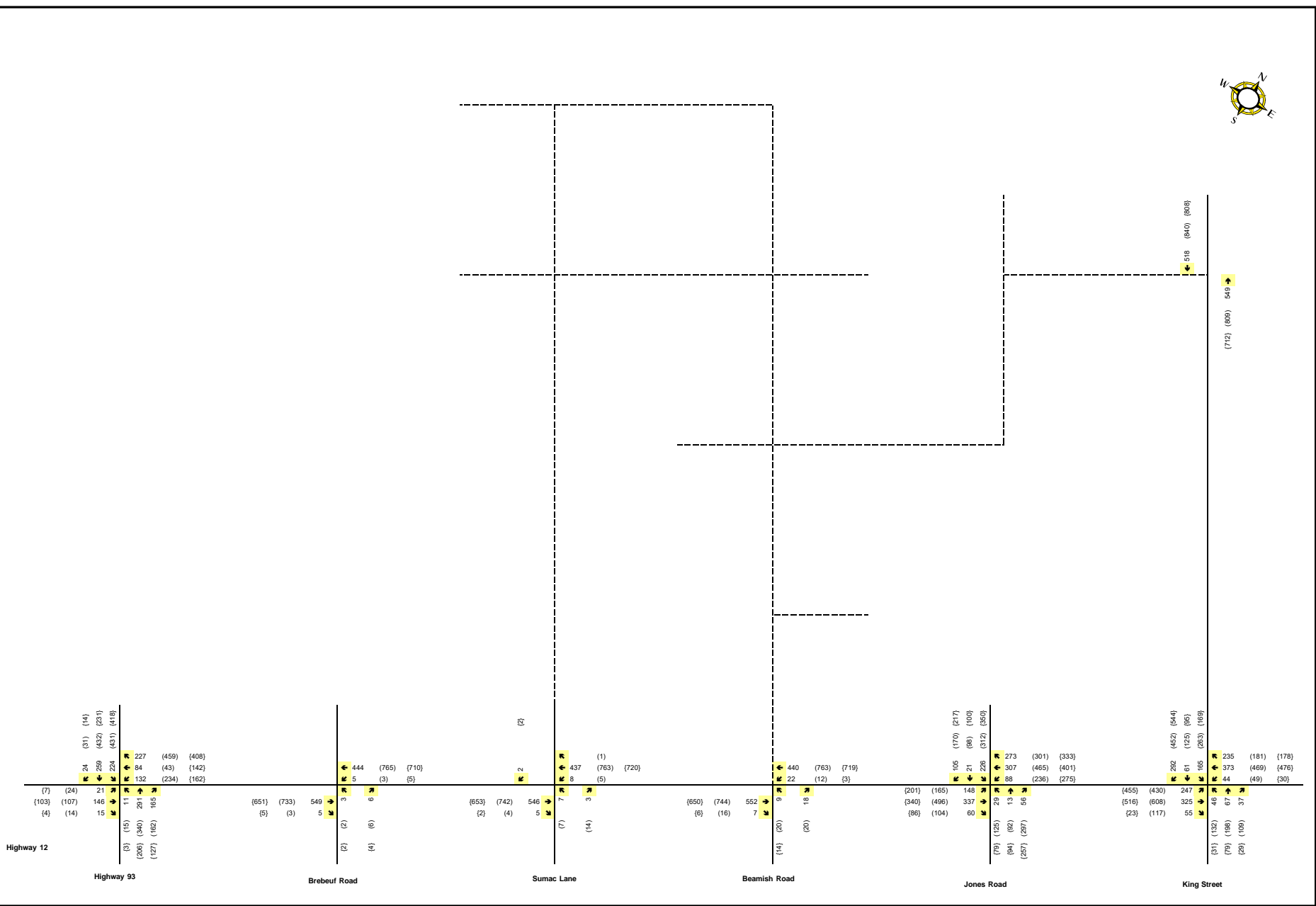
The analyses completed for the year 2020 were repeated for the year 2025. Year 2020 background traffic volumes include five more years of 1.25% per year background traffic growth. The SmartCentres traffic and the BIN Management traffic were held constant, as these commercial developments were assumed to be built out by 2020. The results of the intersection capacity analysis are shown in **Table 13**. Detailed intersection capacity analysis sheets are included in **Appendix J** and 2025 background traffic volumes are shown in **Figure 15**.

**Table 13: Intersection Capacity Analysis – 2025 Background Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (18)	--	B (15)	--	B (12)	--
Brebeuf Road at Highway 12	Unsignalized	B (15)	--	C (19)	--	C (18)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	C (24)	--	D (27)	--	B (14)	--
Beamish Road at Highway 12	Unsignalized	C (16)	--	D (31)	--	D (32)	--
Jones Road at Highway 12	Signalized	B (16)	--	C (24)	SB-L (0.87)	C (23)	--
King Street at Highway 12	Signalized	B (18)	--	C (21)	--	C (21)	--

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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.

The analysis shows an adequate level of service, acceptable delays and no critical movements at all intersections during all peak hours in the year 2025, with the exception of the intersection of Jones Road at Highway 12. This intersection is expected to experience a critical movement in the PM peak hour. East-west traffic volumes limit the amount of green time that can be allocated for the north-south movements, leading to longer delays for southbound left turning traffic.



**LEGEND**

- XX AM Peak Hour Volumes
- (XX) PM Peak Hour Volumes
- {XX} Saturday Peak Hour Volumes

**FIGURE 15**  
Horizon Year 2025  
Background Traffic Volumes

## 6.4 Horizon Year 2025 – Total Traffic Conditions

Total traffic conditions in the year 2025 represent the background traffic plus the traffic that would be generated by construction and occupancy of the entire Phase 1 of the Hanson development (all sub-phases 1A, 1B, 1C, 1D and 1E). Development traffic volumes assigned to the intersections of Street 'C' / Beamish Road at Highway 12 and Street 'A' at King Street were then assigned to individual movements at internal intersections. The results of the intersection capacity analysis of the external intersections and intersections are shown in **Table 14**. Detailed intersection capacity analysis sheets are included in **Appendix K** and 2025 total traffic volumes are shown in **Figure 16**.

**Table 14: Intersection Capacity Analysis – 2025 Total Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (14)	--	B (17)	--	B (13)	--
Brebeuf Road at Highway 12	Unsignalized	C (16)	--	C (21)	--	C (20)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	D (28)	--	D (32)	--	B (14)	--
Beamish Road / Street C at Highway 12	Signalized	B (14)	--	A (9)	--	B (13)	--
Jones Road at Highway 12	Signalized	B (15)	--	C (25)	SB-L (0.95)	C (22)	--
King Street at Highway 12	Signalized	B (16)	--	B (19)	--	B (18)	--
Street 'A' at King Street	Unsignalized	C (21)	--	E (49)	EB-L (0.43)	D (39)	--
	Signalized	A (9)	--	A (9)	--	A (9)	--
Street 'C' at Street 'D'	Unsignalized	A (7)	--	A (8)	--	A (8)	--
Street 'B' & Street 'A'	Unsignalized	A (8)	--	A (8)	--	A (8)	--
Street 'C' at Street 'B'	Unsignalized	B (10)	--	B (11)	--	B (14)	--

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. NB-LTR = northbound left-through-right; SB-LTR = southbound left-through-right; SB-L = southbound left; NB-LTR = northbound left-through-right.

The new access point to the development, Street 'A' at King Street, was first tested as unsignalized intersection. Signal warrants were calculated for Street 'A' at King Street. The analysis sheets, provided in **Appendix H**, indicate that the intersection does not meet the signal warrant requirements with 2025 traffic volumes. Analysis of the 2030 traffic volumes show signal warrants are met in that horizon year. However, it is recommended the intersection of Street 'A' and King Street be signalized in 2025 to address long vehicle delays noted in the analysis, because it is a primary access point for the development and because it will help facilitate traffic movement into and out of the development.

Similar to the 2025 background traffic analysis, the intersection of Jones Road and Highway 12 is expect to exhibit delays during the PM hours. The intersection of Les Barber / Sumac Lane and Highway 12 experiences some delay during the PM peak hour. Due to the very low volumes of vehicles forecast to be delayed, no improvements are recommended.

The remaining intersections in the study area are expected to exhibit adequate level of service and adequate capacity for all three peak hours.

For the year 2025, recommended improvements include:

- 1) Signalize Street 'A' and King Street, with a cycle time of 50 seconds.

Horizon year 2025 lane configurations, including improvements for total traffic conditions, are shown in **Figure 17**.

Sumac Lane

Street C

Street C

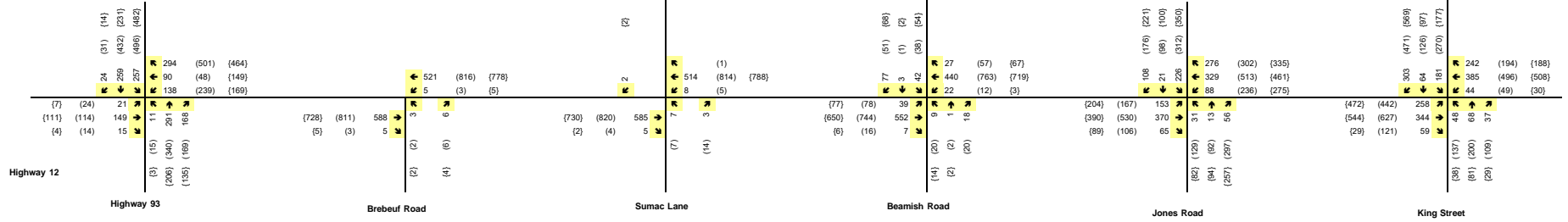
Street D

Street B

Street A

Street B

--Block 6 Emergency Access

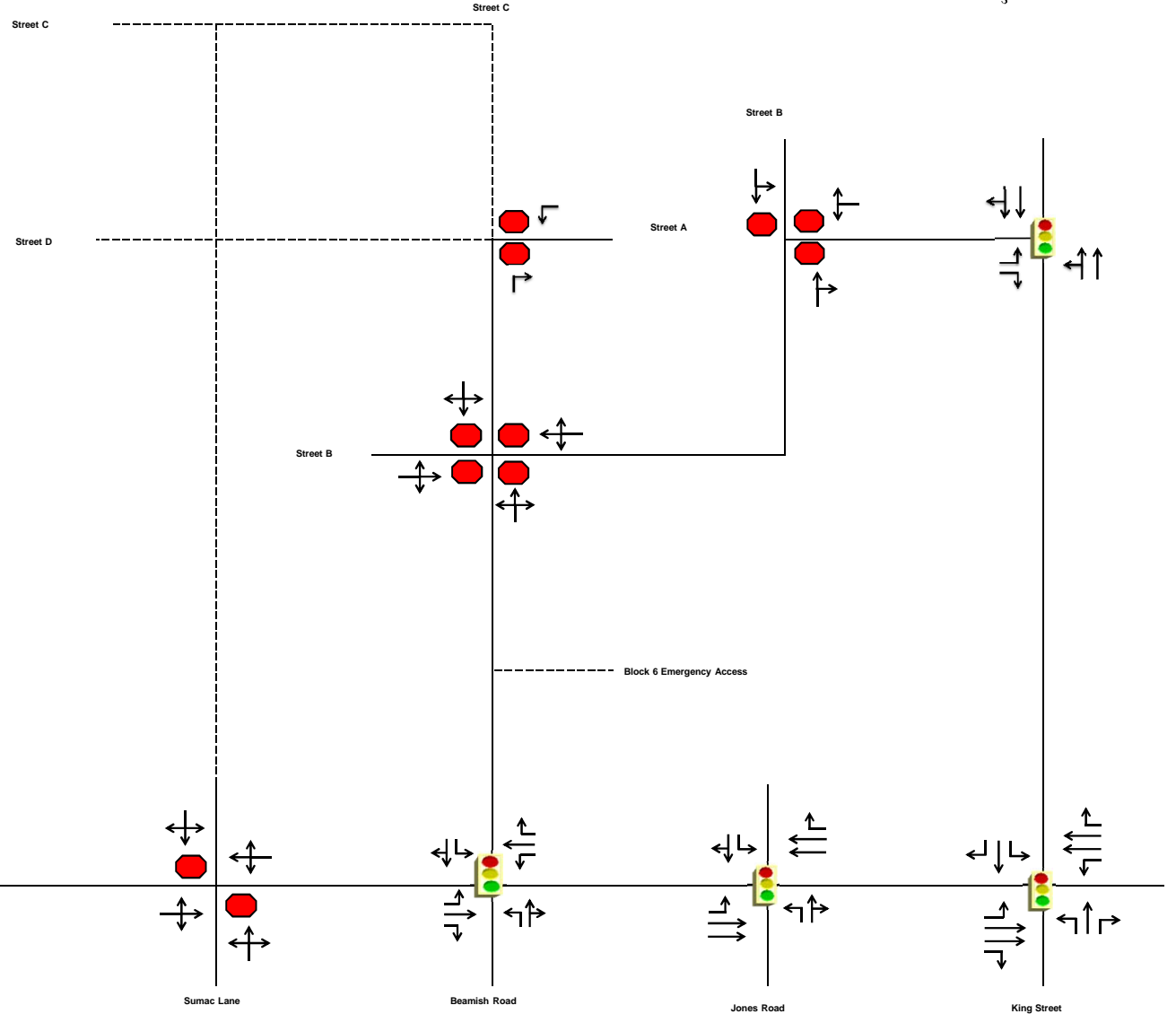


**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 [XX] Saturday Peak Hour Volumes

**FIGURE 16**  
 Horizon Year 2025





Sumac Lane



**LEGEND**

→ Movements

-  Stop-Controlled Intersection
-  Signalized Intersection



**FIGURE 17**

Horizon Year 2025 Lane Configurations with Road Improvements for Total Traffic

## 6.5 Horizon Year 2030 – Background Traffic Conditions

Year 2030 background traffic volumes include five more years of 1.25% per year background traffic growth. The results of the intersection capacity analysis are shown in **Table 15**. Detailed intersection capacity analysis sheets are included in **Appendix L** background traffic volumes are shown in **Figure 18**.

**Table 15: Intersection Capacity Analysis – 2030 Background Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (18)	--	B (16)	--	B (14)	--
Brebeuf Road at Highway 12	Unsignalized	C (15)	--	C (20)	--	C (20)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	D (27)	--	D (32)	--	B (14)	--
Beamish Road/Street 'C' at Highway 12	Unsignalized	C (17)	--	E (36)	NB-LR (0.27)	E (35)	NB-LR (0.11)
Jones Road at Highway 12	Signalized	B (16)	--	C (24)	SB-L (0.87) WB-L (0.86)	C (23)	--
King Street at Highway 12	Signalized	B (18)	--	C (10)	--	C (21)	--

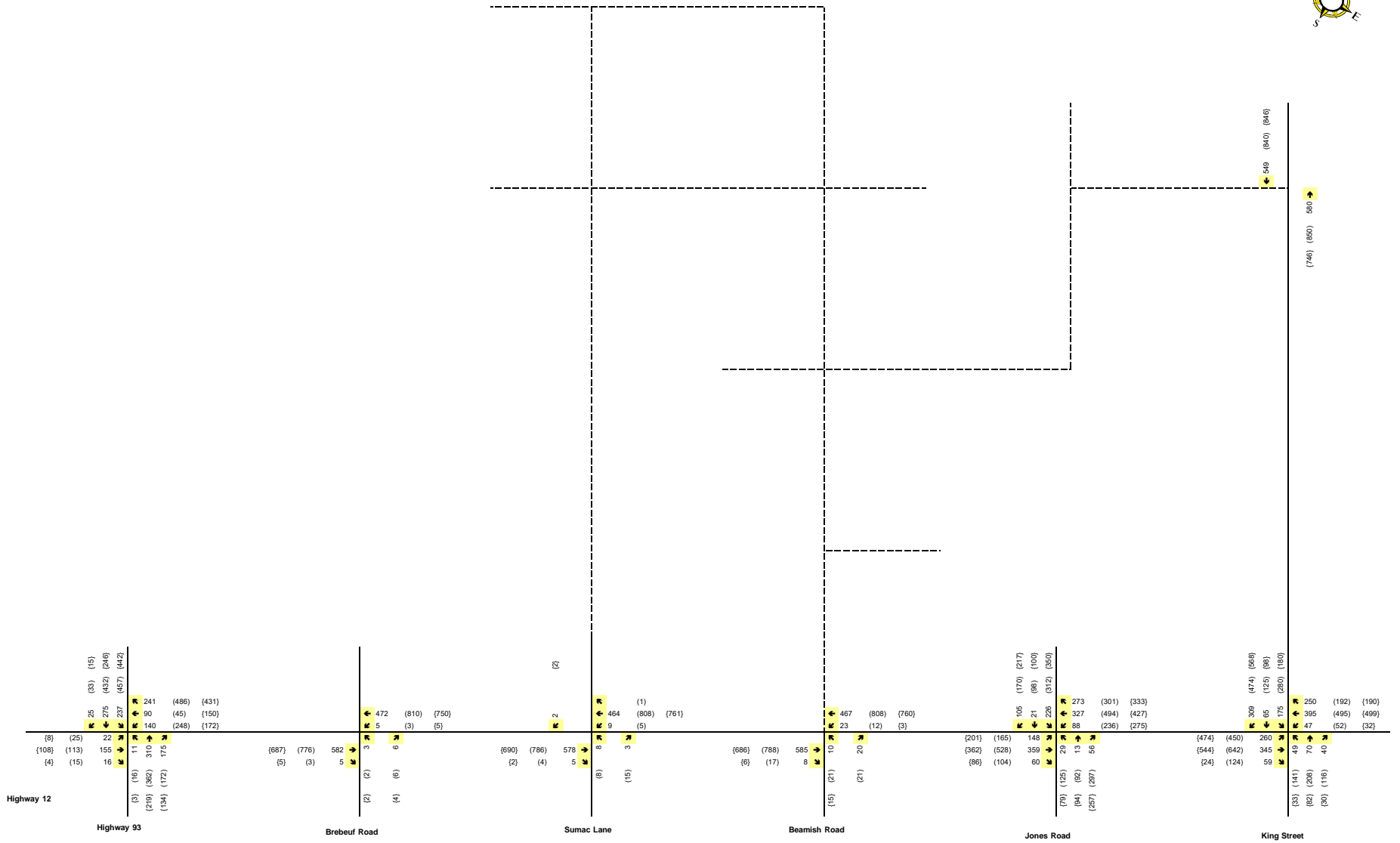
- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection.

Similar to all previous analyses of background traffic growth, the 2030 background traffic analysis overall indicates adequate levels of service and adequate capacity at most of the intersection during each peak hour.

Delays and critical movements are forecasted for Jones Road at Highway 12 in the PM peak hour. These movements are forecast to be at 87% and 86% of capacity, which show some remaining spare capacity and no improvements are recommended.

The intersection of Beamish Road and Highway 12 experiences some delay during the PM and Saturday peak hours. Due to the very low volumes of vehicles forecast to be delayed, no improvements are recommended.





**LEGEND**

- XX AM Peak Hour Volumes
- (XX) PM Peak Hour Volumes
- (XX) Saturday Peak Hour Volumes

**FIGURE 18**

Horizon Year 2030  
Background Traffic Volumes

## 6.4 Horizon Year 2030 – Total Traffic Conditions

By the year 2030, the entire Hanson development (Phases 1, 2 and 3) is expected to be constructed and fully occupied. Hanson traffic was added to the 2030 background traffic in order to analyze total traffic conditions.

Five unsignalized all-way stop controlled Hanson development internal intersections were analyzed in this horizon year. The results of the intersection capacity analysis for 2030 total traffic conditions for external and internal intersections are shown in **Table 16**, with intersection capacity analysis sheets provided in **Appendix M** and 2030 total traffic volumes shown in **Figure 19**.

**Table 16: Intersection Capacity Analysis – 2030 Total Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (14)	--	C (21)	WB-L (0.89) SB-L (0.87)	B (15)	--
Brebeuf Road at Highway 12	Unsignalized	C (18)	--	D (28)	--	D (28)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	F (54)	NB-LTR (0.13) SB-LTR (0.68)	F (736)	NB-LTR (0.44) SB-LTR (2.31)	F (721)	SB-LTR (2.36)
	<b>Signalized</b>	B (11)	--	B (12)	--	A (9)	--
Street 'C' / Beamish Road at Highway 12	Signalized	B (14)	--	B(10)	--	B (13)	--
Jones Road at Highway 12	Signalized	B (15)	--	C (26)	SB-L (0.94)	C (23)	--
King Street at Highway 12	Signalized	B (16)	--	C (23)	--	C (23)	--
King Street at Street A	Signalized	B (11)	--	B (12)	--	B (13)	--
Sumac Lane at Street 'C'	Unsignalized	A (7)	--	A (8)	--	A (8)	--
Sumac Lane at Street 'D'	Unsignalized	A (8)	--	A (8)	--	A (8)	--
Street 'C' at Street 'D'	Unsignalized	A (8)	--	A (9)	--	A (10)	--
Street 'B' at Street 'A'	Unsignalized	A (8)	--	A (9)	--	A (10)	--
Street 'B' at Street 'C'	Unsignalized	B (12)	--	B (14)	--	C (19)	--

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. NB-LTR = northbound left-through-right; SB-LTR = southbound left-through-right

Select left turning movements are forecast to approach capacity in the PM peak hour at the Highway 93 at Highway 12 intersection. As intersection delays are moderate during all peak hours, no improvements are recommended.

The southbound left turning movement at the intersection of Jones Road at Highway 12 is expected to approach capacity during the PM peak hour only, however, the overall intersection delay is moderate and no improvements are recommended.

The intersection of Les Barber / Sumac Lane and Highway 12 is forecast to experience excessive delays for northbound and southbound traffic due to inadequate gaps in the east- and westbound-bound traffic. The signal warrant analysis sheets, provided in **Appendix H**, indicate that the intersection does not meet the signal warrant requirements with 2030 traffic volumes. To alleviate some of the delay, residents exiting the Hanson development have the option to use the signalized intersection of Street 'C' / Beamish Road and Highway 12. Before the development of Phases 2 and 3 proceed, the Traffic Impact Study should be updated to confirm the anticipated traffic volumes and update the signal warrants. If the traffic volumes forecast in this report are shown to be present in future analyses, then traffic signals are recommended at this intersection to address excessive delays and over capacity conditions exiting the Hanson development.

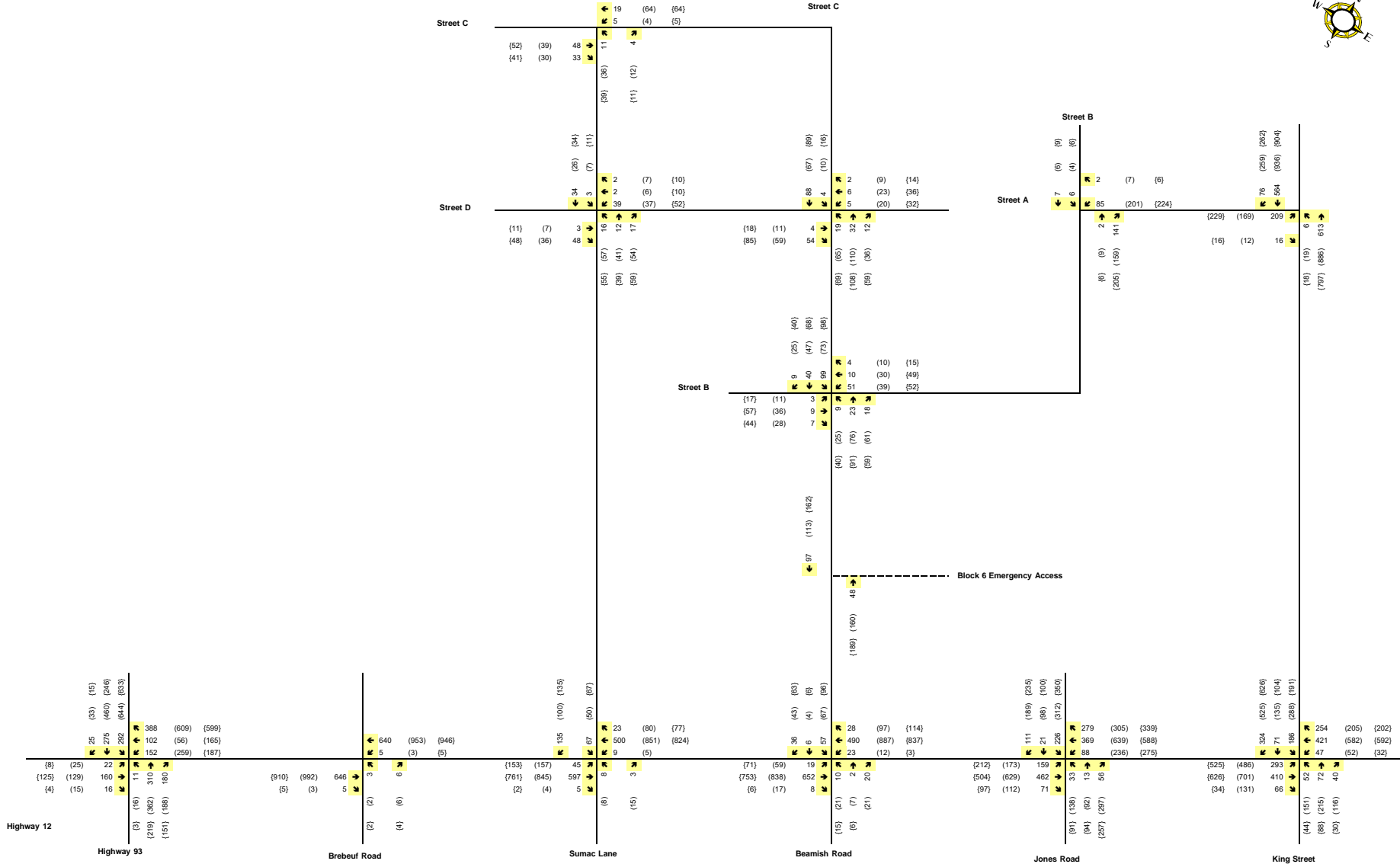
Internal intersections all are expected to operate at adequate levels of service with moderate delays and no movements approaching capacity. As the 2030 analysis represents full build out of the Hanson development, no additional analyses of internal intersections is carried out for horizon years.

For the year 2030, recommended improvements include:

- 1) EB-L and WB-R at Les Barber / Sumac Lane and Highway 12; and
- 2) Signalize the intersection of Les Barber / Sumac Lane and Highway 12.

The lane configurations showing the recommended improvements for this scenario are illustrated in **Figure 20**.

Sumac Lane



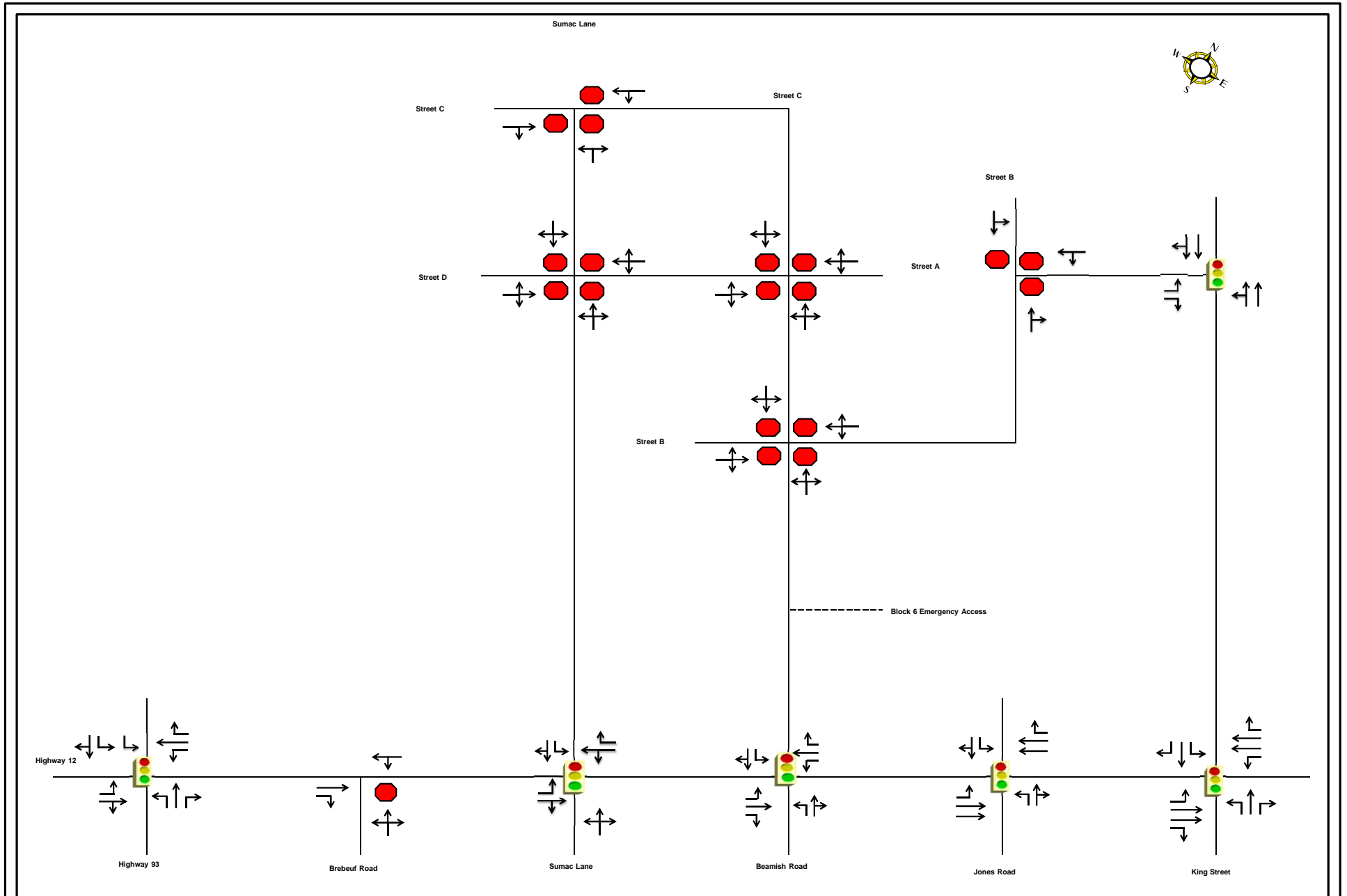
**LEGEND**

- XX AM Peak Hour Volumes
- (XX) PM Peak Hour Volumes
- (XX) Saturday Peak Hour Volumes

**FIGURE 19**

Horizon Year 2030  
Total Traffic Volumes





**LEGEND**

→ Movements

● Stop-Controlled Intersection

⚡ Signalized Intersection

**FIGURE 20**

Horizon Year 2030 Lane Configurations with Road Improvements for Total Traffic

## 6.5 Horizon Year 2035 – Background Traffic Conditions

Horizon year 2035 represents the five year horizon after the Hanson development is constructed and fully occupied. The 2035 background analysis does not include the Hanson development but does include background traffic, which has been increased 1.25% per year from existing conditions. With this annual increase, background traffic is assumed to have grown over 23% since the year 2016. The results of the intersection capacity analysis are shown in **Table 17**. Detailed intersection capacity analysis sheets are included in **Appendix N** and 2035 background traffic volumes are shown in **Figure 21**.

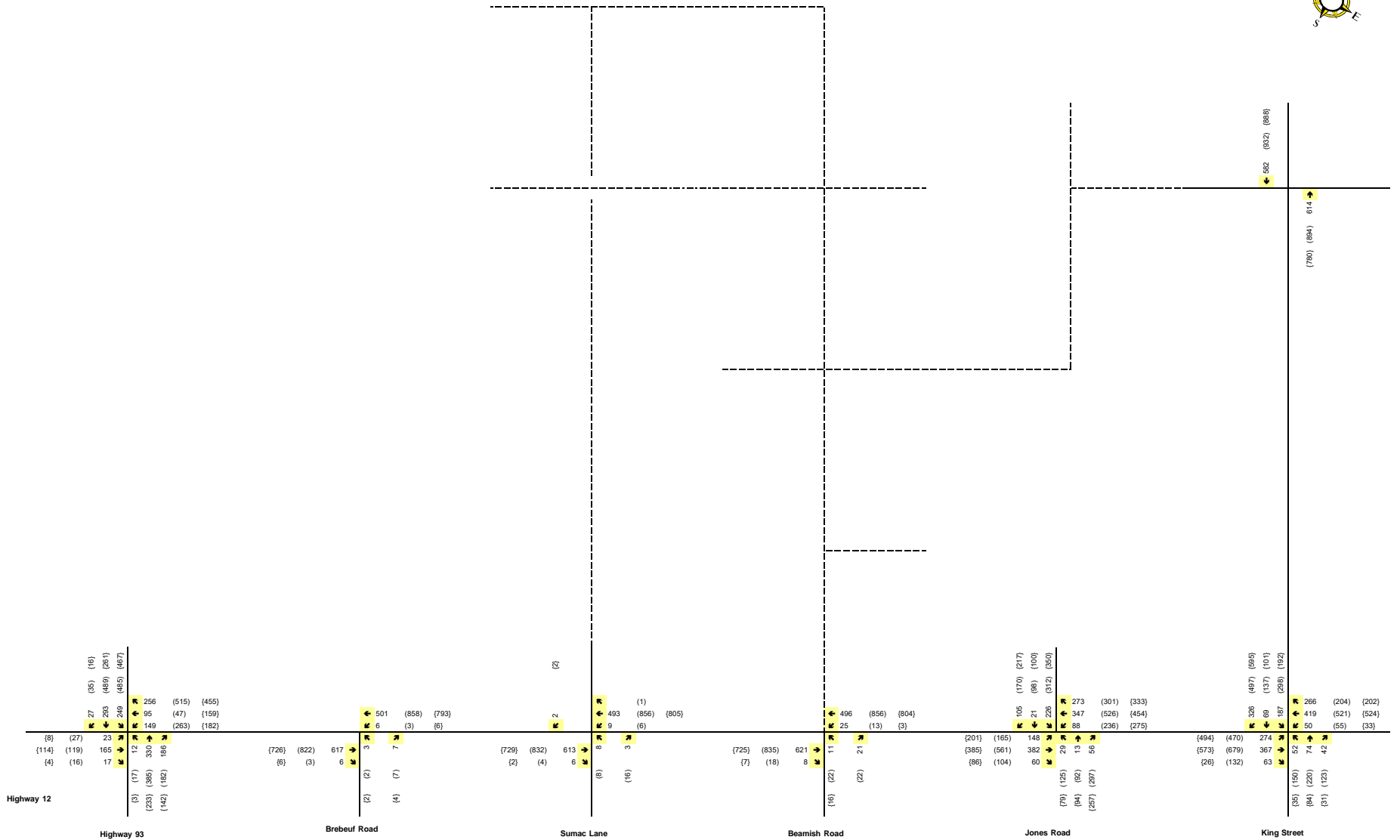
**Table 17: Intersection Capacity Analysis – 2035 Background Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (19)	--	B (18)	--	B (14)	--
Brebeuf Road at Highway 12	Unsignalized	C (16)	--	C (21)	--	C (20)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	D (30)	--	E (35)	NB-LTR (0.17)	B (15)	--
Beamish Road/Street 'C' at Highway 12	Unsignalized	C (18)	--	E (43)	NB-LTR (0.32)	E (40)	NB-LTR (0.13)
Jones Road at Highway 12	Signalized	B (16)	--	C (24)	WB-L (0.88) SB-L (0.87)	C (23)	--
King Street at Highway 12	Signalized	B (18)	--	C (22)	--	C (22)	--

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. WB-L = westbound left; SB-L = southbound left; NB-LR = northbound left-right; SB-LTR = southbound left-through-right; EB-L = eastbound left.

The only intersection with capacity constraints is forecast to be Jones Road at Highway 12 in the PM peak hour. Given the adequate level of service forecast, no improvements are recommended.

The intersections of Les Barber Boulevard/Sumac Land at Highway 12 and Beamish Road at Highway 12 are forecast to experience some delay during the PM and Saturday peak hours. Due to the very low volumes of vehicles forecast to be delayed at these two intersections, no improvements are recommended.



**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 (XX) Saturday Peak Hour Volumes

**FIGURE 21**  
 Horizon Year 2035  
 Background Traffic Volumes

## 6.6 Horizon Year 2035 – Total Traffic Conditions

Horizon Year 2035 total traffic volumes include background traffic growth and all of the Hanson Development traffic. Signal timings were optimized during the analysis process. The road network used in the analysis of total traffic conditions was the same as the 2035 background traffic conditions. The results of the intersection capacity analysis for 2035 total traffic conditions are shown in **Table 18**. Detailed intersection capacity analysis sheets are included in **Appendix O** and 2035 total traffic volumes are shown in **Figure 22**.

**Table 18: Intersection Capacity Analysis – 2035 Total Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (15)	--	C (25)	WB-L (0.92) SB-L (0.94)	B (16)	
Brebeuf Road at Highway 12	Unsignalized	C (18)	--	D (29)	--	D (31)	
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	F (61)	NB-LTR (0.15) SB-LTR (0.73)	F (950)	NB-LTR (0.53) SB-LTR (2.75)	F (888)	SB-LTR (2.70)
	<b>Signalized</b>	B (11)	--	B (12)	--	A (9)	--
Beamish Road at Highway 12	Signalized	B (14)	--	B (11)	--	B (13)	--
Jones Road at Highway 12	Signalized	B (16)	--	C (26)	WB-L (0.87) SB-L (0.94)	C (23)	--
King Street at Highway 12	Signalized	B (18)	--	C (25)	EB-L (0.88)	C (24)	--
King Street at Street 'A'	Signalized	A (9)	--	B (12)	--	B (13)	--

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. NB-LR = northbound left-right; NB-LTR = northbound left-through-right; SB-LTR = southbound left-through-right; EB-T = eastbound through

Intersections identified previously as having movements approaching capacity once more are identified in the 2035 analysis. As background traffic volumes have grown an additional 1.25% for each of the years between 2030 and 2035, the volume to capacity forecasts have crept higher.



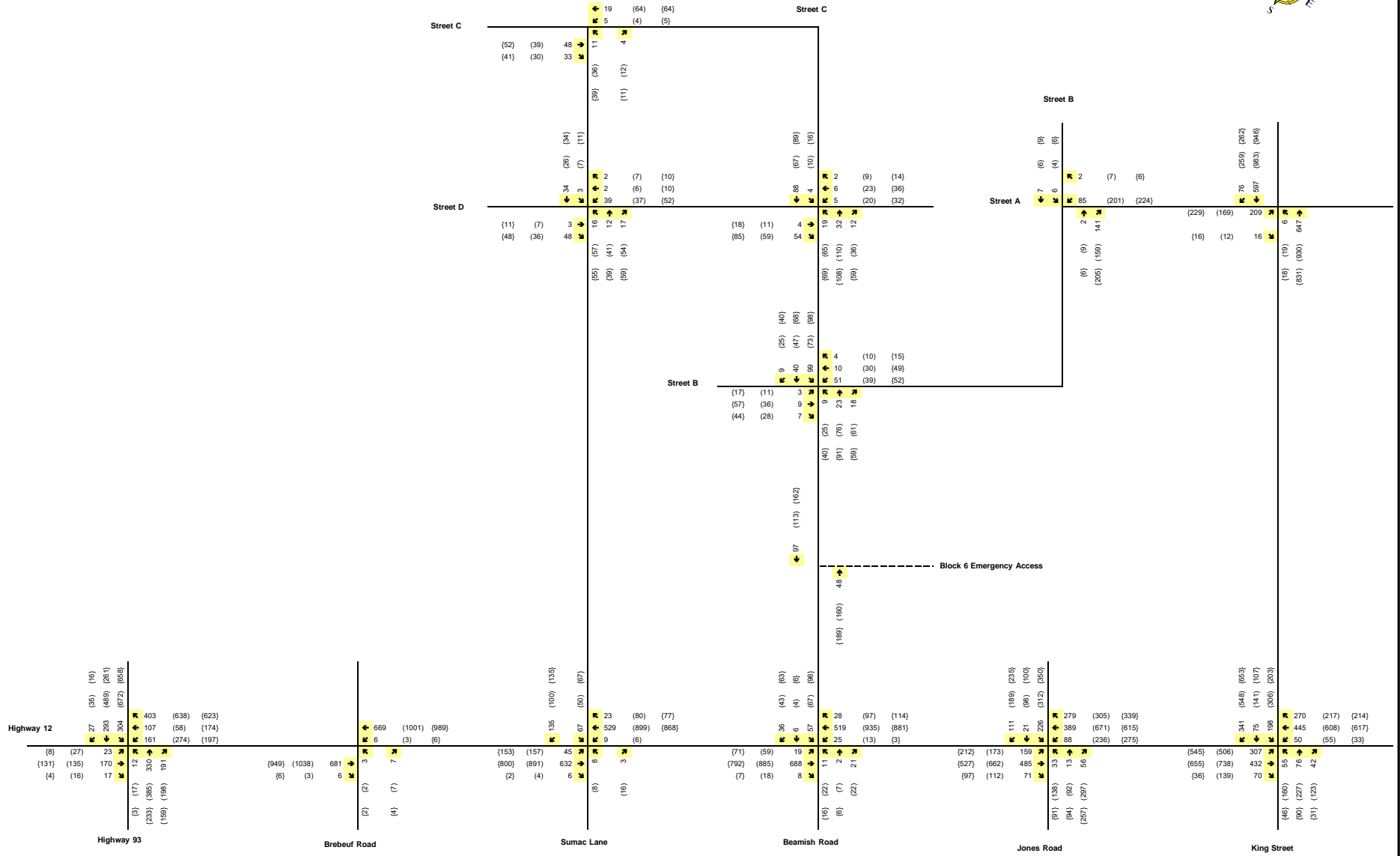
Three intersections are forecasted to exhibit left turning movements approaching capacity, including:

- Highway 93 at Highway 12;
- Jones Road at Highway 12; and
- King Street at Highway 12.

In all three cases, levels of service are expected to adequate (LOS B or C) in all peak hours and no movements are expected to be over capacity. No improvements are recommended.

Similar to the 2030 analysis, the intersection of Les Barber / Sumac Lane at Highway 12 is recommended to be signalized to accommodate full build out of the Hanson development, even though traffic signal warrants are not met. Excessive delays and over capacity lane conditions reported in 2030 are only worse in 2035 with the addition of more background traffic growth.

Sumac Lane



**LEGEND**

- XX AM Peak Hour Volumes
- (XX) PM Peak Hour Volumes
- (XX) Saturday Peak Hour Volumes

**FIGURE 22**

Horizon Year 2035  
Total Traffic Volumes

## 6.7 Horizon Year 2040 – Background Traffic Conditions

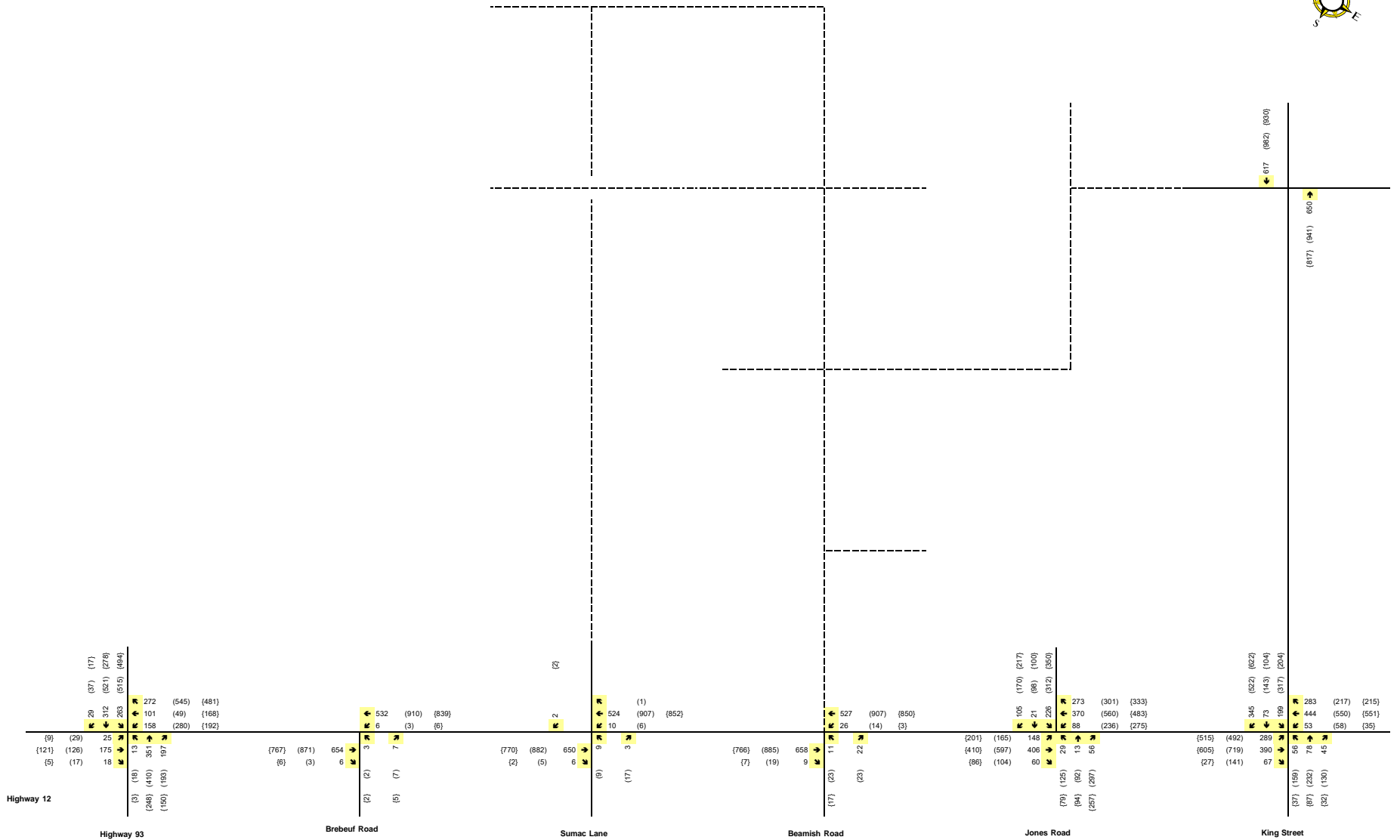
The final horizon year for analysis is the year 2040, which represents ten years beyond the full build out of the Hanson development. The background traffic analysis only includes existing traffic volumes increased by 1.25% for every year to the year 2040. Such an increase would result in background traffic volumes increasing by 30% above existing volumes. The results of the intersection capacity analysis are shown in **Table 19**. Detailed intersection capacity analysis sheets are included in **Appendix P** and 2040 background traffic volumes are shown in **Figure 23**.

**Table 19: Intersection Capacity Analysis – 2040 Background Traffic Conditions**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (19)	--	B (19)	WB-L (0.86)	B (14)	--
Brebeuf Road at Highway 12	Unsignalized	C (16)	--	C (23)	--	C (21)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	D (34)	--	E (43)	NB-LTR (0.21)	C (15)	--
Beamish Road/Street 'C' at Highway 12	Unsignalized	C (19)	--	F (53)	NB-LTR (0.38)	E (46)	NB-LTR (0.16)
Jones Road at Highway 12	Signalized	B (16)	--	C (25)	WB-L (0.91) SB-L (0.87)	C (23)	--
King Street at Highway 12	Signalized	B (18)	--	C (23)	EB-L (0.88)	C (24)	--

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. WB-L = westbound left; SB-L = southbound left; NB-LR = northbound left-right; SB-LTR = southbound left-through-right; EB-L = eastbound left; WB-T = westbound through

The 2040 background traffic analysis overall indicates all movements within capacity, even with the annual background traffic growth. Delays are forecasted for very low numbers of vehicles at select intersections. No improvements are needed to the road network in any horizon year if only background traffic volumes grow.



**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 (XX) Saturday Peak Hour Volumes

**FIGURE 23**  
 Horizon Year 2040  
 Background Traffic Volumes

## 6.8 Horizon Year 2040 – Total Traffic Conditions

For the final with development analysis scenario, Hanson development traffic and background traffic were combined and analyzed for the ten-year horizon (2040). **Table 20** displays the results of the intersection capacity analysis. Detailed intersection capacity analysis sheets are included in **Appendix Q** and 2040 total traffic volumes are shown in **Figure 24**.

**Table 20: Intersection Capacity Analysis – 2040 Total Traffic Conditions**

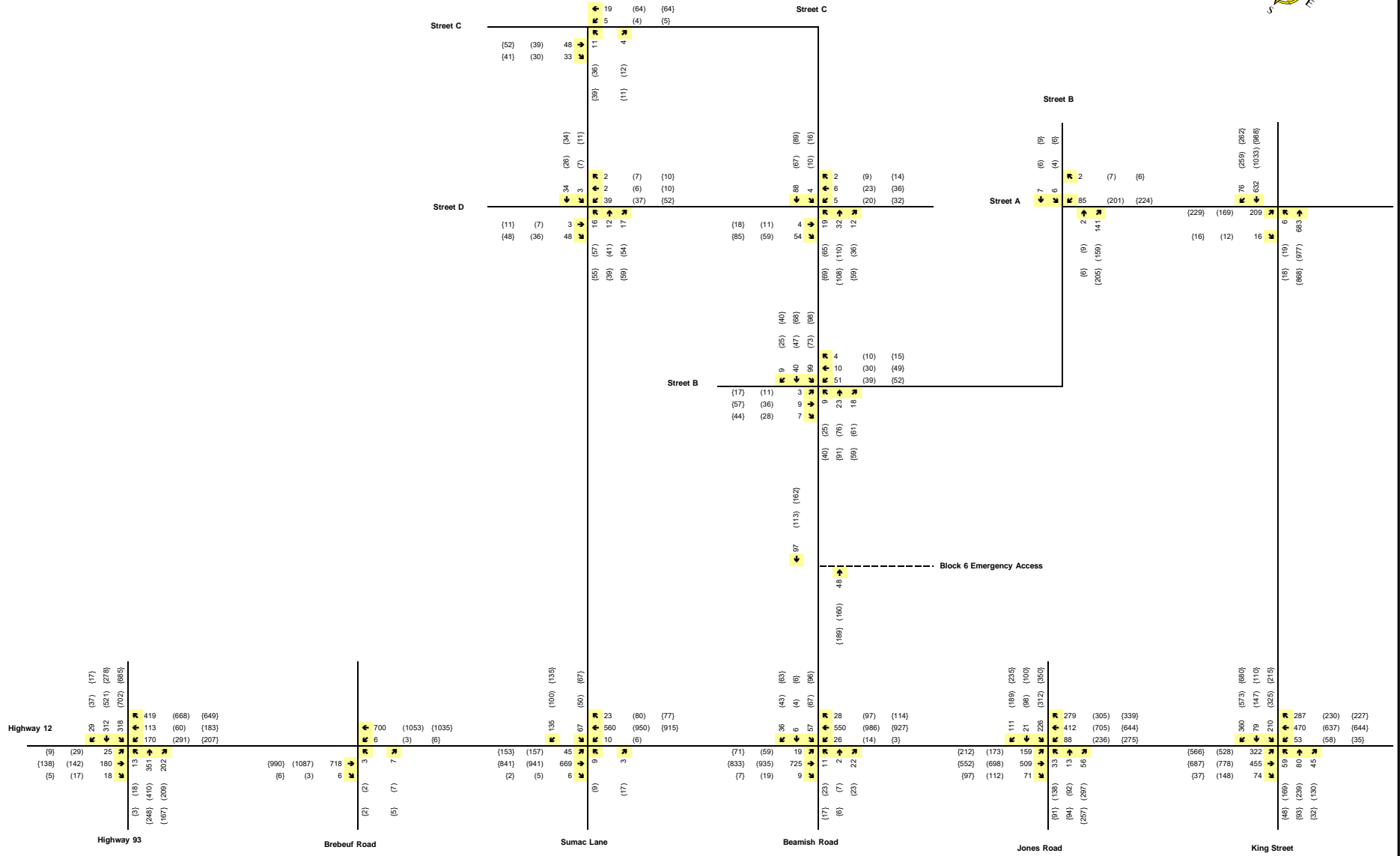
Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (16)	--	C (32)	WB-L (0.95) NB-T (0.85) SB-L (1.02)	B (17)	--
Brebeuf Road at Highway 12	Unsignalized	C (19)	--	D (33)	--	D (32)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	F (74)	NB-LTR (0.19) SB-LTR (0.80)	F (Err)	NB-LTR (0.73) SB-LTR (3.30)	F (Err)	SB-LTR (3.33)
	<b>Signalized</b>	B (12)	--	B (15)	--	A (10)	--
Beamish Road at Highway 12	Signalized	B (15)	--	B (12)	--	B (14)	--
Jones Road at Highway 12	Signalized	B (16)	--	C (27)	WB-L (0.91) SB-L (0.94)	C (24)	--
King Street at Highway 12	Signalized	B (18)	--	C (27)	EB-L (0.93) SB-L (0.91)	C (26)	EB-L (0.86)
King Street at Street 'A'	Signalized	A (9)	--	B (12)	--	B (13)	--

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
2. Critical movements are 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. NB-LR = northbound left-right; EB-T = eastbound through.

The 2040 future total traffic analysis overall indicates a number of intersections where levels of service and capacity issues are present. With the exception of the southbound left turning movement at Highway 93 and Highway 12, all of the movement are forecast to be within capacity.

Given the long term horizon and assumptions regarding continuous background traffic growth, no further improvements are recommended in the study area. It is acknowledged that a revised Traffic Impact Study would need to be prepared prior to full build out of the Hanson development. Through that study, new traffic data could be collected and future conditions could be reconfirmed.

Sumac Lane



**LEGEND**  
 XX AM Peak Hour Volumes  
 (XX) PM Peak Hour Volumes  
 [XX] Saturday Peak Hour Volumes

**FIGURE 24**  
 Horizon Year 2040  
 Total Traffic Volumes

## 7.0 STORAGE LENGTHS & CAPACITY CALCULATIONS

This chapter discusses the existing and proposed storage lengths for the exclusive turning movements in the study area.

### 7.1 Existing Storage

The existing storage lengths for exclusive turning movements in the study area were measured using Google Earth and are recorded in **Table 21**. These are approximate lengths.

**Table 21: Existing Storage Lengths**

Intersection	Control Type	Exclusive Lane	Storage Length (m)
Highway 12 at Highway 93	Signalized	NB-L	120
		NB-R	N/A <sup>1</sup>
		SB-L	200
		EB-L	190
		WB-L	60
		WB-R	N/A <sup>1</sup>
Highway 12 at Brebeuf Road	Stop-Controlled	EB-R	Taper
Highway 12 at Beamish Road	Stop-Controlled	EB-R	110
		WB-L	130
Highway 12 at Jones Road	Signalized	SB-L	60
		EB-L	155
		WB-R	115
Highway 12 at King Street	Signalized	NB-L	55
		NB-R	65
		SB-L	100
		SB-R	N/A
		EB-L	150
		EB-R	115
		WB-L	Taper
		WB-R	N/A <sup>1</sup>

Note: 1. Not applicable because the movement is a free-flow channel.

## 7.2 Storage Calculation Methodology

The following methodology was used to confirm the required storage length for existing turning movements and determine the proposed storage lengths for the new turning movements:

1. The left and right turn storage lengths for signalized and unsignalized intersections were based on Synchro's 95<sup>th</sup> percentile queuing results; and
2. All storage lengths have been conservatively rounded up to accommodate an additional vehicle. A minimum of 30 metres has been used for the recommended storage length on proposed MTO exclusive lanes and a minimum of 15 metres has been recommended on proposed municipal exclusive lanes, based on forecast traffic volumes and vehicle speeds.

### 7.2.1 2020 Storage Length

In the horizon 2020 Total Traffic scenario, several exclusive turning lanes are recommended to be added to the road network to accommodate Phases 1A and 1B of the Hanson development.

Recommendations for the interim storage lengths can be made; however, it is very important to observe the necessary storage lengths at full build-out to avoid having to extend the exclusive turning lanes several years after implementation. The final recommendations for the storage lengths at each intersection will be based on the results reported in the 2025 horizon year, which would include full build out and occupancy of Phase 1 of the Hanson development.

### 7.2.2 2025 Storage Length

The horizon 2025 Total Future scenario represents full build-out of Phase 1 of the Hanson development. The existing storage lengths along with the proposed storage lengths, obtained from Synchro, of the exclusive lanes are shown in **Table 22**.

### 7.2.2 2030 Storage Length

The 2030 horizon year represents full build out of all phases of the Hanson development. Storage lengths have been re-examined for this year and also are reported in **Table 22**.



**Table 22: Proposed Storage Length for Turning Lanes**

Intersection	Control Type	Exclusive Lane	Existing Storage Length	Synchro Queue									Proposed Storage Length
				2020 – 95 <sup>th</sup> Percentile (m)			2025 – 95 <sup>th</sup> Percentile (m)			2030 – 95 <sup>th</sup> Percentile (m)			
				AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	
Highway 12 at Highway 93	Signalized	NB-L	135m	4.0m	6.1m	2.2m	4.4m	6.6m	1.7m	4.4m	6.9m	2.4m	
		SB-L	200m	23.9m	54.1m	47.7m	27.5m	61.2m	43.9m	29.4m	112.8m	73.8m	
		EB-L	60m	8.0m	8.6m	4.3m	8.5m	9.0m	4.6m	9.0m	9.5m	4.5m	
		WB-L	190m	40.5m	37.0m	26.6m	43.3m	67.4m	52.5m	46.3m	82.3m	56.0m	
Highway 12 at Beamish Rd / Street C	Signalized	NB-L	--	5.1m	8.3m	6.5m	5.4m	9.9m	7.3m	6.1m	10.2m	8.2m	30m
		SB-L	--	26.8m	19.2m	25.6m	15.2m	15.3m	18.7m	20.1m	23.5m	37.5m	45m
		EB-L	--	3.8m	5.4m	6.6m	4.5m	7.4m	9.4m	1.7m	4.3m	6.0m	30m
		EB-R	110m	0.2m	0.6m	0.0m	0.1m	0.4m	0.1m	0.0m	0.0m	0.0m	
		WB-L	130m	3.7m	0.8m	0.3m	8.8m	0.7m	0.3m	8.8m	0.6m	0.4m	
		WB-R	--	3.7m	0.8m	2.1m	7.9m	0.5m	1.6m	8.1m	0.8m	6.3m	30m
Highway 12 at Jones Road	Signalized	NB-L	60m <sup>1</sup>	8.4m	36.6m	26.9m	8.4m	37.0m	23.2m	8.8m	41.7m	26.1m	
		SB-L	70m	45.5m	86.0m	74.1m	45.5m	86.0m	54.8m	45.5m	85.6m	55.4m	
		EB-L	160m	26.0m	30.0m	34.0	18.5m	23.8m	27.0m	18.9m	25.3m	29.3m	
		WB-L	55m <sup>1</sup>	24.3m	75.6m	84.5m	11.6m	76.1m	47.7m	24.7m	78.4m	47.3m	
		WB-R	115m	16.6m	15.5m	15.7m	16.6m	15.5m	19.4m	16.8m	14.8m	19.4m	
Highway 12 at King Street	Signalized	NB-L	70m	14.3m	33.9m	11.6m	14.1m	37.2m	12.3	15.9m	38.7m	14.6m	
		NB-R	75m	1.0m	10.9m	0.0m	1.4m	11.5m	0.0m	2.1m	11.3m	0.0m	
		SB-L	120m	39.0m	67.1m	40.5m	44.9m	86.2m	44.9m	55.7m	85.6m	59.6m	
		EB-L	150m	43.9m	69.5m	77.8m	39.0m	64.1m	72.9m	41.1	104.8m	96.1m	
		EB-R	25m	5.6m	7.6m	2.2m	6.0m	7.5m	2.6m	5.7m	10.1m	3.1m	
		WB-L	140m	13.5m	17.2m	11.8m	13.9m	14.6m	12.2m	12.3m	19.2m	13.1m	

Intersection	Control Type	Exclusive Lane	Existing Storage Length	Synchro Queue									Proposed Storage Length (m)
				2020 – 95 <sup>th</sup> Percentile (m)			2025 – 95 <sup>th</sup> Percentile (m)			2030 – 95 <sup>th</sup> Percentile (m)			
				AM	PM	SAT	AM	PM	SAT	AM	PM	SAT	
King Street at Street A	Signalized	EB-L	--	--	--	--	17.4m	12.2m	13.7m	31.1m	27.0m	33.8m	60m
Highway 12 at Les Barber Blvd / Sumac Lane	Signalized	SB-L	--	--	--	--	--	--	--	20.7m	18.1m	22.7m	30m
		EB-L	--	--	--	--	--	--	--	6.4m	8.2m	9.2m	30m
		WB-R	--	--	--	--	--	--	--	--	1.3m	5.1m	2.3m

Notes: 1. The Traffic Control Signal Timing and Capacity Analysis at Signalized Intersections is applicable for signalized left turn movements. The storage lane length is calculated to store the average arrivals 95% of the time (Level of Service 'A');

!. Exclusive lane and storage length associated with the Highway 12 Commercial development

A summary of the recommendations are listed below:

- Proposed storage lengths have been provided for intersections and movements accessing the Hanson development. There is adequate space to accommodate all of these storage lengths.
- The westbound left at Jones Road was reported to require 55m of storage. It appears that 75m of storage has been constructed, which should accommodate most queue lengths for this movement.
- Queue lengths for the southbound left from SmartCentres onto Highway 12 are forecast to exceed storage space. There is additional space within the SmartCentres travel aisles to accommodate additional storage.

## 8.0 HIGHWAY 12 CAPACITY

This chapter completes a capacity calculation for the travel lanes on Highway 12 in the study area. The analysis uses midblock volumes between Brebeuf Road and Les Barber / Sumac Lane as the location for the capacity analysis. The estimated capacity of travel lanes on Highway 12 was calculated using the methodology found in MTO's Geometric Design Guideline. The estimated saturation flows per lane on Highway 12 is 1,127 vehicles. A summary of the calculations can be found in **Appendix R**. A comparison of the estimated capacity and the anticipated midblock volumes can be found in **Table 23**. This table provides forecast volumes with and without the development for all horizon years. It also provides the midblock volume to capacity ratios for volumes that are at 85% or higher than the lane capacity.

A volume to capacity threshold of 0.85 is typically used to determine when to consider mitigation measures for an intersection or road segment. The analysis shows that Highway 12 eastbound could reach this threshold in the PM peak hour in the "with development" scenario in the year 2030. This assumes full build out of the BIN Management site, background traffic volume growth of 1.25% per year every year and full build out and occupancy of all phases of the Hanson development.

Given that the 0.85 threshold is met for only one direction and only one peak hour, no highway widening is recommended by the year 2030.

Looking at 2035 and 2040, with the 1.25% growth in background traffic, the volume to capacity ratio increases. The PM peak hour experiences a v/c ratio of 0.85 or greater both eastbound and westbound in 2035 and 2040 horizons. The Saturday peak hour experiences v/c ratios of 0.85 or greater in the 2040 horizon for westbound traffic only.

The AM peak hour is not expected to approach capacity in any of the horizon years studied, with or without the Hanson development. Highway 12 is not expected to approach capacity without the Hanson development in any of the horizon years studied.

Widening of Highway 12 should be considered in 2035 and likely would be needed by 2040 if all of the assumptions in this report hold true.

**Table 23: Highway 12 Capacity Calculations**

Horizon	Peak Period	Lane Capacity	Future Background Traffic Volume and Resulting Volume to Capacity (V/C) Ratio				Future Total Traffic Volume and Resulting Volume to Capacity (V/C) Ratio			
			Eastbound	V/C Ratio	Westbound	V/C Ratio	Eastbound	V/C Ratio	Westbound	V/C Ratio
2020	AM	1,188	520	--	423	--	546	--	468	--
	PM	1,188	705	--	726	--	744	--	755	--
	SAT	1,188	621	--	676	--	668	--	718	--
2025	AM	1,188	551	--	449	--	590	--	526	--
	PM	1,188	746	--	768	--	824	--	819	--
	SAT	1,188	655	--	715	--	732	--	783	--
2030	AM	1,188	583	--	477	--	647	--	645	--
	PM	1,188	790	--	813	--	1,006	0.85	956	--
	SAT	1,188	692	--	755	--	916	--	951	--
2035	AM	1,188	619	--	507	--	683	--	675	--
	PM	1,188	836	--	861	--	1,052	0.89	1,004	0.85
	SAT	1,188	731	--	799	--	955	--	995	--
2040	AM	1,188	656	--	538	--	720	--	706	--
	PM	1,188	887	--	913	--	1,103	0.93	1,056	0.89
	SAT	1,188	772	--	845	--	996	--	1,041	0.88

### 8.1 Sensitivity Test – Horizon Year 2040 – Total Traffic Conditions with Widening

A sensitivity test was conducted to determine the impact of widening Highway 12 on intersection performance. **Table 24** shows the intersection capacity analysis for the 2040 Total Traffic conditions if Highway 12 was to be widened to four through lanes (two in each direction). Detailed intersection capacity analysis sheets are included in **Appendix Q**.

**Table 24: Intersection Capacity Analysis – 2040 Total Traffic Conditions with Widening**

Intersections	Control Type	AM Peak Hour		PM Peak Hour		SAT Peak Hour	
		LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>	LOS (Delay in seconds) <sup>1</sup>	Critical Movements <sup>2</sup>
Highway 93 at Highway 12	Signalized	B (17)	--	C (33)	WB-L (0.95) NB-T (0.85) SB-L (1.02)	B (19)	--
Brebeuf Road at Highway 12	Unsignalized	B (15)	--	C (20)	--	C (20)	--
Les Barber Boulevard / Sumac Lane at Highway 12	Unsignalized	F (61)	NB-LTR (0.16)	F (675)	NB-LTR (0.37) SB-LTR (2.19)	F (665)	SB-LTR (2.23)
	<b>Signalized</b>	A (9)	--	A (8)	--	A (6)	--
Beamish Road at Highway 12	Signalized	B (11)	--	A (5)	--	A (7)	--
Jones Road at Highway 12	Signalized	B (16)	--	C (27)	WB-L (0.91) SB-L (0.94)	C (24)	--
King Street at Highway 12	Signalized	B (18)	--	C (27)	EB-L (0.93) SB-L (0.91)	C (26)	EB-L (0.86)
King Street at Street 'A'	Signalized	A (9)	--	B (12)	--	B (13)	--

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay.  
 2. Critical movements are 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. NB-LR = northbound left-right; EB-T = eastbound through.

Widening Highway 12 provides additional midblock capacity and provides marginal reductions in vehicle delay at select intersections. As the capacity constraints typically are north or south left turning movements, the addition of east-west through lanes does not alleviate the north-south capacity constraints.

## 9.0 INTERNAL TRAFFIC CIRCULATION

Public streets within the Hanson development are designed with “complete streets” in mind. Public streets will include dedicated facilities for pedestrians, cyclists and vehicles. On-street parking is provided along select public streets. Lane widths are sufficient but have purposely been designed to not be overly wide, as a wider street encourages higher speeds. Sidewalks are provided along at least one side of public roads, with the other side being a multi-use trail that can be used by pedestrians and cyclists. Cycling facilities, either multi-use trails or on-street bike lanes, provide dedicated space for cyclists. All of these efforts will play a part in naturally calming the speed of traffic without having to install speed bumps or other traffic calming measures. Non-Hanson related traffic is not expected to short cut through the development, as travel times will remain faster to use the external arterial road network.

Similarly, internal private driveways and private roads provide adequate space for vehicle manoeuvres without overbuilding the paved surfaces. Short blocks and multi-modal connectivity allow people to get where they want to go by multiple modes in an efficient manner.

No further measures outside of these planned and designed are required in order to support safe pedestrian, cyclist and vehicular traffic movement.

## 10.0 HIGHWAY 12 ILLUMINATION

MTO’s “Ministry Policy for Highway Illumination”, dated May 8, 2002, was provided for use to conduct the illumination warrants for the stretch of Highway 12 adjacent to the Hanson development. Form 4, Non-Freeway – Continuous Illumination was used to calculate the warrant.

The calculation form is provided in **Appendix S**. An explanation of the calculations for each classification factor is provided in this chapter. The results of the analysis indicated a score of 48 points, whereas a score of 70 points is needed to warrant illumination. While intersections on Highway 12 will be illuminated, continuous illumination is **not warranted**.

### 10.1 Geometric Factors

Classification Factor	Analysis
No. of Lanes	There presently are 2 lanes on Highway 12 from the intersection with Highway 93 to just west of the intersection with Jones Road. From Jones Road east through King Street, Highway 12 has four lanes. As 4 lanes is the lowest number of lanes available on the worksheet, “4” was selected for this rating.
Lane Width	The present lanes on Highway 12 are wide, greater than 3.50 metres.
Critical Curves m (deg.)	Highway 12 is relatively straight in the study area, with no critical curves.
Grades (vertical)	There is some rolling terrain in the study area. The steepest slope is the eastbound approach to the intersection with Beamish Road. Measuring the survey drawings indicated that the slope in this location is less than 3%.
Sight Distance (M)	Due to the relatively straight road and relatively flat conditions, sight distance is excellent.
Raised Curb Median	There is a raised curb median only at a few locations; at the Highway 12 intersections at Jones Road and at King Street.
Parking	“No Parking” signs have not been placed on Highway 12 and parking along Highway 12 has not been observed. As parking is not posted as prohibited, as a conservative approach, parking is considered to be permitted on both sides of Highway 12.



## 10.2 Operational Factors

<b>Factor</b>	<b>Analysis</b>
Signals:	Three of the six intersections analysed are signalized. About half the intersections signalized was selected.
Level of Service (any dark hour):	The PM peak hour is dark during the winter months. All intersections operate at LOS B or C in the existing PM peak hour.
Median width:	There generally is no median. Medians are localized to intersections and are narrow.
Median Openings Per km:	There is no access control.
Curb Cuts:	As there is no access control. > 40% was selected, albeit there are limited number of locations where vehicles presently access the highway.
Operating Speed (km/h):	The posted speed limit is 80km/hour in the western part of the study area and 60 km/hour in the eastern portion of the study area. As a conservative approach, > 80km/hour was selected as the operating speed.
Pedestrian Traffic at Night (peds/km):	Traffic counts collected for this study do not indicate any pedestrian activity. With the opening of the BIN Management site in the past 12 months on the south leg of Jones Road, there could be some pedestrian activity between this site and SmartCentres development on the north leg of Jones Road. Due to the auto-centric nature of these developments and their distance from existing residential developments, pedestrian traffic is expected to be minimal. The intersection of Jones Road with Highway 12 presently is illuminated.

### 10.3 Environmental Factors

<b>Factor</b>	<b>Analysis</b>
Type of Development:	The development will be primarily residential with some commercial. Mainly commercial development exists presently in the study area, with some industrial uses
Advertising or Area Illumination:	The only areas presently illuminated are the intersections of Highway 12 at Highway 93, Jones Road and King Street. There is no midblock illumination or illumination of other intersections.
Accidents (% of Night-to-Total Accidents (3 yr. avg.):	A review of accident data in the study area provided by MTO revealed 31 accidents from 2012 through 2014, with 3 of them occurring at night. This equates to less than 20% of the reported accidents occurring at night in the study area.

## 11.0 CONCLUSIONS AND RECOMMENDATIONS

### 11.1 Conclusions

The report concludes that:

- The existing road network has adequate capacity to accommodate existing traffic volumes and operates at an adequate level of service;
- The addition of a vehicular connection between the Hanson development and the SmartCentres commercial block would provide an alternative vehicular access route but not be expected to redistribute traffic volumes noticeably. It will also provide a pedestrian and cycling connections between the Hanson development and the SmartCentres;
- The main internal intersections of the Hanson development are expected to operate with adequate levels of service and adequate capacity as unsignalized intersections;
- External intersection improvements will be needed at the Hanson development access points:
  - Signalization of the Beamish Road / Street 'C' and Highway 12 intersection, in the year 2020;
    - Exclusive northbound left, southbound left, eastbound left and westbound right turning lanes;
  - Signalization of the Street 'A' at King Street intersection, in the year 2025; and
  - Signalization of the Sumac Lane at Highway 12 intersection in the year 2030;
    - Exclusive eastbound left and westbound right turning lanes.
- With the recommended intersection improvements shown in Table 2, all external intersections are expected to exhibit an adequate level of service and have adequate capacity to accommodate forecast traffic volumes;
- In the horizon years (2035 and 2040), select movements at select intersections will begin to approach capacity. Because of adequate levels of service and the long term horizon, no additional intersection improvements are recommended at this time;
- Hanson development intersections should be illuminated along Highway 12 but continuous illumination is not warranted; and
- Highway 12 is expected to approach capacity in select peak hours beginning in 2030. If the BIN Management site, background traffic growth and Hanson development proceeds as forecast, Highway 12 likely will need to be widened by 2040.

## 11.2 Recommendations

Road improvements shown in **Table 25** are recommended to be constructed. Recommendations are made by horizon year and by scenario: background traffic (no Hanson development) and total traffic (with the Hanson development). The recommended road improvements are shown diagrammatically in **Figure 25**.

These improvements would only be if construction of the Hanson development, the BIN Management site and background traffic volumes increase as assumed in this report. If the timing of development or the amount of development differs from what is assumed in this report, then the need for and timing of road improvements also could change.

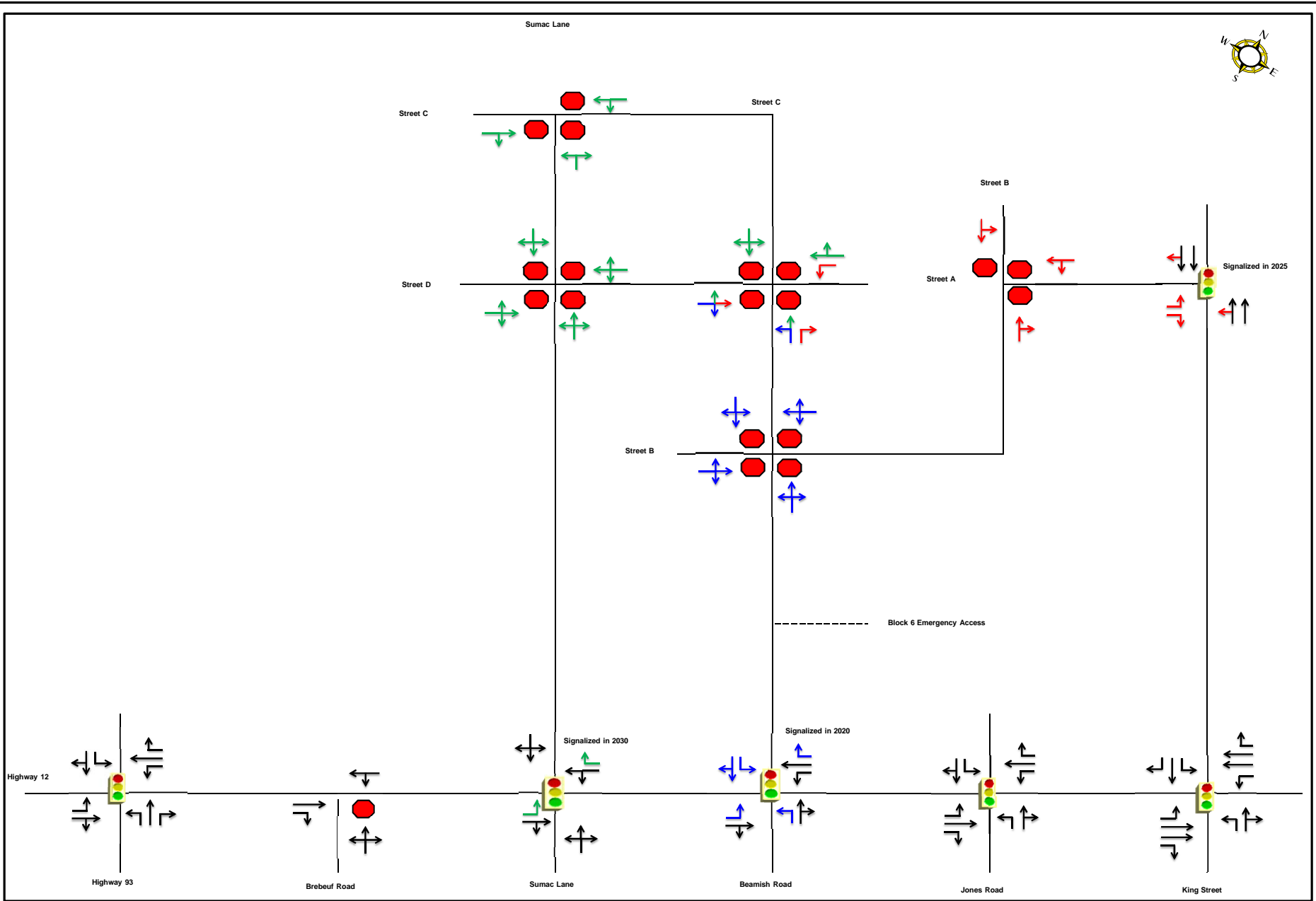
**Table 25: Road Improvements Needed by Horizon Year and Development Scenario**

Intersections	2020		2025		2030		2035 / 2040	
	Background Traffic	Total Traffic	Background Traffic	Total Traffic	Background Traffic	Total Traffic	Background Traffic	Total Traffic
Highway 93 at Highway 12	--	--	--	--	--	--	--	--
Brebeuf Road at Highway 12	--	--	--	--	--	--	--	--
Sumac Lane / Les Barber Boulevard / Street 'B' at Highway 12	--	--	--	--	--	Signalize Exclusive EB-L, WB-R lanes	--	--
Beamish Road / Street 'C' at Highway 12	--	Signalize Exclusive EB-L, SB-L, WB-R, NB-L lanes	--	--	--	--	--	--
Jones Road at Highway 12	Exclusive WB-L lane	--	--	--	--	--	--	--
King Street at Highway 12	--	--	--	--	--	--	--	--
King Street at Street 'A'	--	--	--	Signalize Exclusive EB-L	--	--	--	--
Highway 12 Corridor	--	--	--	--	--	--	--	Consider Widening

Storage lengths for new left turn and right turn lanes are recommended as shown in **Table 26**.

**Table 26: Recommended Storage Lengths**

Intersection	Control Type	Exclusive Lane	Recommended Lane Length (m)
Highway 12 at Beamish Rd / Street C	Signalized	NB-L	30
		SB-L	45
		EB-L	30
		WB-R	30
King Street at Street A	Signalized	EB-L	60
Sumac Lane / Les Barber Boulevard / Street 'B' at Highway 12	Signalized	SB-L	30
		EB-L	30
		WB-R	30



- LEGEND**
- Existing Movements
  - Improved Movements in 2020
  - Improved Movements in 2025
  - Improved Movements in 2030
  - Stop-Controlled Intersection
  - Signalized Intersection

**FIGURE 25**  
Road Improvements by Horizon Year

# APPENDIX

**G**

SYNCHRO

WORKSHEETS

- FUTURE

BACKGROUND

CONDITIONS





Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	179	7	147	74	278	3	338	236	206	240	9
Future Volume (vph)	13	179	7	147	74	278	3	338	236	206	240	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.995				0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1794	0	1656	1743	1495	1347	1792	1524	1703	1754	0
Flt Permitted	0.701			0.475			0.581			0.325		
Satd. Flow (perm)	1074	1794	0	828	1743	1495	824	1792	1524	583	1754	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				327			278		4	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		218.2			1632.3			668.8			164.2	
Travel Time (s)		9.8			73.5			30.1			7.4	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Adj. Flow (vph)	15	211	8	173	87	327	4	398	278	242	282	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	219	0	173	87	327	4	398	278	242	293	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

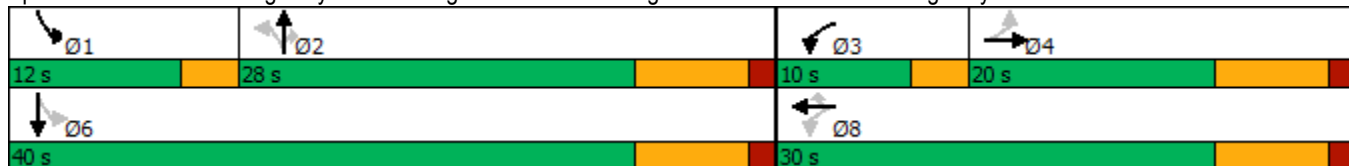


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	20.0	20.0		10.0	30.0	30.0	28.0	28.0	28.0	12.0	40.0	
Total Split (%)	28.6%	28.6%		14.3%	42.9%	42.9%	40.0%	40.0%	40.0%	17.1%	57.1%	
Maximum Green (s)	12.8	12.8		7.0	22.8	22.8	20.6	20.6	20.6	9.0	32.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	12.9	12.9		27.1	22.9	22.9	21.4	21.4	21.4	37.4	33.0	
Actuated g/C Ratio	0.19	0.19		0.40	0.33	0.33	0.31	0.31	0.31	0.55	0.48	
v/c Ratio	0.07	0.65		0.41	0.15	0.46	0.02	0.71	0.42	0.51	0.35	
Control Delay	24.2	35.3		17.4	17.0	4.6	17.3	29.9	4.8	12.5	12.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.2	35.3		17.4	17.0	4.6	17.3	29.9	4.8	12.5	12.5	
LOS	C	D		B	B	A	B	C	A	B	B	
Approach Delay		34.6			10.2			19.6			12.5	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	68.6
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	16.7
Intersection LOS:	B
Intersection Capacity Utilization:	71.0%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	15	219	173	87	327	4	398	278	242	293
v/c Ratio	0.07	0.65	0.41	0.15	0.46	0.02	0.71	0.42	0.51	0.35
Control Delay	24.2	35.3	17.4	17.0	4.6	17.3	29.9	4.8	12.5	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	35.3	17.4	17.0	4.6	17.3	29.9	4.8	12.5	12.5
Queue Length 50th (m)	1.7	27.6	15.4	8.2	0.0	0.4	48.3	0.0	16.3	23.4
Queue Length 95th (m)	6.1	45.6	26.9	16.5	13.0	2.3	72.5	13.0	26.6	37.0
Internal Link Dist (m)		194.2		1608.3			644.8			140.2
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	216	363	424	605	733	260	564	670	481	862
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.60	0.41	0.14	0.45	0.02	0.71	0.41	0.50	0.34

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	179	7	147	74	278	3	338	236	206	240	9
Future Volume (vph)	13	179	7	147	74	278	3	338	236	206	240	9
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1793		1656	1743	1495	1347	1792	1524	1703	1754	
Flt Permitted	0.70	1.00		0.48	1.00	1.00	0.58	1.00	1.00	0.33	1.00	
Satd. Flow (perm)	1073	1793		829	1743	1495	823	1792	1524	583	1754	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	211	8	173	87	327	4	398	278	242	282	11
RTOR Reduction (vph)	0	2	0	0	0	218	0	0	191	0	2	0
Lane Group Flow (vph)	15	217	0	173	87	109	4	398	87	242	291	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	11.9	11.9		21.9	21.9	21.9	20.4	20.4	20.4	32.0	32.0	
Effective Green, g (s)	12.9	12.9		22.9	22.9	22.9	21.4	21.4	21.4	33.0	33.0	
Actuated g/C Ratio	0.19	0.19		0.33	0.33	0.33	0.31	0.31	0.31	0.48	0.48	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	202	337		373	582	499	257	559	476	437	844	
v/s Ratio Prot		c0.12		c0.05	0.05			c0.22		c0.08	0.17	
v/s Ratio Perm	0.01			0.10		0.07	0.00		0.06	0.19		
v/c Ratio	0.07	0.65		0.46	0.15	0.22	0.02	0.71	0.18	0.55	0.34	
Uniform Delay, d1	22.9	25.7		17.1	16.0	16.4	16.3	20.8	17.2	11.5	11.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	4.2		0.9	0.1	0.2	0.0	4.6	0.3	1.5	0.3	
Delay (s)	23.0	29.9		18.0	16.1	16.6	16.3	25.4	17.4	13.0	11.4	
Level of Service	C	C		B	B	B	B	C	B	B	B	
Approach Delay (s)		29.4			16.9			22.1			12.1	
Approach LOS		C			B			C			B	

### Intersection Summary

HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	16.6
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

# Lanes, Volumes, Timings

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	594	36	28	457	59	21	0	35	98	2	50
Future Volume (vph)	31	594	36	28	457	59	21	0	35	98	2	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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
Frt			0.850			0.850		0.850			0.855	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1154	0	1770	1593	0
Flt Permitted	0.439			0.324			0.721			0.733		
Satd. Flow (perm)	818	1810	1188	434	1759	1583	993	1154	0	1365	1593	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			44			63		101				53
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			85.1				66.9
Travel Time (s)		73.5			28.8			6.1				4.8
Peak Hour 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
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Adj. Flow (vph)	33	632	38	30	486	63	22	0	37	104	2	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	632	38	30	486	63	22	37	0	104	55	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

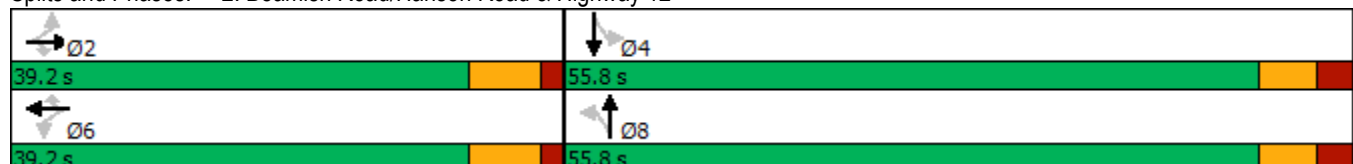


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	39.2	39.2	39.2	39.2	39.2	39.2	55.8	55.8		55.8	55.8	
Total Split (%)	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	32.4	32.4	32.4	32.4	32.4	32.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	15.0	15.0		15.0	15.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	29.0	29.0	29.0	29.0	29.0	29.0	11.8	11.8		11.8	11.8	
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.23	0.23		0.23	0.23	
v/c Ratio	0.07	0.63	0.06	0.12	0.50	0.07	0.10	0.11		0.34	0.14	
Control Delay	6.2	11.7	2.2	7.4	9.5	2.1	18.1	0.7		21.2	7.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.2	11.7	2.2	7.4	9.5	2.1	18.1	0.7		21.2	7.3	
LOS	A	B	A	A	A	A	B	A		C	A	
Approach Delay		10.9			8.6			7.2			16.4	
Approach LOS		B			A			A			B	

Intersection Summary

Area Type:	Other
Cycle Length:	95
Actuated Cycle Length:	52.4
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.63
Intersection Signal Delay:	10.5
Intersection LOS:	B
Intersection Capacity Utilization:	56.2%
ICU Level of Service:	B
Analysis Period (min):	15

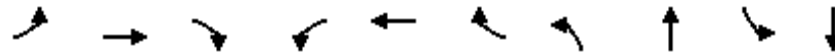
Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12



Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	632	38	30	486	63	22	37	104	55
v/c Ratio	0.07	0.63	0.06	0.12	0.50	0.07	0.10	0.11	0.34	0.14
Control Delay	6.2	11.7	2.2	7.4	9.5	2.1	18.1	0.7	21.2	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.2	11.7	2.2	7.4	9.5	2.1	18.1	0.7	21.2	7.3
Queue Length 50th (m)	1.3	35.9	0.0	1.2	24.8	0.0	1.7	0.0	8.3	0.2
Queue Length 95th (m)	4.8	71.4	2.8	5.0	49.8	4.0	6.9	0.3	21.6	7.6
Internal Link Dist (m)	1608.3			615.3			61.1			42.9
Turn Bay Length (m)	30.0		115.0	93.0		75.0				
Base Capacity (vph)	523	1157	775	277	1125	1035	950	1108	1306	1526
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.55	0.05	0.11	0.43	0.06	0.02	0.03	0.08	0.04

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	594	36	28	457	59	21	0	35	98	2	50
Future Volume (vph)	31	594	36	28	457	59	21	0	35	98	2	50
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1154		1770	1593	
Flt Permitted	0.44	1.00	1.00	0.32	1.00	1.00	0.72	1.00		0.73	1.00	
Satd. Flow (perm)	817	1810	1188	434	1759	1583	993	1154		1365	1593	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	632	38	30	486	63	22	0	37	104	2	53
RTOR Reduction (vph)	0	0	17	0	0	28	0	29	0	0	41	0
Lane Group Flow (vph)	33	632	21	30	486	35	22	8	0	104	14	0
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	28.0	28.0	28.0	28.0	28.0	28.0	10.8	10.8		10.8	10.8	
Effective Green, g (s)	29.0	29.0	29.0	29.0	29.0	29.0	11.8	11.8		11.8	11.8	
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.55	0.55	0.23	0.23		0.23	0.23	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	452	1001	657	240	973	876	223	259		307	358	
v/s Ratio Prot		c0.35			0.28			0.01				0.01
v/s Ratio Perm	0.04		0.02	0.07		0.02	0.02			c0.08		
v/c Ratio	0.07	0.63	0.03	0.12	0.50	0.04	0.10	0.03		0.34	0.04	
Uniform Delay, d1	5.4	8.0	5.3	5.6	7.2	5.3	16.1	15.8		17.0	15.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.3	0.0	0.2	0.4	0.0	0.2	0.1		0.7	0.0	
Delay (s)	5.5	9.3	5.3	5.8	7.6	5.4	16.3	15.9		17.7	15.9	
Level of Service	A	A	A	A	A	A	B	B		B	B	
Approach Delay (s)		8.9			7.3			16.0			17.1	
Approach LOS		A			A			B			B	

Intersection Summary

HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	52.4	Sum of lost time (s)	11.6
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	55.0		14.8			85.1
Travel Time (s)	4.0		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	481	111	50	394	230	43	11	23	169	23	103
Future Volume (vph)	130	481	111	50	394	230	43	11	23	169	23	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99		1.00		
Frt			0.850			0.850		0.897				0.877
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1626	0	1736	1587	0
Flt Permitted	0.455			0.451			0.666			0.732		
Satd. Flow (perm)	856	3343	1455	857	3406	1553	973	1626	0	1335	1587	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			258		26				116
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)									3	3		
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
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Adj. Flow (vph)	146	540	125	56	443	258	48	12	26	190	26	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	146	540	125	56	443	258	48	38	0	190	142	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

# Lanes, Volumes, Timings

## 5: Jones Road & Highway 12

03/04/2021

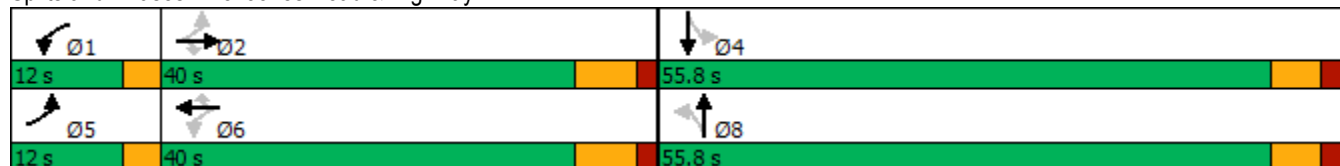


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	35.8	26.5	26.5	33.2	21.2	21.2	15.3	15.3		15.3		15.3
Actuated g/C Ratio	0.60	0.45	0.45	0.56	0.36	0.36	0.26	0.26		0.26		0.26
v/c Ratio	0.22	0.36	0.17	0.09	0.36	0.36	0.19	0.09		0.55		0.29
Control Delay	6.8	13.9	4.2	6.3	16.1	4.2	18.8	9.5		25.5		7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	6.8	13.9	4.2	6.3	16.1	4.2	18.8	9.5		25.5		7.2
LOS	A	B	A	A	B	A	B	A		C		A
Approach Delay		11.1			11.3			14.7				17.7
Approach LOS		B			B			B				B

### Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 59.3  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 12.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.5%  
 ICU Level of Service B  
 Analysis Period (min) 15

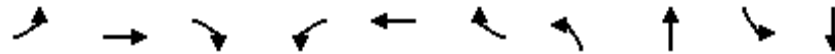
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	146	540	125	56	443	258	48	38	190	142
v/c Ratio	0.22	0.36	0.17	0.09	0.36	0.36	0.19	0.09	0.55	0.29
Control Delay	6.8	13.9	4.2	6.3	16.1	4.2	18.8	9.5	25.5	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	13.9	4.2	6.3	16.1	4.2	18.8	9.5	25.5	7.2
Queue Length 50th (m)	5.8	22.7	0.0	2.1	18.4	0.0	4.2	1.0	18.4	2.2
Queue Length 95th (m)	16.3	42.0	9.8	7.5	35.4	14.1	11.5	6.7	36.0	13.1
Internal Link Dist (m)	615.3				306.8		52.2		126.5	
Turn Bay Length (m)	216.0		160.0		80.0				80.0	
Base Capacity (vph)	678	1941	897	667	1977	1010	825	1384	1133	1364
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.28	0.14	0.08	0.22	0.26	0.06	0.03	0.17	0.10

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	130	481	111	50	394	230	43	11	23	169	23	103	
Future Volume (vph)	130	481	111	50	394	230	43	11	23	169	23	103	
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.88		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1628		1734	1588		
Flt Permitted	0.45	1.00	1.00	0.45	1.00	1.00	0.67	1.00		0.73	1.00		
Satd. Flow (perm)	856	3343	1455	856	3406	1553	974	1628		1336	1588		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
Adj. Flow (vph)	146	540	125	56	443	258	48	12	26	190	26	116	
RTOR Reduction (vph)	0	0	70	0	0	162	0	19	0	0	87	0	
Lane Group Flow (vph)	146	540	55	56	443	96	48	19	0	190	55	0	
Confl. Peds. (#/hr)									3	3			
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			8				4	
Permitted Phases	2		2	6		6	8			4			
Actuated Green, G (s)	32.6	25.5	25.5	25.6	21.5	21.5	14.3	14.3		14.3	14.3		
Effective Green, g (s)	33.6	26.5	26.5	27.6	22.5	22.5	15.3	15.3		15.3	15.3		
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.37	0.37	0.25	0.25		0.25	0.25		
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8		
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	615	1464	637	470	1266	577	246	411		337	401		
v/s Ratio Prot	c0.04	c0.16		0.01	0.13			0.01				0.03	
v/s Ratio Perm	0.10		0.04	0.04		0.06	0.05			c0.14			
v/c Ratio	0.24	0.37	0.09	0.12	0.35	0.17	0.20	0.05		0.56	0.14		
Uniform Delay, d1	6.6	11.4	9.9	9.2	13.7	12.7	17.8	17.1		19.7	17.5		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.2	0.2	0.1	0.1	0.2	0.2	0.4	0.0		2.2	0.2		
Delay (s)	6.8	11.6	10.0	9.3	13.9	12.9	18.2	17.1		21.9	17.7		
Level of Service	A	B	A	A	B	B	B	B		C	B		
Approach Delay (s)		10.5			13.2			17.7			20.1		
Approach LOS		B			B			B			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.4		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.42										
Actuated Cycle Length (s)			60.5		Sum of lost time (s)					13.6			
Intersection Capacity Utilization			62.5%		ICU Level of Service					B			
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	321	71	80	433	250	29	42	27	97	78	212
Future Volume (vph)	280	321	71	80	433	250	29	42	27	97	78	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.99			0.99	1.00		
Fr <sub>t</sub>		0.973				0.850			0.850			0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3272	0	1805	3374	1583	1805	1759	1615	1736	1845	1553
Fl <sub>t</sub> Permitted	0.445			0.491			0.699			0.726		
Satd. Flow (perm)	813	3272	0	933	3374	1563	1328	1759	1594	1325	1845	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		43				287			78			244
Link Speed (k/h)		60			60			50				50
Link Distance (m)		330.8			413.9			201.9				591.8
Travel Time (s)		19.8			24.8			14.5				42.6
Confl. Peds. (#/hr)	1					1			1	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Adj. Flow (vph)	322	369	82	92	498	287	33	48	31	111	90	244
Shared Lane Traffic (%)												
Lane Group Flow (vph)	322	451	0	92	498	287	33	48	31	111	90	244
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

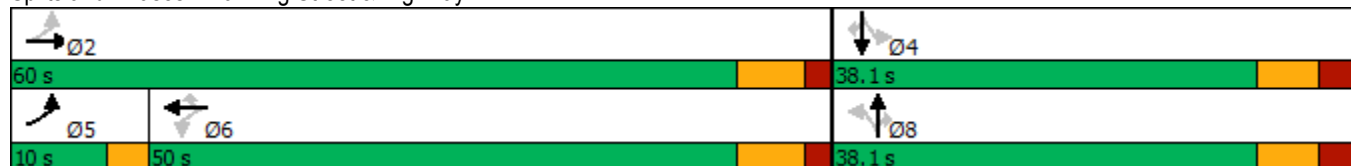


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		43.0	43.0	43.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.1	46.0		36.0	36.0	36.0	13.1	13.1	13.1	13.1	13.1	13.1
Actuated g/C Ratio	0.70	0.65		0.50	0.50	0.50	0.18	0.18	0.18	0.18	0.18	0.18
v/c Ratio	0.48	0.21		0.20	0.29	0.31	0.14	0.15	0.09	0.45	0.26	0.50
Control Delay	6.9	5.2		11.9	11.2	2.5	25.2	25.1	0.7	32.2	26.8	7.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	5.2		11.9	11.2	2.5	25.2	25.1	0.7	32.2	26.8	7.7
LOS	A	A		B	B	A	C	C	A	C	C	A
Approach Delay		5.9			8.4			18.4				17.7
Approach LOS		A			A			B				B

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 71.3  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.50  
 Intersection Signal Delay: 9.9  
 Intersection LOS: A  
 Intersection Capacity Utilization 73.0%  
 ICU Level of Service C  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12





Queues

6: King Street & Highway 12

03/04/2021


























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	322	451	92	498	287	33	48	31	111	90	244
v/c Ratio	0.48	0.21	0.20	0.29	0.31	0.14	0.15	0.09	0.45	0.26	0.50
Control Delay	6.9	5.2	11.9	11.2	2.5	25.2	25.1	0.7	32.2	26.8	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	5.2	11.9	11.2	2.5	25.2	25.1	0.7	32.2	26.8	7.7
Queue Length 50th (m)	12.5	9.8	6.4	19.3	0.0	3.9	5.7	0.0	14.1	11.0	0.0
Queue Length 95th (m)	27.8	18.9	16.3	32.3	10.8	10.5	13.6	0.5	27.3	21.9	15.3
Internal Link Dist (m)		306.8		389.9			177.9			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	674	2491	576	2084	1075	596	790	759	595	828	832
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	0.48	0.18	0.16	0.24	0.27	0.06	0.06	0.04	0.19	0.11	0.29

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 6: King Street & Highway 12

03/04/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	280	321	71	80	433	250	29	42	27	97	78	212	
Future Volume (vph)	280	321	71	80	433	250	29	42	27	97	78	212	
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1735	3271		1805	3374	1563	1805	1759	1594	1734	1845	1553	
Flt Permitted	0.44	1.00		0.49	1.00	1.00	0.70	1.00	1.00	0.73	1.00	1.00	
Satd. Flow (perm)	813	3271		934	3374	1563	1327	1759	1594	1325	1845	1553	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	322	369	82	92	498	287	33	48	31	111	90	244	
RTOR Reduction (vph)	0	15	0	0	0	142	0	0	25	0	0	199	
Lane Group Flow (vph)	322	436	0	92	498	145	33	48	6	111	90	45	
Confl. Peds. (#/hr)	1					1			1	1			
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.1	12.1	12.1	12.1	12.1	12.1	
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.1	13.1	13.1	13.1	13.1	13.1	
Actuated g/C Ratio	0.65	0.65		0.51	0.51	0.51	0.18	0.18	0.18	0.18	0.18	0.18	
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	629	2114		472	1708	791	243	323	292	243	338	285	
v/s Ratio Prot	c0.06	0.13			c0.15			0.03			0.05		
v/s Ratio Perm	0.27			0.10		0.09	0.02		0.00	c0.08		0.03	
v/c Ratio	0.51	0.21		0.19	0.29	0.18	0.14	0.15	0.02	0.46	0.27	0.16	
Uniform Delay, d1	5.5	5.1		9.6	10.2	9.6	24.4	24.4	23.8	25.9	25.0	24.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.4	0.2	0.2	0.3	0.2	0.0	1.4	0.4	0.3	
Delay (s)	6.2	5.2		10.0	10.4	9.8	24.6	24.6	23.9	27.3	25.4	24.7	
Level of Service	A	A		A	B	A	C	C	C	C	C	C	
Approach Delay (s)		5.6			10.1			24.4			25.5		
Approach LOS		A			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			12.4		HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio			0.36										
Actuated Cycle Length (s)			71.3		Sum of lost time (s)				14.1				
Intersection Capacity Utilization			73.0%		ICU Level of Service					C			
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings  
10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	38	50	0
Future Volume (vph)	0	0	0	38	50	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Frnt</b>						
<b>Flt Protected</b>						
Satd. Flow (prot)	1863	0	0	1145	1242	0
<b>Flt Permitted</b>						
Satd. Flow (perm)	1863	0	0	1145	1242	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	46.1			34.8	14.8	
Travel Time (s)	3.3			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	66%	53%	2%
Adj. Flow (vph)	0	0	0	41	54	0
<b>Shared Lane Traffic (%)</b>						
Lane Group Flow (vph)	0	0	0	41	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
<b>Two way Left Turn Lane</b>						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	38	50	0
Future Volume (Veh/h)	0	0	0	38	50	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	41	54	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				100		
pX, platoon unblocked						
vC, conflicting volume	95	54	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95	54	54			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	905	1013	1551			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	41	54			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1551	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	25	6	0	25
Future Volume (vph)	6	0	25	6	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.950					
Satd. Flow (prot)	902	0	923	0	0	950
Flt Permitted	0.950					
Satd. Flow (perm)	902	0	923	0	0	950
Link Speed (k/h)	50	50				
Link Distance (m)	95.4	55.5				40.5
Travel Time (s)	6.9	4.0				2.9
Confl. Peds. (#/hr)	10	10	10		10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	2%	100%	100%	2%	100%
Adj. Flow (vph)	7	0	27	7	0	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	34	0	0	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	0.0				0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	15		25	
Sign Control	Stop	Free			Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
	ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	25	6	0	25
Future Volume (Veh/h)	6	0	25	6	0	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	27	7	0	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						225
pX, platoon unblocked						
vC, conflicting volume	78	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	78	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	719	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	7	34	27			
Volume Left	7	0	0			
Volume Right	0	7	0			
cSH	719	1700	1551			
Volume to Capacity	0.01	0.02	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	10.1	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.1	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			1.0			
Intersection Capacity Utilization			19.0%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	25	27	0
Future Volume (vph)	0	0	0	25	27	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	950	950	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	950	950	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	48.4			40.5	49.5	
Travel Time (s)	3.5			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	100%	100%	2%
Adj. Flow (vph)	0	0	0	27	29	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	27	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	19.0%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	25	27	0
Future Volume (Veh/h)	0	0	0	25	27	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	27	29	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	76	49	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	76	49	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	912	1003	1558			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	27	29			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1558	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			



Lanes, Volumes, Timings

26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	56.1		49.5			34.8
Travel Time (s)	4.0		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis  
 26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	135					
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	183	7	164	79	311	3	351	251	219	250	9
Future Volume (vph)	13	183	7	164	79	311	3	351	251	219	250	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.995				0.850			0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1794	0	1656	1743	1495	1347	1792	1524	1703	1755	0
Flt Permitted	0.697			0.456			0.574			0.324		
Satd. Flow (perm)	1068	1794	0	795	1743	1495	814	1792	1524	581	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				366			295			3
Link Speed (k/h)		80			80			80				80
Link Distance (m)		218.2			1632.3			668.8				164.2
Travel Time (s)		9.8			73.5			30.1				7.4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Adj. Flow (vph)	15	215	8	193	93	366	4	413	295	258	294	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	223	0	193	93	366	4	413	295	258	305	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

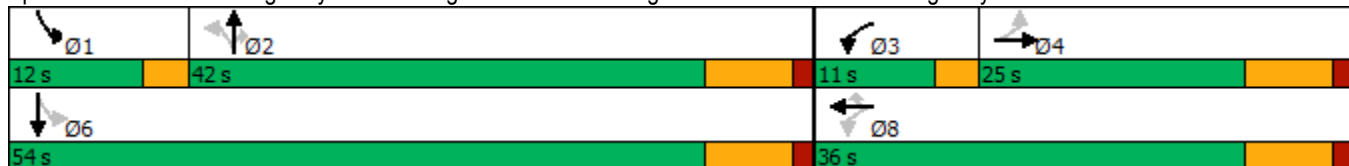


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	25.0	25.0		11.0	36.0	36.0	42.0	42.0	42.0	12.0	54.0	
Total Split (%)	27.8%	27.8%		12.2%	40.0%	40.0%	46.7%	46.7%	46.7%	13.3%	60.0%	
Maximum Green (s)	17.8	17.8		8.0	28.8	28.8	34.6	34.6	34.6	9.0	46.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	15.3	15.3		30.5	26.3	26.3	26.4	26.4	26.4	42.8	38.3	
Actuated g/C Ratio	0.20	0.20		0.39	0.34	0.34	0.34	0.34	0.34	0.55	0.49	
v/c Ratio	0.07	0.63		0.47	0.16	0.49	0.01	0.67	0.41	0.56	0.35	
Control Delay	28.3	37.9		21.5	20.1	5.0	17.3	28.3	4.3	14.4	13.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.3	37.9		21.5	20.1	5.0	17.3	28.3	4.3	14.4	13.4	
LOS	C	D		C	C	A	B	C	A	B	B	
Approach Delay		37.3			12.0			18.3			13.8	
Approach LOS		D			B			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	77.4
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	17.3
Intersection LOS:	B
Intersection Capacity Utilization:	71.6%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	15	223	193	93	366	4	413	295	258	305
v/c Ratio	0.07	0.63	0.47	0.16	0.49	0.01	0.67	0.41	0.56	0.35
Control Delay	28.3	37.9	21.5	20.1	5.0	17.3	28.3	4.3	14.4	13.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	37.9	21.5	20.1	5.0	17.3	28.3	4.3	14.4	13.4
Queue Length 50th (m)	1.9	30.8	19.3	9.6	0.0	0.4	53.9	0.0	19.5	27.0
Queue Length 95th (m)	7.1	56.3	38.6	21.8	14.9	2.3	81.0	12.5	32.6	43.5
Internal Link Dist (m)		194.2		1608.3			644.8			140.2
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	263	443	415	679	806	379	834	867	468	1094
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.50	0.47	0.14	0.45	0.01	0.50	0.34	0.55	0.28

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	183	7	164	79	311	3	351	251	219	250	9
Future Volume (vph)	13	183	7	164	79	311	3	351	251	219	250	9
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1794		1656	1743	1495	1347	1792	1524	1703	1754	
Flt Permitted	0.70	1.00		0.46	1.00	1.00	0.57	1.00	1.00	0.32	1.00	
Satd. Flow (perm)	1068	1794		794	1743	1495	814	1792	1524	582	1754	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	215	8	193	93	366	4	413	295	258	294	11
RTOR Reduction (vph)	0	2	0	0	0	241	0	0	194	0	2	0
Lane Group Flow (vph)	15	221	0	193	93	125	4	413	101	258	303	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	14.3	14.3		25.3	25.3	25.3	25.5	25.5	25.5	37.4	37.4	
Effective Green, g (s)	15.3	15.3		26.3	26.3	26.3	26.5	26.5	26.5	38.4	38.4	
Actuated g/C Ratio	0.20	0.20		0.34	0.34	0.34	0.34	0.34	0.34	0.50	0.50	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	211	355		370	593	508	279	614	522	432	871	
v/s Ratio Prot		c0.12		c0.06	0.05			c0.23		c0.08	0.17	
v/s Ratio Perm	0.01			0.12		0.08	0.00		0.07	0.22		
v/c Ratio	0.07	0.62		0.52	0.16	0.25	0.01	0.67	0.19	0.60	0.35	
Uniform Delay, d1	25.2	28.4		19.2	17.8	18.4	16.8	21.7	17.9	12.6	11.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	3.4		1.3	0.1	0.3	0.0	3.2	0.2	2.2	0.3	
Delay (s)	25.4	31.8		20.5	17.9	18.6	16.8	24.9	18.1	14.8	12.2	
Level of Service	C	C		C	B	B	B	C	B	B	B	
Approach Delay (s)		31.4			19.1			22.0			13.4	
Approach LOS		C			B			C			B	

### Intersection Summary

HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	77.3	Sum of lost time (s)	16.6
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	610	36	28	479	34	21	0	35	48	3	83
Future Volume (vph)	46	610	36	28	479	34	21	0	35	48	3	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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			0.93			0.93	0.98	0.98		0.99	0.96	
Frt			0.850			0.850		0.850			0.855	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1127	0	1770	1533	0
Flt Permitted	0.428			0.325			0.698			0.733		
Satd. Flow (perm)	797	1810	1102	435	1759	1470	945	1127	0	1350	1533	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			44			44		80				88
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			85.1				66.9
Travel Time (s)		73.5			28.8			6.1				4.8
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Peak Hour 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
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Adj. Flow (vph)	49	649	38	30	510	36	22	0	37	51	3	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	649	38	30	510	36	22	37	0	51	91	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
2: Beamish Road/Hanson Road & Highway 12

03/04/2021

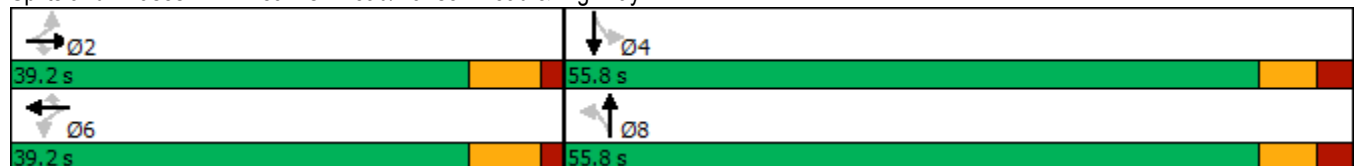


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	39.2	39.2	39.2	39.2	39.2	39.2	55.8	55.8		55.8	55.8	
Total Split (%)	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	32.4	32.4	32.4	32.4	32.4	32.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	15.0	15.0		15.0	15.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	31.1	31.1	31.1	31.1	31.1	31.1	11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58	0.58	0.20	0.20		0.20	0.20	
v/c Ratio	0.11	0.62	0.06	0.12	0.50	0.04	0.11	0.13		0.18	0.24	
Control Delay	5.8	10.7	2.0	6.6	8.9	1.8	19.0	2.6		19.5	7.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	5.8	10.7	2.0	6.6	8.9	1.8	19.0	2.6		19.5	7.3	
LOS	A	B	A	A	A	A	B	A		B	A	
Approach Delay		10.0			8.3			8.7			11.7	
Approach LOS		A			A			A			B	

Intersection Summary

Area Type:	Other
Cycle Length:	95
Actuated Cycle Length:	53.7
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.62
Intersection Signal Delay:	9.4
Intersection LOS:	A
Intersection Capacity Utilization:	72.6%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12

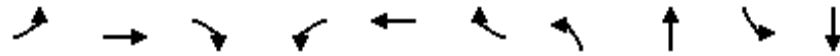




Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	649	38	30	510	36	22	37	51	91
v/c Ratio	0.11	0.62	0.06	0.12	0.50	0.04	0.11	0.13	0.18	0.24
Control Delay	5.8	10.7	2.0	6.6	8.9	1.8	19.0	2.6	19.5	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	10.7	2.0	6.6	8.9	1.8	19.0	2.6	19.5	7.3
Queue Length 50th (m)	1.9	37.4	0.0	1.2	26.6	0.0	1.8	0.0	4.3	0.3
Queue Length 95th (m)	5.7	65.1	2.6	4.4	46.5	2.3	7.0	2.3	12.1	9.7
Internal Link Dist (m)	1608.3			615.3			61.1		42.9	
Turn Bay Length (m)	30.0		115.0	93.0		75.0				
Base Capacity (vph)	496	1127	702	270	1095	931	880	1055	1258	1434
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.58	0.05	0.11	0.47	0.04	0.03	0.04	0.04	0.06

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	610	36	28	479	34	21	0	35	48	3	83
Future Volume (vph)	46	610	36	28	479	34	21	0	35	48	3	83
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1746	1810	1129	1259	1759	1505	1295	1132		1759	1545	
Flt Permitted	0.43	1.00	1.00	0.32	1.00	1.00	0.70	1.00		0.73	1.00	
Satd. Flow (perm)	786	1810	1129	430	1759	1505	952	1132		1357	1545	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	49	649	38	30	510	36	22	0	37	51	3	88
RTOR Reduction (vph)	0	0	16	0	0	15	0	29	0	0	70	0
Lane Group Flow (vph)	49	649	22	30	510	21	22	8	0	51	21	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	30.1	30.1	30.1	30.1	30.1	30.1	10.0	10.0		10.0	10.0	
Effective Green, g (s)	31.1	31.1	31.1	31.1	31.1	31.1	11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58	0.58	0.20	0.20		0.20	0.20	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	455	1048	653	249	1018	871	195	231		277	316	
v/s Ratio Prot		c0.36			0.29			0.01				0.01
v/s Ratio Perm	0.06		0.02	0.07		0.01	0.02			c0.04		
v/c Ratio	0.11	0.62	0.03	0.12	0.50	0.02	0.11	0.03		0.18	0.07	
Uniform Delay, d1	5.1	7.4	4.9	5.1	6.7	4.8	17.4	17.1		17.6	17.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.1	0.0	0.2	0.4	0.0	0.3	0.1		0.3	0.1	
Delay (s)	5.2	8.5	4.9	5.3	7.1	4.8	17.6	17.1		18.0	17.3	
Level of Service	A	A	A	A	A	A	B	B		B	B	
Approach Delay (s)		8.1			6.9			17.3			17.5	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			8.9	HCM 2000 Level of Service				A				
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			53.7	Sum of lost time (s)				11.6				
Intersection Capacity Utilization			72.6%	ICU Level of Service				C				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	55.0		14.8			85.1
Travel Time (s)	4.0		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

























03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	446	111	50	387	233	43	12	23	169	23	103
Future Volume (vph)	131	446	111	50	387	233	43	12	23	169	23	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99		1.00		
Frt			0.850			0.850		0.900				0.877
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1629	0	1736	1587	0
Flt Permitted	0.458			0.468			0.666			0.732		
Satd. Flow (perm)	862	3343	1455	889	3406	1553	973	1629	0	1335	1587	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			262			26			116
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)									3	3		
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
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Adj. Flow (vph)	147	501	125	56	435	262	48	13	26	190	26	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	147	501	125	56	435	262	48	39	0	190	142	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1		2
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left		Thru
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0		10.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0		0.6
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

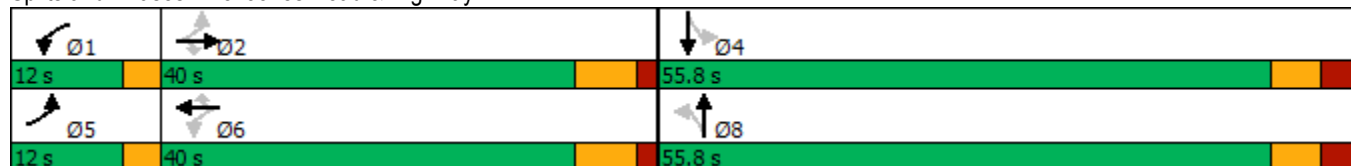


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	35.7	26.4	26.4	33.1	21.1	21.1	15.2	15.2		15.2		15.2
Actuated g/C Ratio	0.60	0.45	0.45	0.56	0.36	0.36	0.26	0.26		0.26		0.26
v/c Ratio	0.22	0.34	0.17	0.09	0.36	0.36	0.19	0.09		0.56		0.29
Control Delay	6.7	13.6	4.2	6.2	16.0	4.2	18.8	9.6		25.7		7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	6.7	13.6	4.2	6.2	16.0	4.2	18.8	9.6		25.7		7.2
LOS	A	B	A	A	B	A	B	A		C		A
Approach Delay		10.8			11.2			14.7				17.8
Approach LOS		B			B			B				B

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 59.1  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.56  
 Intersection Signal Delay: 12.3  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.5%  
 ICU Level of Service B  
 Analysis Period (min) 15

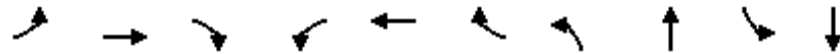
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	147	501	125	56	435	262	48	39	190	142
v/c Ratio	0.22	0.34	0.17	0.09	0.36	0.36	0.19	0.09	0.56	0.29
Control Delay	6.7	13.6	4.2	6.2	16.0	4.2	18.8	9.6	25.7	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.7	13.6	4.2	6.2	16.0	4.2	18.8	9.6	25.7	7.2
Queue Length 50th (m)	5.8	20.7	0.0	2.1	17.9	0.0	4.2	1.1	18.4	2.2
Queue Length 95th (m)	16.3	38.6	9.7	7.5	34.4	14.2	11.4	6.9	35.9	13.1
Internal Link Dist (m)		615.3			306.8			52.2		126.5
Turn Bay Length (m)	216.0		160.0	80.0		80.0				
Base Capacity (vph)	682	1947	899	682	1984	1013	828	1391	1136	1368
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.26	0.14	0.08	0.22	0.26	0.06	0.03	0.17	0.10

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↗		↘	↗	
Traffic Volume (vph)	131	446	111	50	387	233	43	12	23	169	23	103
Future Volume (vph)	131	446	111	50	387	233	43	12	23	169	23	103
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1630		1734	1588	
Flt Permitted	0.46	1.00	1.00	0.47	1.00	1.00	0.67	1.00		0.73	1.00	
Satd. Flow (perm)	862	3343	1455	890	3406	1553	974	1630		1335	1588	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	147	501	125	56	435	262	48	13	26	190	26	116
RTOR Reduction (vph)	0	0	70	0	0	165	0	19	0	0	87	0
Lane Group Flow (vph)	147	501	55	56	435	97	48	20	0	190	55	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	32.5	25.4	25.4	25.5	21.4	21.4	14.2	14.2		14.2	14.2	
Effective Green, g (s)	33.5	26.4	26.4	27.5	22.4	22.4	15.2	15.2		15.2	15.2	
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.37	0.37	0.25	0.25		0.25	0.25	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	618	1463	637	483	1265	576	245	410		336	400	
v/s Ratio Prot	c0.04	c0.15		0.01	0.13			0.01				0.03
v/s Ratio Perm	0.10		0.04	0.04		0.06	0.05			c0.14		
v/c Ratio	0.24	0.34	0.09	0.12	0.34	0.17	0.20	0.05		0.57	0.14	
Uniform Delay, d1	6.5	11.2	9.9	9.2	13.7	12.7	17.7	17.1		19.7	17.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.1	0.1	0.2	0.2	0.4	0.0		2.2	0.2	
Delay (s)	6.7	11.4	10.0	9.3	13.9	12.9	18.1	17.1		21.8	17.6	
Level of Service	A	B	A	A	B	B	B	B		C	B	
Approach Delay (s)		10.3			13.2			17.7			20.0	
Approach LOS		B			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			13.4			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.41									
Actuated Cycle Length (s)			60.3			Sum of lost time (s)			13.6			
Intersection Capacity Utilization			62.5%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group



Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	303	71	80	431	257	28	43	27	113	81	212
Future Volume (vph)	264	303	71	80	431	257	28	43	27	113	81	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.99			0.99	1.00		
Frt		0.971				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3267	0	1805	3374	1583	1805	1759	1615	1736	1845	1553
Flt Permitted	0.445			0.502			0.697			0.725		
Satd. Flow (perm)	813	3267	0	954	3374	1563	1324	1759	1594	1323	1845	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		46				295			78			244
Link Speed (k/h)		60			60			50				50
Link Distance (m)		330.8			413.9			201.9				591.8
Travel Time (s)		19.8			24.8			14.5				42.6
Confl. Peds. (#/hr)	1					1			1	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Adj. Flow (vph)	303	348	82	92	495	295	32	49	31	130	93	244
Shared Lane Traffic (%)												
Lane Group Flow (vph)	303	430	0	92	495	295	32	49	31	130	93	244
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		43.0	43.0	43.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.1	46.1		36.1	36.1	36.1	14.0	14.0	14.0	14.0	14.0	14.0
Actuated g/C Ratio	0.69	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.45	0.20		0.19	0.29	0.32	0.12	0.14	0.08	0.51	0.26	0.49
Control Delay	7.0	5.5		12.4	11.7	2.6	24.6	24.6	0.7	33.3	26.3	7.3
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	7.0	5.5		12.4	11.7	2.6	24.6	24.6	0.7	33.3	26.3	7.3
LOS	A	A		B	B	A	C	C	A	C	C	A
Approach Delay		6.1			8.7			18.0			18.3	
Approach LOS		A			A			B			B	

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 72.2  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.51  
 Intersection Signal Delay: 10.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 73.8%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021


























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	303	430	92	495	295	32	49	31	130	93	244
v/c Ratio	0.45	0.20	0.19	0.29	0.32	0.12	0.14	0.08	0.51	0.26	0.49
Control Delay	7.0	5.5	12.4	11.7	2.6	24.6	24.6	0.7	33.3	26.3	7.3
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	7.0	5.5	12.4	11.7	2.6	24.6	24.6	0.7	33.3	26.3	7.3
Queue Length 50th (m)	12.6	9.8	6.6	19.8	0.0	3.8	5.8	0.0	16.7	11.3	0.0
Queue Length 95th (m)	28.1	19.1	16.8	33.5	11.2	10.3	13.6	0.4	31.2	22.4	15.2
Internal Link Dist (m)		306.8		389.9			177.9			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	666	2460	582	2060	1069	588	781	751	587	819	825
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	0.45	0.17	0.16	0.24	0.28	0.05	0.06	0.04	0.22	0.11	0.30

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

03/04/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	264	303	71	80	431	257	28	43	27	113	81	212
Future Volume (vph)	264	303	71	80	431	257	28	43	27	113	81	212
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1735	3269		1805	3374	1563	1805	1759	1594	1734	1845	1553
Flt Permitted	0.44	1.00		0.50	1.00	1.00	0.70	1.00	1.00	0.73	1.00	1.00
Satd. Flow (perm)	813	3269		953	3374	1563	1324	1759	1594	1324	1845	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	303	348	82	92	495	295	32	49	31	130	93	244
RTOR Reduction (vph)	0	17	0	0	0	148	0	0	25	0	0	197
Lane Group Flow (vph)	303	413	0	92	495	148	32	49	6	130	93	47
Confl. Peds. (#/hr)	1					1			1	1		
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	13.0	13.0	13.0	13.0	13.0	13.0
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	14.0	14.0	14.0	14.0	14.0	14.0
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	621	2087		476	1687	781	256	341	309	256	357	301
v/s Ratio Prot	c0.05	0.13			c0.15			0.03			0.05	
v/s Ratio Perm	0.26			0.10		0.09	0.02		0.00	c0.10		0.03
v/c Ratio	0.49	0.20		0.19	0.29	0.19	0.12	0.14	0.02	0.51	0.26	0.16
Uniform Delay, d1	5.8	5.4		10.0	10.6	10.0	24.0	24.1	23.5	26.0	24.7	24.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1		0.3	0.2	0.2	0.2	0.2	0.0	1.6	0.4	0.2
Delay (s)	6.4	5.5		10.3	10.7	10.2	24.3	24.3	23.6	27.6	25.1	24.4
Level of Service	A	A		B	B	B	C	C	C	C	C	C
Approach Delay (s)		5.8			10.5			24.1			25.5	
Approach LOS		A			B			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			12.8	HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			72.2	Sum of lost time (s)				14.1				
Intersection Capacity Utilization			73.8%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
 10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	38	50	0
Future Volume (vph)	0	0	0	38	50	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1145	1242	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1145	1242	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	46.1			34.8	14.8	
Travel Time (s)	3.3			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	66%	53%	2%
Adj. Flow (vph)	0	0	0	41	54	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	41	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
<b>Two way Left Turn Lane</b>						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	38	50	0
Future Volume (Veh/h)	0	0	0	38	50	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	41	54	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)	100					
pX, platoon unblocked						
vC, conflicting volume	95	54	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95	54	54			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	905	1013	1551			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	41	54			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1551	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	25	6	3	25
Future Volume (vph)	0	0	25	6	3	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected						0.995
Satd. Flow (prot)	950	0	923	0	0	994
Flt Permitted						0.995
Satd. Flow (perm)	950	0	923	0	0	994
Link Speed (k/h)	50	50		50		
Link Distance (m)	95.4	55.5		40.5		
Travel Time (s)	6.9	4.0		2.9		
Confl. Peds. (#/hr)	10	10	10		10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	2%	100%	100%	2%	100%
Adj. Flow (vph)	0	0	27	7	3	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	34	0	0	30
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	0.0		0.0		
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	15		25	
Sign Control	Stop	Free		Free		

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	25	6	3	25
Future Volume (Veh/h)	0	0	25	6	3	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	27	7	3	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	225					
pX, platoon unblocked						
vC, conflicting volume	84	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	84	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	711	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	34	30			
Volume Left	0	0	3			
Volume Right	0	7	0			
cSH	1700	1700	1551			
Volume to Capacity	0.00	0.02	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.7			
Lane LOS	A		A			
Approach Delay (s)	0.0	0.0	0.7			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.3			
Intersection Capacity Utilization			19.0%	ICU Level of Service		A
Analysis Period (min)			15			



Lanes, Volumes, Timings  
 20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	25	28	0
Future Volume (vph)	0	0	0	25	28	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	950	950	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	950	950	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	48.4			40.5	49.5	
Travel Time (s)	3.5			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	100%	100%	2%
Adj. Flow (vph)	0	0	0	27	30	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	27	30	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	19.0%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	25	28	0
Future Volume (Veh/h)	0	0	0	25	28	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	27	30	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	77	50	40			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	77	50	40			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	911	1001	1557			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	27	30			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1557	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Frnt</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	56.1		49.5			34.8
Travel Time (s)	4.0		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis  
 26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	135					
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	177	7	167	79	443	3	374	256	277	266	9
Future Volume (vph)	13	177	7	167	79	443	3	374	256	277	266	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.994				0.850			0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1792	0	1656	1743	1495	1347	1792	1524	1703	1755	0
Flt Permitted	0.697			0.453			0.564			0.290		
Satd. Flow (perm)	1068	1792	0	790	1743	1495	800	1792	1524	520	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				478			301			3
Link Speed (k/h)		80			80			80				80
Link Distance (m)		218.2			1632.3			668.8				164.2
Travel Time (s)		9.8			73.5			30.1				7.4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Adj. Flow (vph)	15	208	8	196	93	521	4	440	301	326	313	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	216	0	196	93	521	4	440	301	326	324	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

# Lanes, Volumes, Timings

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	24.0	24.0		10.0	34.0	34.0	40.0	40.0	40.0	16.0	56.0	
Total Split (%)	26.7%	26.7%		11.1%	37.8%	37.8%	44.4%	44.4%	44.4%	17.8%	62.2%	
Maximum Green (s)	16.8	16.8		7.0	26.8	26.8	32.6	32.6	32.6	13.0	48.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	15.0	15.0		29.4	25.2	25.2	27.4	27.4	27.4	46.8	42.3	
Actuated g/C Ratio	0.19	0.19		0.37	0.31	0.31	0.34	0.34	0.34	0.58	0.53	
v/c Ratio	0.08	0.64		0.52	0.17	0.65	0.01	0.72	0.42	0.66	0.35	
Control Delay	30.2	40.6		25.5	22.7	8.1	18.0	31.0	4.4	15.8	12.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.2	40.6		25.5	22.7	8.1	18.0	31.0	4.4	15.8	12.2	
LOS	C	D		C	C	A	B	C	A	B	B	
Approach Delay		39.9			14.0			20.2			14.0	
Approach LOS		D			B			C			B	

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 80.3

Natural Cycle: 70

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 18.4

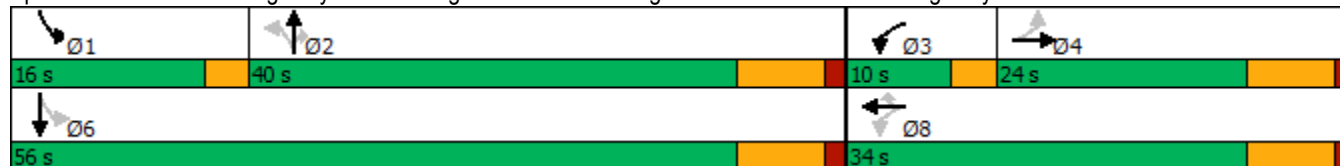
Intersection LOS: B

Intersection Capacity Utilization 71.5%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



# Queues

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	15	216	196	93	521	4	440	301	326	324
v/c Ratio	0.08	0.64	0.52	0.17	0.65	0.01	0.72	0.42	0.66	0.35
Control Delay	30.2	40.6	25.5	22.7	8.1	18.0	31.0	4.4	15.8	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	40.6	25.5	22.7	8.1	18.0	31.0	4.4	15.8	12.2
Queue Length 50th (m)	2.0	32.5	22.7	11.0	4.9	0.4	63.0	0.0	25.3	28.5
Queue Length 95th (m)	7.2	55.6	40.8	22.6	25.3	2.4	91.0	13.2	39.2	43.7
Internal Link Dist (m)		194.2		1608.3			644.8			140.2
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	240	404	377	612	835	339	760	820	512	1101
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.53	0.52	0.15	0.62	0.01	0.58	0.37	0.64	0.29

### Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	177	7	167	79	443	3	374	256	277	266	9
Future Volume (vph)	13	177	7	167	79	443	3	374	256	277	266	9
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1793		1656	1743	1495	1347	1792	1524	1703	1755	
Flt Permitted	0.70	1.00		0.45	1.00	1.00	0.56	1.00	1.00	0.29	1.00	
Satd. Flow (perm)	1068	1793		790	1743	1495	800	1792	1524	521	1755	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	208	8	196	93	521	4	440	301	326	313	11
RTOR Reduction (vph)	0	2	0	0	0	328	0	0	198	0	1	0
Lane Group Flow (vph)	15	214	0	196	93	193	4	440	103	326	323	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	14.1	14.1		24.2	24.2	24.2	26.5	26.5	26.5	41.3	41.3	
Effective Green, g (s)	15.1	15.1		25.2	25.2	25.2	27.5	27.5	27.5	42.3	42.3	
Actuated g/C Ratio	0.19	0.19		0.31	0.31	0.31	0.34	0.34	0.34	0.53	0.53	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	201	338		336	548	470	274	615	523	464	926	
v/s Ratio Prot		c0.12		c0.06	0.05			c0.25		c0.11	0.18	
v/s Ratio Perm	0.01			0.12		0.13	0.00		0.07	0.26		
v/c Ratio	0.07	0.63		0.58	0.17	0.41	0.01	0.72	0.20	0.70	0.35	
Uniform Delay, d1	26.7	30.0		21.5	19.9	21.6	17.4	22.9	18.5	12.6	10.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	3.9		2.6	0.1	0.6	0.0	4.2	0.3	4.8	0.3	
Delay (s)	26.9	33.8		24.1	20.0	22.2	17.4	27.1	18.8	17.4	11.2	
Level of Service	C	C		C	C	C	B	C	B	B	B	
Approach Delay (s)		33.4			22.4			23.7			14.3	
Approach LOS		C			C			C			B	

### Intersection Summary

HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	80.1	Sum of lost time (s)	16.6
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Lanes, Volumes, Timings  
2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	706	36	28	543	36	21	2	35	63	6	42
Future Volume (vph)	25	706	36	28	543	36	21	2	35	63	6	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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			0.93			0.93	0.98	0.98		0.99	0.97	
Frt			0.850			0.850		0.858			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1155	0	1770	1561	0
Flt Permitted	0.381			0.261			0.724			0.732		
Satd. Flow (perm)	710	1810	1102	349	1759	1470	979	1155	0	1349	1561	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			44			44		37				45
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			85.1				66.9
Travel Time (s)		73.5			28.8			6.1				4.8
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Peak Hour 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
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Adj. Flow (vph)	27	751	38	30	578	38	22	2	37	67	6	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	751	38	30	578	38	22	39	0	67	51	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
2: Beamish Road/Hanson Road & Highway 12

03/04/2021

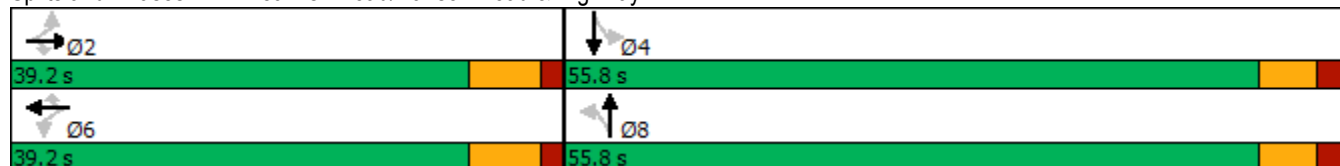


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	39.2	39.2	39.2	39.2	39.2	39.2	55.8	55.8		55.8	55.8	
Total Split (%)	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	32.4	32.4	32.4	32.4	32.4	32.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	15.0	15.0		15.0	15.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	33.4	33.4	33.4	33.4	33.4	33.4	11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.60	0.20	0.20		0.20	0.20	
v/c Ratio	0.06	0.70	0.06	0.14	0.55	0.04	0.11	0.15		0.25	0.15	
Control Delay	5.4	12.3	1.9	7.2	9.4	1.8	20.1	9.5		21.8	9.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	5.4	12.3	1.9	7.2	9.4	1.8	20.1	9.5		21.8	9.1	
LOS	A	B	A	A	A	A	C	A		C	A	
Approach Delay		11.6			8.9			13.3			16.3	
Approach LOS		B			A			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	95
Actuated Cycle Length:	56.1
Natural Cycle:	105
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.70
Intersection Signal Delay:	11.0
Intersection LOS:	B
Intersection Capacity Utilization:	72.0%
ICU Level of Service:	C
Analysis Period (min):	15

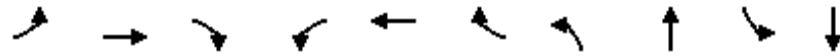
Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12



Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	751	38	30	578	38	22	39	67	51
v/c Ratio	0.06	0.70	0.06	0.14	0.55	0.04	0.11	0.15	0.25	0.15
Control Delay	5.4	12.3	1.9	7.2	9.4	1.8	20.1	9.5	21.8	9.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.4	12.3	1.9	7.2	9.4	1.8	20.1	9.5	21.8	9.1
Queue Length 50th (m)	1.0	47.5	0.0	1.2	31.8	0.0	2.0	0.2	6.1	0.5
Queue Length 95th (m)	3.8	86.0	2.6	4.8	57.1	2.5	7.0	6.7	15.4	7.9
Internal Link Dist (m)	1608.3			615.3			61.1		42.9	
Turn Bay Length (m)	30.0		115.0		93.0		75.0			
Base Capacity (vph)	422	1076	673	207	1046	892	872	1032	1201	1395
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.70	0.06	0.14	0.55	0.04	0.03	0.04	0.06	0.04

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	706	36	28	543	36	21	2	35	63	6	42
Future Volume (vph)	25	706	36	28	543	36	21	2	35	63	6	42
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.95	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1748	1810	1127	1261	1759	1503	1294	1159		1758	1572	
Flt Permitted	0.38	1.00	1.00	0.26	1.00	1.00	0.72	1.00		0.73	1.00	
Satd. Flow (perm)	701	1810	1127	347	1759	1503	986	1159		1354	1572	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	751	38	30	578	38	22	2	37	67	6	45
RTOR Reduction (vph)	0	0	15	0	0	15	0	30	0	0	36	0
Lane Group Flow (vph)	27	751	23	30	578	23	22	9	0	67	15	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	32.4	32.4	32.4	32.4	32.4	32.4	10.1	10.1		10.1	10.1	
Effective Green, g (s)	33.4	33.4	33.4	33.4	33.4	33.4	11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.60	0.20	0.20		0.20	0.20	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	417	1077	670	206	1047	894	195	229		267	311	
v/s Ratio Prot		c0.42			0.33			0.01				0.01
v/s Ratio Perm	0.04		0.02	0.09		0.02	0.02			c0.05		
v/c Ratio	0.06	0.70	0.03	0.15	0.55	0.03	0.11	0.04		0.25	0.05	
Uniform Delay, d1	4.8	7.9	4.7	5.0	6.8	4.7	18.5	18.2		19.0	18.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.0	0.0	0.3	0.6	0.0	0.3	0.1		0.5	0.1	
Delay (s)	4.8	9.8	4.7	5.4	7.5	4.7	18.7	18.3		19.5	18.3	
Level of Service	A	A	A	A	A	A	B	B		B	B	
Approach Delay (s)		9.4			7.2			18.4			19.0	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.6	HCM 2000 Level of Service				A				
HCM 2000 Volume to Capacity ratio			0.59									
Actuated Cycle Length (s)			56.1	Sum of lost time (s)				11.6				
Intersection Capacity Utilization			72.0%	ICU Level of Service				C				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	55.0		14.8			85.1
Travel Time (s)	4.0		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	0.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	541	122	50	450	236	47	9	23	169	23	106
Future Volume (vph)	137	541	122	50	450	236	47	9	23	169	23	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99		1.00		
Frt			0.850			0.850		0.892				0.877
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1624	0	1736	1587	0
Flt Permitted	0.412			0.422			0.665			0.734		
Satd. Flow (perm)	775	3343	1455	802	3406	1553	972	1624	0	1338	1587	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			265		26				119
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)									3	3		
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
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Adj. Flow (vph)	154	608	137	56	506	265	53	10	26	190	26	119
Shared Lane Traffic (%)												
Lane Group Flow (vph)	154	608	137	56	506	265	53	36	0	190	145	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

# Lanes, Volumes, Timings

## 5: Jones Road & Highway 12

03/04/2021

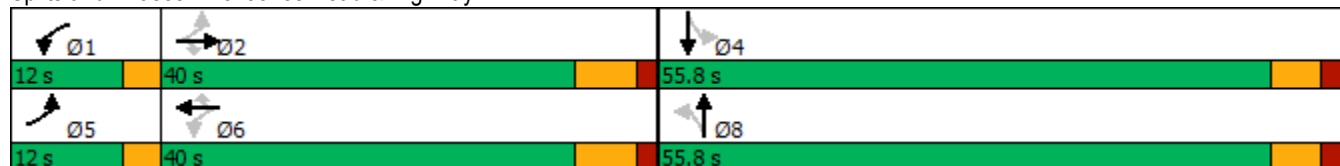


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	36.4	27.0	27.0	33.6	21.6	21.6	15.6	15.6		15.6		15.6
Actuated g/C Ratio	0.61	0.45	0.45	0.56	0.36	0.36	0.26	0.26		0.26		0.26
v/c Ratio	0.25	0.40	0.19	0.10	0.41	0.36	0.21	0.08		0.55		0.29
Control Delay	7.0	14.4	4.1	6.4	16.7	4.2	19.5	9.3		25.6		7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	7.0	14.4	4.1	6.4	16.7	4.2	19.5	9.3		25.6		7.2
LOS	A	B	A	A	B	A	B	A		C		A
Approach Delay		11.6			12.0			15.4				17.7
Approach LOS		B			B			B				B

### Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 60.1  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 12.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.9%  
 ICU Level of Service B  
 Analysis Period (min) 15

### Splits and Phases: 5: Jones Road & Highway 12

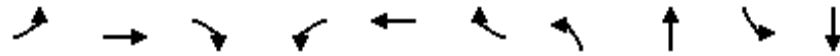




Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	154	608	137	56	506	265	53	36	190	145
v/c Ratio	0.25	0.40	0.19	0.10	0.41	0.36	0.21	0.08	0.55	0.29
Control Delay	7.0	14.4	4.1	6.4	16.7	4.2	19.5	9.3	25.6	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.0	14.4	4.1	6.4	16.7	4.2	19.5	9.3	25.6	7.2
Queue Length 50th (m)	6.2	26.4	0.0	2.1	22.0	0.0	4.7	0.9	18.6	2.2
Queue Length 95th (m)	17.5	48.3	10.2	7.7	41.0	14.2	12.9	6.6	37.2	13.5
Internal Link Dist (m)	615.3				306.8				52.2	126.5
Turn Bay Length (m)	216.0		160.0		80.0				80.0	
Base Capacity (vph)	640	1918	893	641	1954	1003	835	1399	1150	1381
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.32	0.15	0.09	0.26	0.26	0.06	0.03	0.17	0.10

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	541	122	50	450	236	47	9	23	169	23	106
Future Volume (vph)	137	541	122	50	450	236	47	9	23	169	23	106
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1624		1734	1587	
Flt Permitted	0.41	1.00	1.00	0.42	1.00	1.00	0.66	1.00		0.73	1.00	
Satd. Flow (perm)	776	3343	1455	801	3406	1553	971	1624		1339	1587	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	154	608	137	56	506	265	53	10	26	190	26	119
RTOR Reduction (vph)	0	0	77	0	0	166	0	19	0	0	89	0
Lane Group Flow (vph)	154	608	60	56	506	99	53	17	0	190	56	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.1	26.0	26.0	26.0	21.9	21.9	14.6	14.6		14.6	14.6	
Effective Green, g (s)	34.1	27.0	27.0	28.0	22.9	22.9	15.6	15.6		15.6	15.6	
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.37	0.37	0.25	0.25		0.25	0.25	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	583	1472	640	449	1272	580	247	413		340	403	
v/s Ratio Prot	c0.04	c0.18		0.01	0.15			0.01				0.04
v/s Ratio Perm	0.11		0.04	0.05		0.06	0.05			c0.14		
v/c Ratio	0.26	0.41	0.09	0.12	0.40	0.17	0.21	0.04		0.56	0.14	
Uniform Delay, d1	6.7	11.7	10.0	9.3	14.1	12.8	18.0	17.2		19.9	17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.1	0.1	0.3	0.2	0.4	0.0		2.0	0.2	
Delay (s)	6.9	12.0	10.1	9.5	14.4	13.0	18.5	17.3		21.9	17.8	
Level of Service	A	B	B	A	B	B	B	B		C	B	
Approach Delay (s)		10.8			13.6			18.0			20.1	
Approach LOS		B			B			B			C	

### Intersection Summary

HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	296	367	74	80	470	254	29	44	27	108	84	233
Future Volume (vph)	296	367	74	80	470	254	29	44	27	108	84	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.99			0.99	1.00		
Fr <sub>t</sub>		0.975				0.850			0.850			0.850
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3274	0	1805	3374	1583	1805	1759	1615	1736	1845	1553
Fl <sub>t</sub> Permitted	0.419			0.465			0.694			0.724		
Satd. Flow (perm)	765	3274	0	884	3374	1563	1319	1759	1594	1321	1845	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		38				292			78			268
Link Speed (k/h)		60			60			50				50
Link Distance (m)		330.8			413.9			201.9				591.8
Travel Time (s)		19.8			24.8			14.5				42.6
Confl. Peds. (#/hr)	1						1			1	1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Adj. Flow (vph)	340	422	85	92	540	292	33	51	31	124	97	268
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	507	0	92	540	292	33	51	31	124	97	268
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

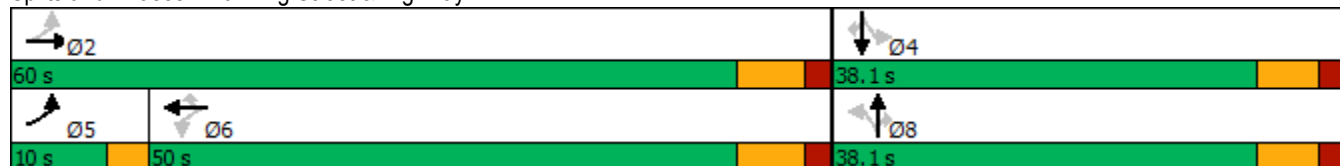


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		43.0	43.0	43.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.1	46.1		36.1	36.1	36.1	13.7	13.7	13.7	13.7	13.7	13.7
Actuated g/C Ratio	0.70	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.53	0.24		0.21	0.32	0.31	0.13	0.15	0.08	0.49	0.28	0.52
Control Delay	8.0	5.7		12.5	11.7	2.6	24.9	24.9	0.7	33.0	26.7	7.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	5.7		12.5	11.7	2.6	24.9	24.9	0.7	33.0	26.7	7.5
LOS	A	A		B	B	A	C	C	A	C	C	A
Approach Delay		6.6			8.9			18.4				17.8
Approach LOS		A			A			B				B

Intersection Summary

Area Type:	Other
Cycle Length:	98.1
Actuated Cycle Length:	71.9
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.53
Intersection Signal Delay:	10.4
Intersection LOS:	B
Intersection Capacity Utilization:	73.6%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021




























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	340	507	92	540	292	33	51	31	124	97	268
v/c Ratio	0.53	0.24	0.21	0.32	0.31	0.13	0.15	0.08	0.49	0.28	0.52
Control Delay	8.0	5.7	12.5	11.7	2.6	24.9	24.9	0.7	33.0	26.7	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.0	5.7	12.5	11.7	2.6	24.9	24.9	0.7	33.0	26.7	7.5
Queue Length 50th (m)	14.0	12.1	6.6	21.7	0.0	3.9	6.1	0.0	15.9	11.9	0.0
Queue Length 95th (m)	31.0	22.6	17.0	36.2	11.0	10.6	14.1	0.5	30.1	23.3	15.8
Internal Link Dist (m)		306.8		389.9			177.9			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	641	2473	541	2069	1071	588	784	754	589	822	841
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	0.53	0.21	0.17	0.26	0.27	0.06	0.07	0.04	0.21	0.12	0.32

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

03/04/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 								
Traffic Volume (vph)	296	367	74	80	470	254	29	44	27	108	84	233	
Future Volume (vph)	296	367	74	80	470	254	29	44	27	108	84	233	
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1735	3274		1805	3374	1563	1805	1759	1594	1734	1845	1553	
Flt Permitted	0.42	1.00		0.47	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00	
Satd. Flow (perm)	765	3274		884	3374	1563	1319	1759	1594	1321	1845	1553	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	340	422	85	92	540	292	33	51	31	124	97	268	
RTOR Reduction (vph)	0	14	0	0	0	145	0	0	25	0	0	217	
Lane Group Flow (vph)	340	493	0	92	540	147	33	51	6	124	97	51	
Confl. Peds. (#/hr)	1					1			1	1			
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.7	12.7	12.7	12.7	12.7	12.7	
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.7	13.7	13.7	13.7	13.7	13.7	
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19	
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	598	2099		443	1694	784	251	335	303	251	351	295	
v/s Ratio Prot	c0.06	0.15			c0.16			0.03			0.05		
v/s Ratio Perm	0.30			0.10		0.09	0.03		0.00	c0.09		0.03	
v/c Ratio	0.57	0.24		0.21	0.32	0.19	0.13	0.15	0.02	0.49	0.28	0.17	
Uniform Delay, d1	5.8	5.5		10.0	10.6	9.8	24.2	24.3	23.6	26.0	24.9	24.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.1		0.4	0.2	0.2	0.2	0.2	0.0	1.5	0.4	0.3	
Delay (s)	7.1	5.6		10.4	10.8	10.0	24.4	24.5	23.7	27.5	25.3	24.6	
Level of Service	A	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		6.2			10.5			24.2			25.5		
Approach LOS		A			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			12.7		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.39										
Actuated Cycle Length (s)			71.9		Sum of lost time (s)						14.1		
Intersection Capacity Utilization			73.6%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings  
10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	220	7	16	63	88	300
Future Volume (vph)	220	7	16	63	88	300
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996				0.896	
Flt Protected	0.954			0.990		
Satd. Flow (prot)	1770	0	0	1228	1499	0
Flt Permitted	0.954			0.990		
Satd. Flow (perm)	1770	0	0	1228	1499	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	46.1			34.8	14.8	
Travel Time (s)	3.3			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	66%	53%	2%
Adj. Flow (vph)	239	8	17	68	96	326
Shared Lane Traffic (%)						
Lane Group Flow (vph)	247	0	0	85	422	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	42.4%
	ICU Level of Service A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	220	7	16	63	88	300
Future Volume (Veh/h)	220	7	16	63	88	300
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	239	8	17	68	96	326
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						100
pX, platoon unblocked						
vC, conflicting volume	361	259	422			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	361	259	422			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	62	99	99			
cM capacity (veh/h)	628	780	1137			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	247	85	422			
Volume Left	239	17	0			
Volume Right	8	0	326			
cSH	632	1137	1700			
Volume to Capacity	0.39	0.01	0.25			
Queue Length 95th (m)	14.8	0.4	0.0			
Control Delay (s)	14.3	1.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	14.3	1.7	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			4.9			
Intersection Capacity Utilization			42.4%	ICU Level of Service	A	
Analysis Period (min)			15			



Lanes, Volumes, Timings  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	25	6	6	25
Future Volume (vph)	0	0	25	6	6	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected						0.990
Satd. Flow (prot)	950	0	923	0	0	1046
Flt Permitted						0.990
Satd. Flow (perm)	950	0	923	0	0	1046
Link Speed (k/h)	50		50		50	
Link Distance (m)	95.4		55.5		40.5	
Travel Time (s)	6.9		4.0		2.9	
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	2%	100%	100%	2%	100%
Adj. Flow (vph)	0	0	27	7	7	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	34	0	0	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.3%
	ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	25	6	6	25
Future Volume (Veh/h)	0	0	25	6	6	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	27	7	7	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	225					
pX, platoon unblocked						
vC, conflicting volume	92	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	92	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	701	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	34	34			
Volume Left	0	0	7			
Volume Right	0	7	0			
cSH	1700	1700	1551			
Volume to Capacity	0.00	0.02	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	1.5			
Lane LOS	A		A			
Approach Delay (s)	0.0	0.0	1.5			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.8			
Intersection Capacity Utilization			19.3%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	8	12	41	38	35
Future Volume (vph)	25	8	12	41	38	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.966			0.935		
Flt Protected	0.964			0.989		
Satd. Flow (prot)	1735	0	0	1055	1162	0
Flt Permitted	0.964			0.989		
Satd. Flow (perm)	1735	0	0	1055	1162	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	48.4			40.5	49.5	
Travel Time (s)	3.5			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	100%	100%	2%
Adj. Flow (vph)	27	9	13	45	41	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	36	0	0	58	79	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.3%
	ICU Level of Service A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	8	12	41	38	35
Future Volume (Veh/h)	25	8	12	41	38	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	9	13	45	41	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	151	80	89			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	151	80	89			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	820	964	1494			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	36	58	79			
Volume Left	27	13	0			
Volume Right	9	0	38			
cSH	852	1494	1700			
Volume to Capacity	0.04	0.01	0.05			
Queue Length 95th (m)	1.1	0.2	0.0			
Control Delay (s)	9.4	1.7	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.4	1.7	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			2.5			
Intersection Capacity Utilization			22.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	56.1		49.5			34.8
Travel Time (s)	4.0		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
 26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	135					
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	0.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	177	7	182	79	471	3	398	272	291	283	9
Future Volume (vph)	13	177	7	182	79	471	3	398	272	291	283	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (m)	60.0			100.0			68.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.994				0.850			0.850		0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1792	0	1656	1743	1495	1347	1792	1524	3303	1755	0
Flt Permitted	0.697			0.425			0.554			0.950		
Satd. Flow (perm)	1068	1792	0	741	1743	1495	786	1792	1524	3303	1755	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				467			320			3
Link Speed (k/h)		80			80			80				80
Link Distance (m)		218.2			1632.3			668.8				164.2
Travel Time (s)		9.8			73.5			30.1				7.4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Adj. Flow (vph)	15	208	8	214	93	554	4	468	320	342	333	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	216	0	214	93	554	4	468	320	342	344	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)		3.6			3.6			7.2				7.2
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

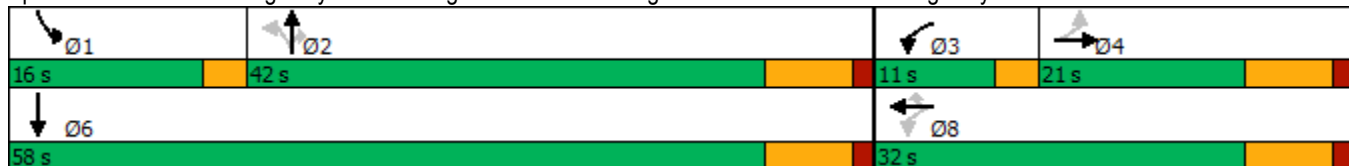


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2			
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	21.0	21.0		11.0	32.0	32.0	42.0	42.0	42.0	16.0	58.0	
Total Split (%)	23.3%	23.3%		12.2%	35.6%	35.6%	46.7%	46.7%	46.7%	17.8%	64.4%	
Maximum Green (s)	13.8	13.8		8.0	24.8	24.8	34.6	34.6	34.6	13.0	50.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	13.9	13.9		29.2	25.0	25.0	29.1	29.1	29.1	13.0	44.1	
Actuated g/C Ratio	0.17	0.17		0.36	0.31	0.31	0.36	0.36	0.36	0.16	0.54	
v/c Ratio	0.08	0.71		0.58	0.17	0.71	0.01	0.74	0.43	0.65	0.36	
Control Delay	32.8	47.5		28.8	24.1	11.0	17.0	30.9	4.2	40.0	11.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	32.8	47.5		28.8	24.1	11.0	17.0	30.9	4.2	40.0	11.8	
LOS	C	D		C	C	B	B	C	A	D	B	
Approach Delay		46.6			16.8			20.0			25.9	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	81.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.74
Intersection Signal Delay:	22.9
Intersection LOS:	C
Intersection Capacity Utilization:	74.1%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12





Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	15	216	214	93	554	4	468	320	342	344
v/c Ratio	0.08	0.71	0.58	0.17	0.71	0.01	0.74	0.43	0.65	0.36
Control Delay	32.8	47.5	28.8	24.1	11.0	17.0	30.9	4.2	40.0	11.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	47.5	28.8	24.1	11.0	17.0	30.9	4.2	40.0	11.8
Queue Length 50th (m)	2.1	34.3	26.4	11.5	10.8	0.4	68.2	0.0	28.0	30.5
Queue Length 95th (m)	7.6	#63.2	46.0	23.4	38.9	2.3	94.4	12.8	42.2	44.0
Internal Link Dist (m)		194.2		1608.3			644.8			140.2
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	195	329	366	556	795	345	788	850	571	1120
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.66	0.58	0.17	0.70	0.01	0.59	0.38	0.60	0.31

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	177	7	182	79	471	3	398	272	291	283	9
Future Volume (vph)	13	177	7	182	79	471	3	398	272	291	283	9
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1793		1656	1743	1495	1347	1792	1524	3303	1755	
Flt Permitted	0.70	1.00		0.43	1.00	1.00	0.55	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1068	1793		741	1743	1495	786	1792	1524	3303	1755	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	208	8	214	93	554	4	468	320	342	333	11
RTOR Reduction (vph)	0	2	0	0	0	324	0	0	206	0	1	0
Lane Group Flow (vph)	15	214	0	214	93	230	4	468	114	342	343	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	12.9	12.9		24.0	24.0	24.0	28.1	28.1	28.1	12.0	43.1	
Effective Green, g (s)	13.9	13.9		25.0	25.0	25.0	29.1	29.1	29.1	13.0	44.1	
Actuated g/C Ratio	0.17	0.17		0.31	0.31	0.31	0.36	0.36	0.36	0.16	0.54	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	181	305		328	533	457	279	638	542	525	947	
v/s Ratio Prot		c0.12		c0.07	0.05			c0.26		c0.10	0.20	
v/s Ratio Perm	0.01			0.13		0.15	0.01		0.07			
v/c Ratio	0.08	0.70		0.65	0.17	0.50	0.01	0.73	0.21	0.65	0.36	
Uniform Delay, d1	28.5	32.0		22.8	20.8	23.3	17.0	22.9	18.3	32.2	10.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	7.2		4.6	0.2	0.9	0.0	4.7	0.3	2.9	0.3	
Delay (s)	28.7	39.1		27.4	20.9	24.1	17.0	27.6	18.6	35.1	11.1	
Level of Service	C	D		C	C	C	B	C	B	D	B	
Approach Delay (s)		38.4			24.6			23.9			23.1	
Approach LOS		D			C			C			C	

### Intersection Summary

HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	81.7	Sum of lost time (s)	16.6
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	736	36	28	585	36	21	2	35	63	6	42
Future Volume (vph)	25	736	36	28	585	36	21	2	35	63	6	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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
Frt			0.850			0.850		0.858			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1181	0	1770	1617	0
Flt Permitted	0.349			0.240			0.724			0.732		
Satd. Flow (perm)	650	1810	1188	321	1759	1583	997	1181	0	1364	1617	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			44			44		37				45
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			85.1				66.9
Travel Time (s)		73.5			28.8			6.1				4.8
Peak Hour 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
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Adj. Flow (vph)	27	783	38	30	622	38	22	2	37	67	6	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	27	783	38	30	622	38	22	39	0	67	51	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

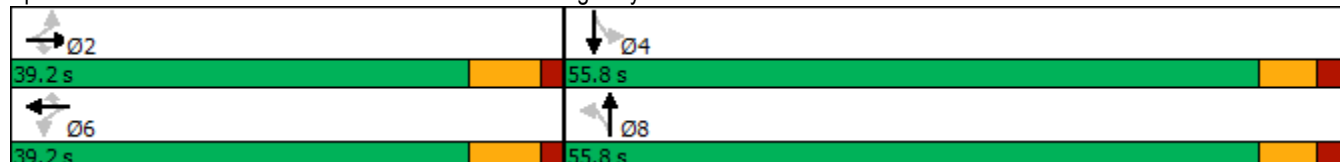


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	39.2	39.2	39.2	39.2	39.2	39.2	55.8	55.8		55.8	55.8	
Total Split (%)	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	32.4	32.4	32.4	32.4	32.4	32.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	15.0	15.0		15.0	15.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	33.4	33.4	33.4	33.4	33.4	33.4	11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.60	0.20	0.20		0.20	0.20	
v/c Ratio	0.07	0.73	0.05	0.16	0.59	0.04	0.11	0.15		0.25	0.14	
Control Delay	5.5	13.2	1.9	7.6	10.1	1.8	20.1	9.4		21.8	9.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	5.5	13.2	1.9	7.6	10.1	1.8	20.1	9.4		21.8	9.0	
LOS	A	B	A	A	B	A	C	A		C	A	
Approach Delay		12.4			9.6			13.3			16.2	
Approach LOS		B			A			B			B	

Intersection Summary

Area Type: Other  
 Cycle Length: 95  
 Actuated Cycle Length: 56.1  
 Natural Cycle: 105  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 11.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 58.6%  
 ICU Level of Service B  
 Analysis Period (min) 15

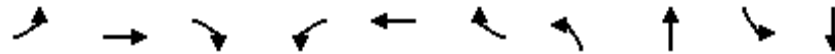
Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12



Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	783	38	30	622	38	22	39	67	51
v/c Ratio	0.07	0.73	0.05	0.16	0.59	0.04	0.11	0.15	0.25	0.14
Control Delay	5.5	13.2	1.9	7.6	10.1	1.8	20.1	9.4	21.8	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.5	13.2	1.9	7.6	10.1	1.8	20.1	9.4	21.8	9.0
Queue Length 50th (m)	1.1	51.1	0.0	1.2	35.6	0.0	2.0	0.2	6.1	0.5
Queue Length 95th (m)	3.8	92.6	2.6	5.0	63.5	2.5	7.1	6.7	15.4	7.9
Internal Link Dist (m)	1608.3			615.3			61.1		42.9	
Turn Bay Length (m)	30.0		115.0	93.0		75.0				
Base Capacity (vph)	386	1077	725	191	1047	959	888	1056	1214	1445
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.73	0.05	0.16	0.59	0.04	0.02	0.04	0.06	0.04

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	736	36	28	585	36	21	2	35	63	6	42
Future Volume (vph)	25	736	36	28	585	36	21	2	35	63	6	42
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1180		1770	1616	
Flt Permitted	0.35	1.00	1.00	0.24	1.00	1.00	0.72	1.00		0.73	1.00	
Satd. Flow (perm)	651	1810	1188	321	1759	1583	996	1180		1363	1616	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	783	38	30	622	38	22	2	37	67	6	45
RTOR Reduction (vph)	0	0	15	0	0	15	0	30	0	0	36	0
Lane Group Flow (vph)	27	783	23	30	622	23	22	9	0	67	15	0
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	32.4	32.4	32.4	32.4	32.4	32.4	10.1	10.1		10.1	10.1	
Effective Green, g (s)	33.4	33.4	33.4	33.4	33.4	33.4	11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.60	0.60	0.20	0.20		0.20	0.20	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	387	1077	707	191	1047	942	197	233		269	319	
v/s Ratio Prot		c0.43			0.35			0.01				0.01
v/s Ratio Perm	0.04		0.02	0.09		0.01	0.02			c0.05		
v/c Ratio	0.07	0.73	0.03	0.16	0.59	0.02	0.11	0.04		0.25	0.05	
Uniform Delay, d1	4.8	8.1	4.7	5.1	7.1	4.7	18.5	18.2		19.0	18.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.5	0.0	0.4	0.9	0.0	0.3	0.1		0.5	0.1	
Delay (s)	4.9	10.6	4.7	5.5	8.0	4.7	18.7	18.3		19.5	18.3	
Level of Service	A	B	A	A	A	A	B	B		B	B	
Approach Delay (s)		10.1			7.7			18.4			19.0	
Approach LOS		B			A			B			B	

### Intersection Summary

HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.1	Sum of lost time (s)	11.6
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	55.0		14.8			85.1
Travel Time (s)	4.0		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



























Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service		A	
Analysis Period (min)	15					



Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	571	122	50	492	236	47	9	23	169	23	106
Future Volume (vph)	137	571	122	50	492	236	47	9	23	169	23	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99		1.00		
Frt			0.850			0.850		0.892				0.877
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1624	0	1736	1587	0
Flt Permitted	0.381			0.408			0.665			0.734		
Satd. Flow (perm)	717	3343	1455	775	3406	1553	972	1624	0	1338	1587	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			137			265			26			119
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)									3	3		
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
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Adj. Flow (vph)	154	642	137	56	553	265	53	10	26	190	26	119
Shared Lane Traffic (%)												
Lane Group Flow (vph)	154	642	137	56	553	265	53	36	0	190	145	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

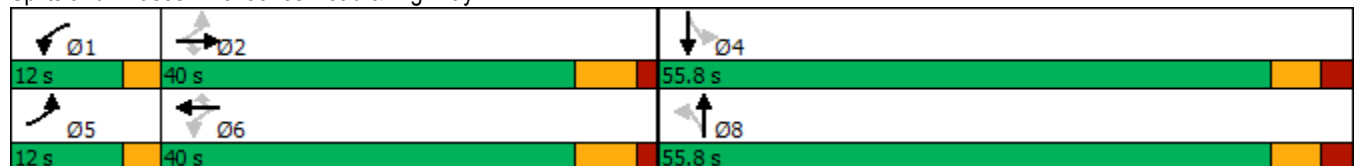


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	36.9	27.5	27.5	34.0	22.0	22.0	15.8	15.8		15.8		15.8
Actuated g/C Ratio	0.61	0.45	0.45	0.56	0.36	0.36	0.26	0.26		0.26		0.26
v/c Ratio	0.26	0.42	0.19	0.10	0.45	0.36	0.21	0.08		0.55		0.29
Control Delay	7.2	14.6	4.0	6.4	17.1	4.1	19.8	9.6		25.9		7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	7.2	14.6	4.0	6.4	17.1	4.1	19.8	9.6		25.9		7.3
LOS	A	B	A	A	B	A	B	A		C		A
Approach Delay		11.8			12.5			15.7				17.9
Approach LOS		B			B			B				B

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 60.8  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 13.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.9%  
 ICU Level of Service B  
 Analysis Period (min) 15

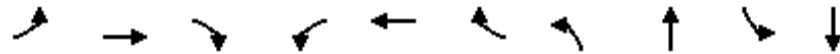
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	154	642	137	56	553	265	53	36	190	145
v/c Ratio	0.26	0.42	0.19	0.10	0.45	0.36	0.21	0.08	0.55	0.29
Control Delay	7.2	14.6	4.0	6.4	17.1	4.1	19.8	9.6	25.9	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	14.6	4.0	6.4	17.1	4.1	19.8	9.6	25.9	7.3
Queue Length 50th (m)	6.3	28.4	0.0	2.2	24.6	0.0	4.7	0.9	18.6	2.2
Queue Length 95th (m)	17.6	51.4	10.1	7.7	45.2	14.0	13.3	6.8	38.8	14.1
Internal Link Dist (m)	615.3				306.8				52.2	126.5
Turn Bay Length (m)	216.0		160.0		80.0				80.0	
Base Capacity (vph)	614	1902	886	629	1937	997	808	1355	1112	1340
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.34	0.15	0.09	0.29	0.27	0.07	0.03	0.17	0.11

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	571	122	50	492	236	47	9	23	169	23	106
Future Volume (vph)	137	571	122	50	492	236	47	9	23	169	23	106
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1624		1734	1587	
Flt Permitted	0.38	1.00	1.00	0.41	1.00	1.00	0.66	1.00		0.73	1.00	
Satd. Flow (perm)	716	3343	1455	775	3406	1553	971	1624		1339	1587	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	154	642	137	56	553	265	53	10	26	190	26	119
RTOR Reduction (vph)	0	0	76	0	0	165	0	19	0	0	89	0
Lane Group Flow (vph)	154	642	61	56	553	100	53	17	0	190	56	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.6	26.5	26.5	26.4	22.3	22.3	14.8	14.8		14.8	14.8	
Effective Green, g (s)	34.6	27.5	27.5	28.4	23.3	23.3	15.8	15.8		15.8	15.8	
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.38	0.38	0.25	0.25		0.25	0.25	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	560	1482	645	439	1279	583	247	413		341	404	
v/s Ratio Prot	c0.04	c0.19		0.01	0.16			0.01				0.04
v/s Ratio Perm	0.11		0.04	0.05		0.06	0.05			c0.14		
v/c Ratio	0.28	0.43	0.09	0.13	0.43	0.17	0.21	0.04		0.56	0.14	
Uniform Delay, d1	6.8	11.9	10.0	9.4	14.4	12.9	18.2	17.4		20.1	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.1	0.1	0.3	0.2	0.4	0.0		2.0	0.2	
Delay (s)	7.0	12.1	10.1	9.5	14.7	13.1	18.6	17.4		22.0	18.0	
Level of Service	A	B	B	A	B	B	B	B		C	B	
Approach Delay (s)		11.0			13.9			18.2			20.3	
Approach LOS		B			B			B			C	

### Intersection Summary

HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	62.0	Sum of lost time (s)	13.6
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	310	383	74	80	498	254	29	44	27	108	84	247
Future Volume (vph)	310	383	74	80	498	254	29	44	27	108	84	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.99			0.99	1.00		
Frt		0.976				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3276	0	1805	3374	1583	1805	1759	1615	1736	1845	1553
Flt Permitted	0.400			0.457			0.694			0.724		
Satd. Flow (perm)	730	3276	0	868	3374	1563	1319	1759	1594	1321	1845	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36				292			78			284
Link Speed (k/h)		60			60			50				50
Link Distance (m)		330.8			413.9			201.9				591.8
Travel Time (s)		19.8			24.8			14.5				42.6
Confl. Peds. (#/hr)	1						1			1	1	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Adj. Flow (vph)	356	440	85	92	572	292	33	51	31	124	97	284
Shared Lane Traffic (%)												
Lane Group Flow (vph)	356	525	0	92	572	292	33	51	31	124	97	284
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

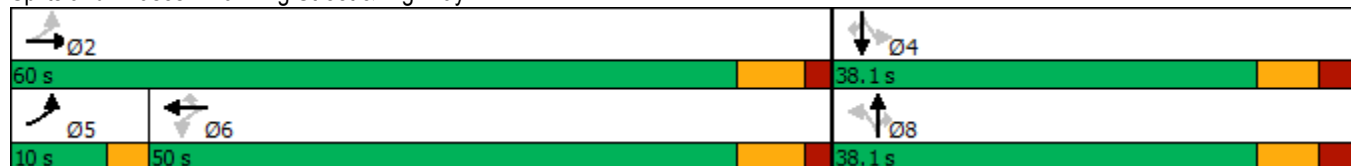


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		43.0	43.0	43.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.1	46.1		36.1	36.1	36.1	13.7	13.7	13.7	13.7	13.7	13.7
Actuated g/C Ratio	0.70	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.57	0.25		0.21	0.34	0.31	0.13	0.15	0.08	0.49	0.28	0.54
Control Delay	8.9	5.8		12.6	11.9	2.6	24.9	24.9	0.7	33.0	26.7	7.6
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	8.9	5.8		12.6	11.9	2.6	24.9	24.9	0.7	33.0	26.7	7.6
LOS	A	A		B	B	A	C	C	A	C	C	A
Approach Delay		7.0			9.1			18.4				17.5
Approach LOS		A			A			B				B

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 71.9  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.57  
 Intersection Signal Delay: 10.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 73.6%  
 ICU Level of Service D  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	356	525	92	572	292	33	51	31	124	97	284
v/c Ratio	0.57	0.25	0.21	0.34	0.31	0.13	0.15	0.08	0.49	0.28	0.54
Control Delay	8.9	5.8	12.6	11.9	2.6	24.9	24.9	0.7	33.0	26.7	7.6
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	8.9	5.8	12.6	11.9	2.6	24.9	24.9	0.7	33.0	26.7	7.6
Queue Length 50th (m)	14.8	12.7	6.6	23.3	0.0	3.9	6.1	0.0	15.9	11.9	0.0
Queue Length 95th (m)	32.6	23.6	17.0	38.5	11.0	10.6	14.1	0.5	30.1	23.3	16.2
Internal Link Dist (m)		306.8		389.9			177.9			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	621	2474	532	2069	1071	588	784	754	589	822	850
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	0.57	0.21	0.17	0.28	0.27	0.06	0.07	0.04	0.21	0.12	0.33

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 6: King Street & Highway 12

03/04/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations														
Traffic Volume (vph)	310	383	74	80	498	254	29	44	27	108	84	247		
Future Volume (vph)	310	383	74	80	498	254	29	44	27	108	84	247		
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900		
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1		
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00		
Satd. Flow (prot)	1735	3275		1805	3374	1563	1805	1759	1594	1734	1845	1553		
Flt Permitted	0.40	1.00		0.46	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00		
Satd. Flow (perm)	731	3275		869	3374	1563	1319	1759	1594	1321	1845	1553		
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87		
Adj. Flow (vph)	356	440	85	92	572	292	33	51	31	124	97	284		
RTOR Reduction (vph)	0	13	0	0	0	145	0	0	25	0	0	230		
Lane Group Flow (vph)	356	512	0	92	572	147	33	51	6	124	97	54		
Confl. Peds. (#/hr)	1					1			1	1				
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%		
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm		
Protected Phases	5	2			6			8				4		
Permitted Phases	2			6		6	8		8	4		4		
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.7	12.7	12.7	12.7	12.7	12.7		
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.7	13.7	13.7	13.7	13.7	13.7		
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19		
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1		
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	580	2099		436	1694	784	251	335	303	251	351	295		
v/s Ratio Prot	c0.07	0.16			c0.17			0.03			0.05			
v/s Ratio Perm	0.32			0.11		0.09	0.03		0.00	c0.09		0.03		
v/c Ratio	0.61	0.24		0.21	0.34	0.19	0.13	0.15	0.02	0.49	0.28	0.18		
Uniform Delay, d1	6.0	5.5		10.0	10.7	9.8	24.2	24.3	23.6	26.0	24.9	24.4		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.9	0.1		0.4	0.2	0.2	0.2	0.2	0.0	1.5	0.4	0.3		
Delay (s)	7.9	5.6		10.4	10.9	10.0	24.4	24.5	23.7	27.5	25.3	24.7		
Level of Service	A	A		B	B	B	C	C	C	C	C	C		
Approach Delay (s)		6.5			10.6			24.2			25.5			
Approach LOS		A			B			C			C			
<b>Intersection Summary</b>														
HCM 2000 Control Delay			12.8	HCM 2000 Level of Service					B					
HCM 2000 Volume to Capacity ratio			0.41											
Actuated Cycle Length (s)			71.9	Sum of lost time (s)					14.1					
Intersection Capacity Utilization			73.6%	ICU Level of Service					D					
Analysis Period (min)			15											

c Critical Lane Group



Lanes, Volumes, Timings  
10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	38	53	0
Future Volume (vph)	0	0	0	38	53	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Frt</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1145	1242	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1145	1242	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	46.1			34.8	14.8	
Travel Time (s)	3.3			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	66%	53%	2%
Adj. Flow (vph)	0	0	0	41	58	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	41	58	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
<b>Two way Left Turn Lane</b>						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	38	53	0
Future Volume (Veh/h)	0	0	0	38	53	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	41	58	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)	100					
pX, platoon unblocked						
vC, conflicting volume	99	58	58			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	99	58	58			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	900	1008	1546			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	41	58			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1546	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service	A		
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	25	6	6	25
Future Volume (vph)	6	0	25	6	6	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.950					0.990
Satd. Flow (prot)	902	0	923	0	0	1046
Flt Permitted	0.950					0.990
Satd. Flow (perm)	902	0	923	0	0	1046
Link Speed (k/h)	50		50			50
Link Distance (m)	95.4		55.5			40.5
Travel Time (s)	6.9		4.0			2.9
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	2%	100%	100%	2%	100%
Adj. Flow (vph)	7	0	27	7	7	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	34	0	0	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.3%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 18: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	25	6	6	25
Future Volume (Veh/h)	6	0	25	6	6	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	27	7	7	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	225					
pX, platoon unblocked						
vC, conflicting volume	92	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	92	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	701	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	7	34	34			
Volume Left	7	0	7			
Volume Right	0	7	0			
cSH	701	1700	1551			
Volume to Capacity	0.01	0.02	0.00			
Queue Length 95th (m)	0.2	0.0	0.1			
Control Delay (s)	10.2	0.0	1.5			
Lane LOS	B		A			
Approach Delay (s)	10.2	0.0	1.5			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			19.3%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings  
20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	25	31	0
Future Volume (vph)	0	0	0	25	31	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	950	950	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	950	950	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	48.4			40.5	49.5	
Travel Time (s)	3.5			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	100%	100%	2%
Adj. Flow (vph)	0	0	0	27	34	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	27	34	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	25	31	0
Future Volume (Veh/h)	0	0	0	25	31	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	27	34	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	81	54	44			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	81	54	44			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	906	996	1551			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	27	34			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1551	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	56.1		49.5			34.8
Travel Time (s)	4.0		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis  
 26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	135					
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service		A	
Analysis Period (min)	15					



Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	136	3	224	200	442	4	312	223	445	392	24
Future Volume (vph)	13	136	3	224	200	442	4	312	223	445	392	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.997				0.850			0.850		0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1710	0	1719	1845	1553	1805	1827	1482	1736	1822	0
Flt Permitted	0.628			0.572			0.511			0.420		
Satd. Flow (perm)	962	1710	0	1035	1845	1553	971	1827	1482	767	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				460			232			6
Link Speed (k/h)		80			80			80				80
Link Distance (m)		534.9			1632.3			668.8				320.5
Travel Time (s)		24.1			73.5			30.1				14.4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Adj. Flow (vph)	14	142	3	233	208	460	4	325	232	464	408	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	145	0	233	208	460	4	325	232	464	433	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

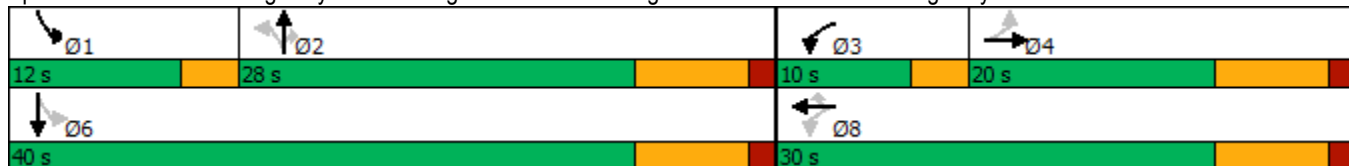


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	20.0	20.0		10.0	30.0	30.0	28.0	28.0	28.0	12.0	40.0	
Total Split (%)	28.6%	28.6%		14.3%	42.9%	42.9%	40.0%	40.0%	40.0%	17.1%	57.1%	
Maximum Green (s)	12.8	12.8		7.0	22.8	22.8	20.6	20.6	20.6	9.0	32.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	12.3	12.3		26.5	22.3	22.3	21.2	21.2	21.2	37.6	33.2	
Actuated g/C Ratio	0.18	0.18		0.39	0.33	0.33	0.31	0.31	0.31	0.55	0.49	
v/c Ratio	0.08	0.47		0.48	0.34	0.56	0.01	0.57	0.37	0.82	0.49	
Control Delay	24.4	30.4		18.7	19.3	5.0	17.0	24.6	4.9	25.3	14.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.4	30.4		18.7	19.3	5.0	17.0	24.6	4.9	25.3	14.1	
LOS	C	C		B	B	A	B	C	A	C	B	
Approach Delay		29.9			11.8			16.4			19.9	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	68.1
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	16.8
Intersection LOS:	B
Intersection Capacity Utilization:	79.2%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	145	233	208	460	4	325	232	464	433
v/c Ratio	0.08	0.47	0.48	0.34	0.56	0.01	0.57	0.37	0.82	0.49
Control Delay	24.4	30.4	18.7	19.3	5.0	17.0	24.6	4.9	25.3	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.4	30.4	18.7	19.3	5.0	17.0	24.6	4.9	25.3	14.1
Queue Length 50th (m)	1.6	17.4	21.2	20.6	0.0	0.4	35.6	0.0	34.0	35.5
Queue Length 95th (m)	6.2	33.8	38.0	37.3	18.4	2.4	62.1	14.5	#77.9	61.3
Internal Link Dist (m)		510.9		1608.3			644.8			296.5
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	194	347	482	644	841	307	579	628	566	901
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.42	0.48	0.32	0.55	0.01	0.56	0.37	0.82	0.48

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	136	3	224	200	442	4	312	223	445	392	24
Future Volume (vph)	13	136	3	224	200	442	4	312	223	445	392	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	1736	1823	
Flt Permitted	0.63	1.00		0.57	1.00	1.00	0.51	1.00	1.00	0.42	1.00	
Satd. Flow (perm)	962	1710		1034	1845	1553	970	1827	1482	768	1823	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	142	3	233	208	460	4	325	232	464	408	25
RTOR Reduction (vph)	0	1	0	0	0	310	0	0	160	0	3	0
Lane Group Flow (vph)	14	144	0	233	208	150	4	325	72	464	430	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	11.3	11.3		21.3	21.3	21.3	20.3	20.3	20.3	32.3	32.3	
Effective Green, g (s)	12.3	12.3		22.3	22.3	22.3	21.3	21.3	21.3	33.3	33.3	
Actuated g/C Ratio	0.18	0.18		0.33	0.33	0.33	0.31	0.31	0.31	0.49	0.49	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	173	308		418	603	507	302	570	462	516	890	
v/s Ratio Prot		c0.08		c0.07	0.11			c0.18		c0.13	0.24	
v/s Ratio Perm	0.01			0.12		0.10	0.00		0.05	0.31		
v/c Ratio	0.08	0.47		0.56	0.34	0.30	0.01	0.57	0.16	0.90	0.48	
Uniform Delay, d1	23.2	25.0		17.9	17.4	17.1	16.2	19.6	17.0	14.0	11.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.1		1.6	0.3	0.3	0.0	1.7	0.2	18.3	0.6	
Delay (s)	23.4	26.1		19.5	17.8	17.4	16.2	21.3	17.2	32.3	12.3	
Level of Service	C	C		B	B	B	B	C	B	C	B	
Approach Delay (s)		25.9			18.0			19.5			22.6	
Approach LOS		C			B			B			C	

### Intersection Summary

HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	68.2	Sum of lost time (s)	16.6
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	730	28	43	820	107	34	0	51	76	2	40
Future Volume (vph)	53	730	28	43	820	107	34	0	51	76	2	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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	1.00		0.96	1.00		0.96	0.98	0.97		0.99	0.96	
Frt			0.850			0.850		0.850			0.857	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1290	0	1770	1531	0
Flt Permitted	0.238			0.290			0.729			0.722		
Satd. Flow (perm)	442	1792	1156	461	1827	1518	1101	1290	0	1327	1531	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			36			84		114				41
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			84.6				63.5
Travel Time (s)		73.5			28.8			6.1				4.6
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Adj. Flow (vph)	55	753	29	44	845	110	35	0	53	78	2	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	753	29	44	845	110	35	53	0	78	43	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

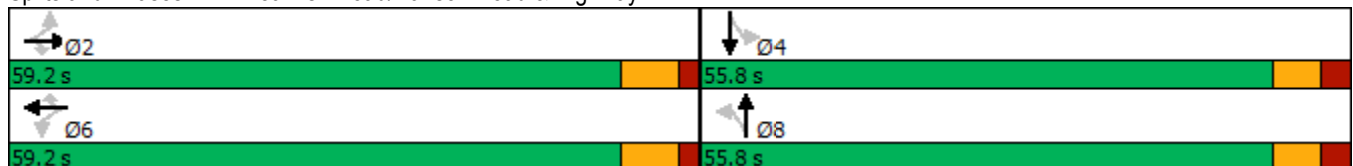


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	59.2	59.2	59.2	59.2	59.2	59.2	55.8	55.8		55.8	55.8	
Total Split (%)	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%	48.5%	48.5%		48.5%	48.5%	
Maximum Green (s)	52.4	52.4	52.4	52.4	52.4	52.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)								15.0	15.0		15.0	15.0
Flash Dont Walk (s)								34.0	34.0		34.0	34.0
Pedestrian Calls (#/hr)								0	0		0	0
Act Effct Green (s)	47.6	47.6	47.6	47.6	47.6	47.6	12.0	12.0		12.0	12.0	
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.67	0.67	0.17	0.17		0.17	0.17	
v/c Ratio	0.19	0.63	0.04	0.14	0.69	0.11	0.19	0.17		0.35	0.15	
Control Delay	6.4	9.7	1.5	5.7	11.1	1.9	30.4	1.4		33.0	11.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.4	9.7	1.5	5.7	11.1	1.9	30.4	1.4		33.0	11.6	
LOS	A	A	A	A	B	A	C	A		C	B	
Approach Delay		9.2			9.8			12.9			25.4	
Approach LOS		A			A			B			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 71.3  
 Natural Cycle: 115  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 10.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 79.2%  
 ICU Level of Service D  
 Analysis Period (min) 15

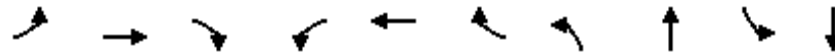
Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12



Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	55	753	29	44	845	110	35	53	78	43
v/c Ratio	0.19	0.63	0.04	0.14	0.69	0.11	0.19	0.17	0.35	0.15
Control Delay	6.4	9.7	1.5	5.7	11.1	1.9	30.4	1.4	33.0	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	9.7	1.5	5.7	11.1	1.9	30.4	1.4	33.0	11.6
Queue Length 50th (m)	2.3	48.0	0.0	1.8	58.1	1.0	4.5	0.0	10.3	0.3
Queue Length 95th (m)	7.7	91.2	2.0	6.1	111.2	5.8	12.9	0.9	23.5	8.6
Internal Link Dist (m)	1608.3				615.3				60.6	39.5
Turn Bay Length (m)	30.0		115.0	93.0				75.0		
Base Capacity (vph)	334	1356	883	349	1382	1169	780	947	940	1096
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.56	0.03	0.13	0.61	0.09	0.04	0.06	0.08	0.04

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	730	28	43	820	107	34	0	51	76	2	40
Future Volume (vph)	53	730	28	43	820	107	34	0	51	76	2	40
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1763	1792	1163	1510	1827	1528	1447	1297		1755	1544	
Flt Permitted	0.24	1.00	1.00	0.29	1.00	1.00	0.73	1.00		0.72	1.00	
Satd. Flow (perm)	441	1792	1163	461	1827	1528	1111	1297		1335	1544	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	55	753	29	44	845	110	35	0	53	78	2	41
RTOR Reduction (vph)	0	0	10	0	0	28	0	44	0	0	34	0
Lane Group Flow (vph)	55	753	19	44	845	82	35	9	0	78	9	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	46.5	46.5	46.5	46.5	46.5	46.5	11.0	11.0		11.0	11.0	
Effective Green, g (s)	47.5	47.5	47.5	47.5	47.5	47.5	12.0	12.0		12.0	12.0	
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.67	0.67	0.17	0.17		0.17	0.17	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	294	1197	776	307	1220	1020	187	218		225	260	
v/s Ratio Prot		0.42			c0.46			0.01				0.01
v/s Ratio Perm	0.12		0.02	0.10		0.05	0.03			c0.06		
v/c Ratio	0.19	0.63	0.02	0.14	0.69	0.08	0.19	0.04		0.35	0.03	
Uniform Delay, d1	4.5	6.8	4.0	4.3	7.3	4.1	25.4	24.7		26.1	24.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.0	0.0	0.2	1.7	0.0	0.5	0.1		0.9	0.1	
Delay (s)	4.8	7.8	4.0	4.5	9.0	4.2	25.9	24.8		27.0	24.8	
Level of Service	A	A	A	A	A	A	C	C		C	C	
Approach Delay (s)		7.5			8.3			25.2			26.2	
Approach LOS		A			A			C			C	

### Intersection Summary

HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	11.6
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	49.9		15.3			84.6
Travel Time (s)	3.6		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	51.4		50.1			34.6
Travel Time (s)	3.7		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	134					
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	590	93	106	646	294	122	33	172	290	38	197
Future Volume (vph)	169	590	93	106	646	294	122	33	172	290	38	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98		0.99		1.00		
Fr <sub>t</sub>			0.850			0.850		0.874				0.874
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3312	1583	1805	3471	1568	1770	1627	0	1787	1625	0
Fl <sub>t</sub> Permitted	0.289			0.400			0.574			0.615		
Satd. Flow (perm)	549	3312	1549	760	3471	1532	1069	1627	0	1155	1625	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94			297		174				199
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Adj. Flow (vph)	171	596	94	107	653	297	123	33	174	293	38	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	596	94	107	653	297	123	207	0	293	237	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

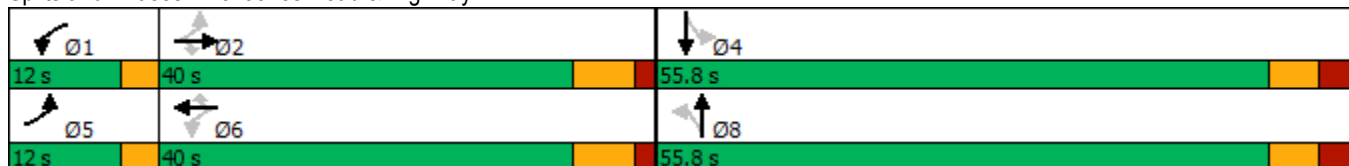


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	39.6	28.0	28.0	37.8	24.8	24.8	26.1	26.1		26.1		26.1
Actuated g/C Ratio	0.53	0.37	0.37	0.51	0.33	0.33	0.35	0.35		0.35		0.35
v/c Ratio	0.38	0.48	0.15	0.21	0.57	0.42	0.33	0.30		0.73		0.34
Control Delay	13.3	22.2	5.8	11.8	24.2	4.9	20.5	5.6		32.6		5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	13.3	22.2	5.8	11.8	24.2	4.9	20.5	5.6		32.6		5.6
LOS	B	C	A	B	C	A	C	A		C		A
Approach Delay		18.6			17.5			11.2				20.6
Approach LOS		B			B			B				C

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 74.7  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 17.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 76.4%  
 ICU Level of Service D  
 Analysis Period (min) 15

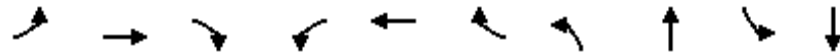
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	171	596	94	107	653	297	123	207	293	237
v/c Ratio	0.38	0.48	0.15	0.21	0.57	0.42	0.33	0.30	0.73	0.34
Control Delay	13.3	22.2	5.8	11.8	24.2	4.9	20.5	5.6	32.6	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	22.2	5.8	11.8	24.2	4.9	20.5	5.6	32.6	5.6
Queue Length 50th (m)	11.3	35.2	0.0	6.8	40.1	0.0	12.1	3.0	34.3	3.4
Queue Length 95th (m)	31.8	69.2	11.0	21.0	75.7	18.1	29.6	17.4	74.0	19.0
Internal Link Dist (m)		615.3			306.8			52.2		126.5
Turn Bay Length (m)	216.0		160.0	80.0		80.0				
Base Capacity (vph)	466	1575	786	543	1651	884	743	1184	803	1191
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.38	0.12	0.20	0.40	0.34	0.17	0.17	0.36	0.20

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	590	93	106	646	294	122	33	172	290	38	197
Future Volume (vph)	169	590	93	106	646	294	122	33	172	290	38	197
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1628		1785	1626	
Flt Permitted	0.29	1.00	1.00	0.40	1.00	1.00	0.57	1.00		0.62	1.00	
Satd. Flow (perm)	548	3312	1550	761	3471	1532	1069	1628		1156	1626	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	171	596	94	107	653	297	123	33	174	293	38	199
RTOR Reduction (vph)	0	0	59	0	0	196	0	114	0	0	130	0
Lane Group Flow (vph)	171	596	35	107	653	101	123	93	0	293	107	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	35.7	27.0	27.0	30.7	24.5	24.5	25.0	25.0		25.0	25.0	
Effective Green, g (s)	37.2	28.0	28.0	32.7	25.5	25.5	26.0	26.0		26.0	26.0	
Actuated g/C Ratio	0.50	0.37	0.37	0.44	0.34	0.34	0.35	0.35		0.35	0.35	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	435	1239	580	433	1183	522	371	565		401	565	
v/s Ratio Prot	c0.05	0.18		0.02	c0.19			0.06				0.07
v/s Ratio Perm	0.14		0.02	0.08		0.07	0.12			c0.25		
v/c Ratio	0.39	0.48	0.06	0.25	0.55	0.19	0.33	0.17		0.73	0.19	
Uniform Delay, d1	11.0	17.9	15.0	12.6	20.0	17.4	18.0	16.9		21.3	17.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.4	0.1	0.3	0.6	0.2	0.5	0.1		6.7	0.2	
Delay (s)	11.6	18.2	15.0	12.9	20.6	17.6	18.5	17.0		28.1	17.2	
Level of Service	B	B	B	B	C	B	B	B		C	B	
Approach Delay (s)		16.5			19.0			17.6			23.2	
Approach LOS		B			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			18.9			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			74.8			Sum of lost time (s)			13.6			
Intersection Capacity Utilization			76.4%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group



Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	372	647	33	30	553	184	102	110	46	235	52	391
Future Volume (vph)	372	647	33	30	553	184	102	110	46	235	52	391
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3361	0	1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.385			0.382			0.722			0.683		
Satd. Flow (perm)	717	3361	0	726	3438	1583	1372	1881	1615	1260	1900	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				192			85			325
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		330.8			413.9			498.1			591.8	
Travel Time (s)		19.8			24.8			29.9			35.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Adj. Flow (vph)	388	674	34	31	576	192	106	115	48	245	54	407
Shared Lane Traffic (%)												
Lane Group Flow (vph)	388	708	0	31	576	192	106	115	48	245	54	407
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

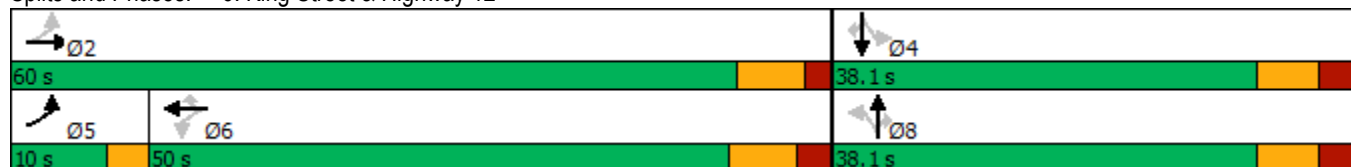


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.6	42.6	42.6	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		42.4	42.4	42.4	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.9	46.9		36.2	36.2	36.2	22.0	22.0	22.0	22.0	22.0	22.0
Actuated g/C Ratio	0.63	0.58		0.45	0.45	0.45	0.27	0.27	0.27	0.27	0.27	0.27
v/c Ratio	0.70	0.36		0.10	0.38	0.24	0.28	0.23	0.10	0.72	0.10	0.61
Control Delay	18.3	10.7		16.6	16.9	3.5	24.5	23.1	1.9	38.7	21.5	9.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	10.7		16.6	16.9	3.5	24.5	23.1	1.9	38.7	21.5	9.7
LOS	B	B		B	B	A	C	C	A	D	C	A
Approach Delay		13.4			13.7			19.9			20.7	
Approach LOS		B			B			B			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 81.1  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.72  
 Intersection Signal Delay: 15.9  
 Intersection LOS: B  
 Intersection Capacity Utilization 83.4%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	388	708	31	576	192	106	115	48	245	54	407
v/c Ratio	0.70	0.36	0.10	0.38	0.24	0.28	0.23	0.10	0.72	0.10	0.61
Control Delay	18.3	10.7	16.6	16.9	3.5	24.5	23.1	1.9	38.7	21.5	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	18.3	10.7	16.6	16.9	3.5	24.5	23.1	1.9	38.7	21.5	9.7
Queue Length 50th (m)	27.2	29.6	2.8	31.6	0.0	13.5	14.3	0.0	35.6	6.5	10.1
Queue Length 95th (m)	#67.7	53.1	9.7	54.0	12.8	26.1	26.7	2.7	60.5	14.6	34.5
Internal Link Dist (m)		306.8		389.9			474.1			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	554	2255	391	1852	941	544	747	692	500	754	831
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	0.70	0.31	0.08	0.31	0.20	0.19	0.15	0.07	0.49	0.07	0.49

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 6: King Street & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗↘		↘	↗↘	↘	↘	↗	↘	↘	↗	↘
Traffic Volume (vph)	372	647	33	30	553	184	102	110	46	235	52	391
Future Volume (vph)	372	647	33	30	553	184	102	110	46	235	52	391
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3360		1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.39	1.00		0.38	1.00	1.00	0.72	1.00	1.00	0.68	1.00	1.00
Satd. Flow (perm)	718	3360		727	3438	1583	1371	1881	1615	1260	1900	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	388	674	34	31	576	192	106	115	48	245	54	407
RTOR Reduction (vph)	0	3	0	0	0	106	0	0	35	0	0	237
Lane Group Flow (vph)	388	705	0	31	576	86	106	115	13	245	54	170
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	45.9	45.9		35.3	35.3	35.3	21.0	21.0	21.0	21.0	21.0	21.0
Effective Green, g (s)	46.9	46.9		36.3	36.3	36.3	22.0	22.0	22.0	22.0	22.0	22.0
Actuated g/C Ratio	0.58	0.58		0.45	0.45	0.45	0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	519	1945		325	1540	709	372	510	438	342	516	434
v/s Ratio Prot	c0.07	c0.21			0.17			0.06				0.03
v/s Ratio Perm	0.36			0.04		0.05	0.08		0.01	c0.19		0.11
v/c Ratio	0.75	0.36		0.10	0.37	0.12	0.28	0.23	0.03	0.72	0.10	0.39
Uniform Delay, d1	10.1	9.1		12.9	14.8	13.0	23.3	22.9	21.7	26.7	22.1	24.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.8	0.2		0.2	0.3	0.1	0.4	0.2	0.0	7.0	0.1	0.6
Delay (s)	16.0	9.3		13.1	15.1	13.2	23.7	23.1	21.7	33.7	22.2	24.6
Level of Service	B	A		B	B	B	C	C	C	C	C	C
Approach Delay (s)		11.6			14.5			23.1			27.6	
Approach LOS		B			B			C			C	

### Intersection Summary

HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	14.7
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	63	54	0
Future Volume (vph)	0	0	0	63	54	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	30.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1173	1284	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1173	1284	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	51.3			34.6	15.3	
Travel Time (s)	3.7			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	62%	48%	2%
Adj. Flow (vph)	0	0	0	68	59	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	68	59	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	63	54	0
Future Volume (Veh/h)	0	0	0	63	54	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	68	59	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						100
pX, platoon unblocked						
vC, conflicting volume	127	59	59			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	127	59	59			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	868	1007	1545			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	68	59			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1545	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service	A		
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	39	10	0	25
Future Volume (vph)	6	0	39	10	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.950					
Satd. Flow (prot)	1107	0	1133	0	0	1166
Flt Permitted	0.950					
Satd. Flow (perm)	1107	0	1133	0	0	1166
Link Speed (k/h)	50	50		50		
Link Distance (m)	98.0	54.6		39.8		
Travel Time (s)	7.1	3.9		2.9		
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	63%	2%	63%	63%	2%	63%
Adj. Flow (vph)	7	0	42	11	0	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	53	0	0	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	0.0		0.0		
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
	ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	39	10	0	25
Future Volume (Veh/h)	6	0	39	10	0	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	42	11	0	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	224					
pX, platoon unblocked						
vC, conflicting volume	94	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	94	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	763	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	7	53	27			
Volume Left	7	0	0			
Volume Right	0	11	0			
cSH	763	1700	1527			
Volume to Capacity	0.01	0.03	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	9.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	9.8	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.8			
Intersection Capacity Utilization			19.0%	ICU Level of Service		A
Analysis Period (min)			15			



Lanes, Volumes, Timings  
 20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	39	27	0
Future Volume (vph)	0	0	0	39	27	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1166	1166	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1166	1166	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.4			39.8	50.1	
Travel Time (s)	4.7			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	63%	63%	2%
Adj. Flow (vph)	0	0	0	42	29	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	42	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	39	27	0
Future Volume (Veh/h)	0	0	0	39	27	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	42	29	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	91	49	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	91	49	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	894	1003	1558			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	42	29			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1558	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	143	3	241	206	476	4	324	242	482	406	24
Future Volume (vph)	13	143	3	241	206	476	4	324	242	482	406	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.997				0.850			0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1710	0	1719	1845	1553	1805	1827	1482	1736	1824	0
Flt Permitted	0.624			0.544			0.504			0.352		
Satd. Flow (perm)	956	1710	0	984	1845	1553	958	1827	1482	643	1824	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				496			252		5	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		534.9			1632.3			668.8			320.5	
Travel Time (s)		24.1			73.5			30.1			14.4	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Adj. Flow (vph)	14	149	3	251	215	496	4	338	252	502	423	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	152	0	251	215	496	4	338	252	502	448	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

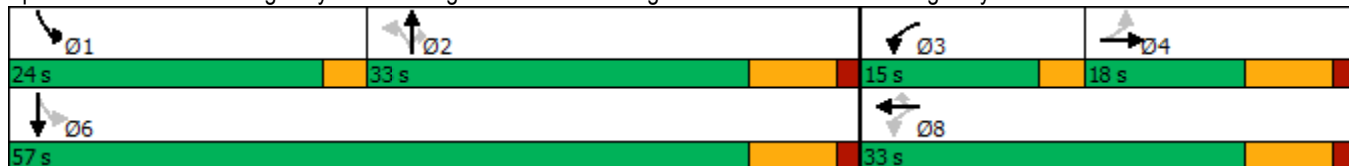


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	18.0	18.0		15.0	33.0	33.0	33.0	33.0	33.0	24.0	57.0	
Total Split (%)	20.0%	20.0%		16.7%	36.7%	36.7%	36.7%	36.7%	36.7%	26.7%	63.3%	
Maximum Green (s)	10.8	10.8		12.0	25.8	25.8	25.6	25.6	25.6	21.0	49.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	11.7	11.7		30.3	26.0	26.0	23.7	23.7	23.7	49.4	45.0	
Actuated g/C Ratio	0.14	0.14		0.36	0.31	0.31	0.28	0.28	0.28	0.59	0.54	
v/c Ratio	0.11	0.64		0.54	0.37	0.60	0.01	0.66	0.42	0.80	0.46	
Control Delay	36.4	48.9		26.1	25.9	5.9	22.8	34.0	5.7	20.7	13.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	36.4	48.9		26.1	25.9	5.9	22.8	34.0	5.7	20.7	13.5	
LOS	D	D		C	C	A	C	C	A	C	B	
Approach Delay		47.9			15.7			21.9			17.3	
Approach LOS		D			B			C			B	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	83.7
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.80
Intersection Signal Delay:	19.6
Intersection LOS:	B
Intersection Capacity Utilization:	82.6%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	152	251	215	496	4	338	252	502	448
v/c Ratio	0.11	0.64	0.54	0.37	0.60	0.01	0.66	0.42	0.80	0.46
Control Delay	36.4	48.9	26.1	25.9	5.9	22.8	34.0	5.7	20.7	13.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	48.9	26.1	25.9	5.9	22.8	34.0	5.7	20.7	13.5
Queue Length 50th (m)	2.2	25.1	31.9	28.7	0.0	0.5	52.1	0.0	45.6	43.5
Queue Length 95th (m)	8.1	#53.4	56.3	51.3	23.6	3.0	82.1	17.1	#72.0	66.0
Internal Link Dist (m)		510.9		1608.3			644.8			296.5
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	135	243	470	594	836	306	584	645	668	1111
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.63	0.53	0.36	0.59	0.01	0.58	0.39	0.75	0.40

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	143	3	241	206	476	4	324	242	482	406	24
Future Volume (vph)	13	143	3	241	206	476	4	324	242	482	406	24
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	1736	1823	
Flt Permitted	0.62	1.00		0.54	1.00	1.00	0.50	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	956	1710		984	1845	1553	957	1827	1482	643	1823	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	149	3	251	215	496	4	338	252	502	423	25
RTOR Reduction (vph)	0	1	0	0	0	341	0	0	181	0	2	0
Lane Group Flow (vph)	14	151	0	251	215	155	4	338	71	502	446	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	10.8	10.8		25.1	25.1	25.1	22.7	22.7	22.7	44.0	44.0	
Effective Green, g (s)	11.8	11.8		26.1	26.1	26.1	23.7	23.7	23.7	45.0	45.0	
Actuated g/C Ratio	0.14	0.14		0.31	0.31	0.31	0.28	0.28	0.28	0.54	0.54	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	134	241		414	575	484	270	517	419	597	980	
v/s Ratio Prot		c0.09		c0.09	0.12			c0.19		c0.19	0.24	
v/s Ratio Perm	0.01			0.10		0.10	0.00		0.05	0.26		
v/c Ratio	0.10	0.63		0.61	0.37	0.32	0.01	0.65	0.17	0.84	0.45	
Uniform Delay, d1	31.3	33.9		23.3	22.4	22.0	21.6	26.4	22.6	13.6	11.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	5.0		2.5	0.4	0.4	0.0	3.3	0.3	10.4	0.5	
Delay (s)	31.7	38.9		25.8	22.8	22.4	21.6	29.7	22.9	24.0	12.3	
Level of Service	C	D		C	C	C	C	C	C	C	B	
Approach Delay (s)		38.3			23.4			26.7			18.5	
Approach LOS		D			C			C			B	

### Intersection Summary

HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	83.7	Sum of lost time (s)	16.6
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	754	28	43	853	68	34	0	51	50	2	64
Future Volume (vph)	92	754	28	43	853	68	34	0	51	50	2	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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
Frt			0.850			0.850		0.850			0.854	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1324	0	1770	1591	0
Flt Permitted	0.237			0.291			0.713			0.722		
Satd. Flow (perm)	441	1792	1205	465	1827	1583	1101	1324	0	1345	1591	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			36			51		119				66
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			84.6				63.5
Travel Time (s)		73.5			28.8			6.1				4.6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Adj. Flow (vph)	95	777	29	44	879	70	35	0	53	52	2	66
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	777	29	44	879	70	35	53	0	52	68	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

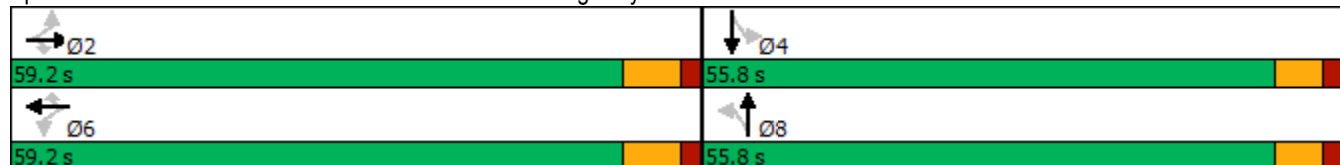


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	59.2	59.2	59.2	59.2	59.2	59.2	55.8	55.8		55.8	55.8	
Total Split (%)	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%	48.5%	48.5%		48.5%	48.5%	
Maximum Green (s)	52.4	52.4	52.4	52.4	52.4	52.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)							15.0	15.0		15.0	15.0	
Flash Dont Walk (s)							34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)							0	0		0	0	
Act Effct Green (s)	53.4	53.4	53.4	53.4	53.4	53.4	11.2	11.2		11.2	11.2	
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.15	0.15		0.15	0.15	
v/c Ratio	0.31	0.62	0.03	0.14	0.69	0.06	0.22	0.18		0.26	0.23	
Control Delay	7.7	8.8	1.2	5.0	10.2	1.8	32.3	1.3		32.7	10.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	7.7	8.8	1.2	5.0	10.2	1.8	32.3	1.3		32.7	10.9	
LOS	A	A	A	A	B	A	C	A		C	B	
Approach Delay		8.4			9.4			13.6			20.3	
Approach LOS		A			A			B			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 76.2  
 Natural Cycle: 135  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.69  
 Intersection Signal Delay: 9.8  
 Intersection LOS: A  
 Intersection Capacity Utilization 85.5%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12

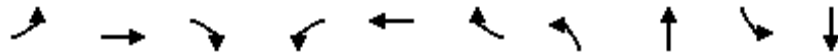




Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	95	777	29	44	879	70	35	53	52	68
v/c Ratio	0.31	0.62	0.03	0.14	0.69	0.06	0.22	0.18	0.26	0.23
Control Delay	7.7	8.8	1.2	5.0	10.2	1.8	32.3	1.3	32.7	10.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.7	8.8	1.2	5.0	10.2	1.8	32.3	1.3	32.7	10.9
Queue Length 50th (m)	4.5	50.9	0.0	1.8	62.6	0.7	4.8	0.0	7.1	0.3
Queue Length 95th (m)	12.5	85.8	1.8	5.5	107.5	4.1	13.0	0.4	17.3	10.9
Internal Link Dist (m)	1608.3			615.3			60.6			39.5
Turn Bay Length (m)	30.0		115.0	93.0		75.0				
Base Capacity (vph)	308	1255	854	325	1279	1124	722	909	881	1066
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.62	0.03	0.14	0.69	0.06	0.05	0.06	0.06	0.06

Intersection Summary

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	754	28	43	853	68	34	0	51	50	2	64
Future Volume (vph)	92	754	28	43	853	68	34	0	51	50	2	64
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1324		1770	1592	
Flt Permitted	0.24	1.00	1.00	0.29	1.00	1.00	0.71	1.00		0.72	1.00	
Satd. Flow (perm)	441	1792	1205	465	1827	1583	1101	1324		1346	1592	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	95	777	29	44	879	70	35	0	53	52	2	66
RTOR Reduction (vph)	0	0	9	0	0	15	0	45	0	0	56	0
Lane Group Flow (vph)	95	777	20	44	879	55	35	8	0	52	12	0
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	52.4	52.4	52.4	52.4	52.4	52.4	10.2	10.2		10.2	10.2	
Effective Green, g (s)	53.4	53.4	53.4	53.4	53.4	53.4	11.2	11.2		11.2	11.2	
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.70	0.70	0.15	0.15		0.15	0.15	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	309	1255	844	325	1280	1109	161	194		197	233	
v/s Ratio Prot		0.43			c0.48			0.01				0.01
v/s Ratio Perm	0.22		0.02	0.09		0.03	0.03			c0.04		
v/c Ratio	0.31	0.62	0.02	0.14	0.69	0.05	0.22	0.04		0.26	0.05	
Uniform Delay, d1	4.3	6.0	3.5	3.8	6.6	3.5	28.6	27.9		28.8	27.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.9	0.0	0.2	1.5	0.0	0.7	0.1		0.7	0.1	
Delay (s)	4.9	6.9	3.5	4.0	8.1	3.6	29.3	28.0		29.6	28.0	
Level of Service	A	A	A	A	A	A	C	C		C	C	
Approach Delay (s)		6.6			7.6			28.5			28.7	
Approach LOS		A			A			C			C	

Intersection Summary

HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	76.2	Sum of lost time (s)	11.6
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	49.9		15.3			84.6
Travel Time (s)	3.6		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	13.3%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service		A	
Analysis Period (min)	15					

# Lanes, Volumes, Timings

## 4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	51.4		50.1			34.6
Travel Time (s)	3.7		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

### Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis  
 4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	134					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	587	93	106	636	296	122	33	172	290	38	200
Future Volume (vph)	170	587	93	106	636	296	122	33	172	290	38	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98		0.99		1.00		
Frt			0.850			0.850		0.874			0.874	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3312	1583	1805	3471	1568	1770	1627	0	1787	1626	0
Flt Permitted	0.295			0.403			0.570			0.616		
Satd. Flow (perm)	560	3312	1549	765	3471	1532	1062	1627	0	1157	1626	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94			299		174			202	
Link Speed (k/h)		80			60			50			50	
Link Distance (m)		639.3			330.8			76.2			150.5	
Travel Time (s)		28.8			19.8			5.5			10.8	
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Adj. Flow (vph)	172	593	94	107	642	299	123	33	174	293	38	202
Shared Lane Traffic (%)												
Lane Group Flow (vph)	172	593	94	107	642	299	123	207	0	293	240	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

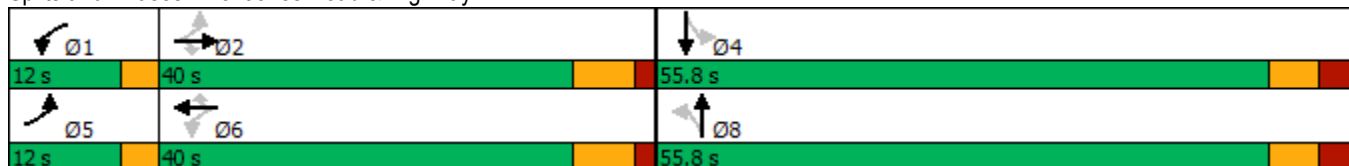


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	39.4	27.8	27.8	37.6	24.6	24.6	26.0	26.0		26.0		26.0
Actuated g/C Ratio	0.53	0.37	0.37	0.51	0.33	0.33	0.35	0.35		0.35		0.35
v/c Ratio	0.38	0.48	0.15	0.21	0.56	0.42	0.33	0.30		0.73		0.34
Control Delay	13.2	22.2	5.9	11.8	24.1	5.0	20.5	5.6		32.4		5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	13.2	22.2	5.9	11.8	24.1	5.0	20.5	5.6		32.4		5.6
LOS	B	C	A	B	C	A	C	A		C		A
Approach Delay		18.6			17.4			11.1				20.3
Approach LOS		B			B			B				C

Intersection Summary

Area Type:	Other
Cycle Length:	107.8
Actuated Cycle Length:	74.4
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	17.6
Intersection LOS:	B
Intersection Capacity Utilization:	76.2%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 5: Jones Road & Highway 12

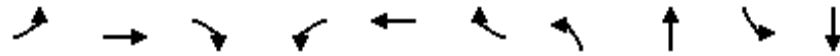




Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	172	593	94	107	642	299	123	207	293	240
v/c Ratio	0.38	0.48	0.15	0.21	0.56	0.42	0.33	0.30	0.73	0.34
Control Delay	13.2	22.2	5.9	11.8	24.1	5.0	20.5	5.6	32.4	5.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	22.2	5.9	11.8	24.1	5.0	20.5	5.6	32.4	5.6
Queue Length 50th (m)	11.3	34.9	0.0	6.8	39.2	0.0	12.1	2.9	34.1	3.4
Queue Length 95th (m)	32.1	69.0	11.0	21.0	74.3	18.2	29.5	17.3	73.3	18.9
Internal Link Dist (m)		615.3			306.8			52.2		126.5
Turn Bay Length (m)	216.0		160.0	80.0		80.0				
Base Capacity (vph)	471	1581	788	545	1657	887	741	1188	807	1195
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.38	0.12	0.20	0.39	0.34	0.17	0.17	0.36	0.20

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (vph)	170	587	93	106	636	296	122	33	172	290	38	200
Future Volume (vph)	170	587	93	106	636	296	122	33	172	290	38	200
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87	1.00	1.00	0.87	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1628	1785	1625		
Flt Permitted	0.29	1.00	1.00	0.40	1.00	1.00	0.57	1.00	0.62	1.00		
Satd. Flow (perm)	560	3312	1550	765	3471	1532	1062	1628	1157	1625		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	172	593	94	107	642	299	123	33	174	293	38	202
RTOR Reduction (vph)	0	0	59	0	0	197	0	114	0	0	132	0
Lane Group Flow (vph)	172	593	35	107	642	102	123	93	0	293	108	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	35.5	26.8	26.8	30.5	24.3	24.3	24.9	24.9		24.9	24.9	
Effective Green, g (s)	37.0	27.8	27.8	32.5	25.3	25.3	25.9	25.9		25.9	25.9	
Actuated g/C Ratio	0.50	0.37	0.37	0.44	0.34	0.34	0.35	0.35		0.35	0.35	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	440	1235	578	434	1178	520	369	565		402	564	
v/s Ratio Prot	c0.05	0.18		0.02	c0.18			0.06				0.07
v/s Ratio Perm	0.14		0.02	0.08		0.07	0.12			c0.25		
v/c Ratio	0.39	0.48	0.06	0.25	0.54	0.20	0.33	0.17		0.73	0.19	
Uniform Delay, d1	10.9	17.8	15.0	12.6	19.9	17.4	17.9	16.8		21.2	17.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.4	0.1	0.3	0.6	0.2	0.5	0.1		6.5	0.2	
Delay (s)	11.5	18.2	15.0	12.9	20.5	17.6	18.5	17.0		27.7	17.2	
Level of Service	B	B	B	B	C	B	B	B		C	B	
Approach Delay (s)		16.5			18.9			17.5			23.0	
Approach LOS		B			B			B			C	

Intersection Summary		
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.60	B
Actuated Cycle Length (s)	74.5	Sum of lost time (s)
Intersection Capacity Utilization	76.2%	13.6
Analysis Period (min)	15	ICU Level of Service
		D

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	370	644	35	30	547	198	104	112	46	243	54	387
Future Volume (vph)	370	644	35	30	547	198	104	112	46	243	54	387
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3358	0	1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.388			0.383			0.720			0.682		
Satd. Flow (perm)	723	3358	0	728	3438	1583	1368	1881	1615	1258	1900	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				206			85			328
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		330.8			413.9			498.1			591.8	
Travel Time (s)		19.8			24.8			29.9			35.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Adj. Flow (vph)	385	671	36	31	570	206	108	117	48	253	56	403
Shared Lane Traffic (%)												
Lane Group Flow (vph)	385	707	0	31	570	206	108	117	48	253	56	403
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

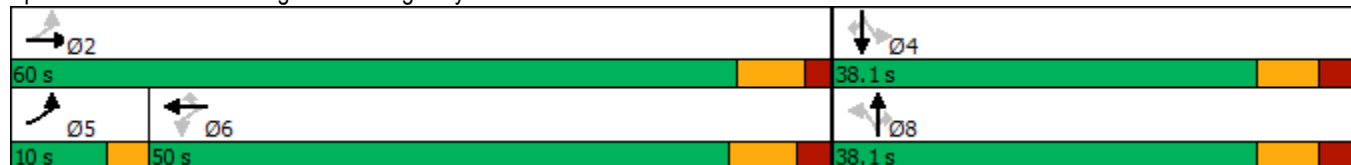


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.6	42.6	42.6	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		42.4	42.4	42.4	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.9	46.9		36.2	36.2	36.2	22.5	22.5	22.5	22.5	22.5	22.5
Actuated g/C Ratio	0.62	0.57		0.44	0.44	0.44	0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.69	0.37		0.10	0.37	0.25	0.29	0.23	0.09	0.73	0.11	0.59
Control Delay	18.2	10.9		16.7	17.1	3.5	24.5	23.0	1.8	39.4	21.4	9.1
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	18.2	10.9		16.7	17.1	3.5	24.5	23.0	1.8	39.4	21.4	9.1
LOS	B	B		B	B	A	C	C	A	D	C	A
Approach Delay		13.4			13.6			19.9			20.8	
Approach LOS		B			B			B			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 81.6  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 15.9      Intersection LOS: B  
 Intersection Capacity Utilization 83.8%      ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021


























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	385	707	31	570	206	108	117	48	253	56	403
v/c Ratio	0.69	0.37	0.10	0.37	0.25	0.29	0.23	0.09	0.73	0.11	0.59
Control Delay	18.2	10.9	16.7	17.1	3.5	24.5	23.0	1.8	39.4	21.4	9.1
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	18.2	10.9	16.7	17.1	3.5	24.5	23.0	1.8	39.4	21.4	9.1
Queue Length 50th (m)	27.6	30.1	2.9	31.8	0.0	13.8	14.6	0.0	37.1	6.8	9.2
Queue Length 95th (m)	#65.4	53.0	9.7	53.2	13.3	26.5	27.1	2.7	62.9	15.1	33.1
Internal Link Dist (m)		306.8		389.9			474.1			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	554	2240	390	1841	943	540	742	689	496	750	829
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	0.69	0.32	0.08	0.31	0.22	0.20	0.16	0.07	0.51	0.07	0.49

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

03/04/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	370	644	35	30	547	198	104	112	46	243	54	387	
Future Volume (vph)	370	644	35	30	547	198	104	112	46	243	54	387	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	3359		1805	3438	1583	1805	1881	1615	1752	1900	1599	
Flt Permitted	0.39	1.00		0.38	1.00	1.00	0.72	1.00	1.00	0.68	1.00	1.00	
Satd. Flow (perm)	722	3359		727	3438	1583	1369	1881	1615	1258	1900	1599	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	385	671	36	31	570	206	108	117	48	253	56	403	
RTOR Reduction (vph)	0	4	0	0	0	114	0	0	35	0	0	237	
Lane Group Flow (vph)	385	703	0	31	570	92	108	117	13	253	56	166	
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.9	45.9		35.3	35.3	35.3	21.5	21.5	21.5	21.5	21.5	21.5	
Effective Green, g (s)	46.9	46.9		36.3	36.3	36.3	22.5	22.5	22.5	22.5	22.5	22.5	
Actuated g/C Ratio	0.58	0.58		0.45	0.45	0.45	0.28	0.28	0.28	0.28	0.28	0.28	
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	518	1932		323	1531	705	377	519	445	347	524	441	
v/s Ratio Prot	c0.07	c0.21			0.17			0.06			0.03		
v/s Ratio Perm	0.35			0.04		0.06	0.08		0.01	c0.20		0.10	
v/c Ratio	0.74	0.36		0.10	0.37	0.13	0.29	0.23	0.03	0.73	0.11	0.38	
Uniform Delay, d1	10.3	9.3		13.1	15.0	13.3	23.2	22.8	21.5	26.7	22.0	23.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	5.7	0.2		0.2	0.3	0.1	0.4	0.2	0.0	7.5	0.1	0.5	
Delay (s)	16.1	9.5		13.3	15.3	13.5	23.6	23.0	21.6	34.2	22.1	24.4	
Level of Service	B	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		11.8			14.7			23.0			27.7		
Approach LOS		B			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			17.6									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.54										
Actuated Cycle Length (s)			81.5									Sum of lost time (s)	14.7
Intersection Capacity Utilization			83.8%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													

Lanes, Volumes, Timings  
 10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	63	54	0
Future Volume (vph)	0	0	0	63	54	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	30.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1173	1284	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1173	1284	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	51.3			34.6	15.3	
Travel Time (s)	3.7			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	62%	48%	2%
Adj. Flow (vph)	0	0	0	68	59	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	68	59	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	63	54	0
Future Volume (Veh/h)	0	0	0	63	54	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	68	59	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	127	59	59			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	127	59	59			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	868	1007	1545			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	68	59			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1545	1700			
Volume to Capacity	0.00	0.00	0.03			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service	A		
Analysis Period (min)	15					



Lanes, Volumes, Timings  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	39	10	0	25
Future Volume (vph)	6	0	39	10	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.950					
Satd. Flow (prot)	1107	0	1133	0	0	1166
Flt Permitted	0.950					
Satd. Flow (perm)	1107	0	1133	0	0	1166
Link Speed (k/h)	50	50		50		
Link Distance (m)	98.0	54.6		39.8		
Travel Time (s)	7.1	3.9		2.9		
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	63%	2%	63%	63%	2%	63%
Adj. Flow (vph)	7	0	42	11	0	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	53	0	0	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6	0.0		0.0		
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	39	10	0	25
Future Volume (Veh/h)	6	0	39	10	0	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	42	11	0	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	224					
pX, platoon unblocked						
vC, conflicting volume	94	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	94	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	763	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	7	53	27			
Volume Left	7	0	0			
Volume Right	0	11	0			
cSH	763	1700	1527			
Volume to Capacity	0.01	0.03	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	9.8	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	9.8	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.8			
Intersection Capacity Utilization			19.0%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	39	27	0
Future Volume (vph)	0	0	0	39	27	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1166	1166	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1166	1166	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.4			39.8	50.1	
Travel Time (s)	4.7			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	63%	63%	2%
Adj. Flow (vph)	0	0	0	42	29	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	42	29	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	39	27	0
Future Volume (Veh/h)	0	0	0	39	27	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	42	29	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	91	49	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	91	49	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	894	1003	1558			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	42	29			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1558	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service	A		
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	144	3	258	205	620	4	344	248	659	432	24
Future Volume (vph)	13	144	3	258	205	620	4	344	248	659	432	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.997				0.850			0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1710	0	1719	1845	1553	1805	1827	1482	1736	1824	0
Flt Permitted	0.624			0.530			0.491			0.284		
Satd. Flow (perm)	956	1710	0	959	1845	1553	933	1827	1482	519	1824	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				646			258			5
Link Speed (k/h)		80			80			80				80
Link Distance (m)		534.9			1632.3			668.8				320.5
Travel Time (s)		24.1			73.5			30.1				14.4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Adj. Flow (vph)	14	150	3	269	214	646	4	358	258	686	450	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	153	0	269	214	646	4	358	258	686	475	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

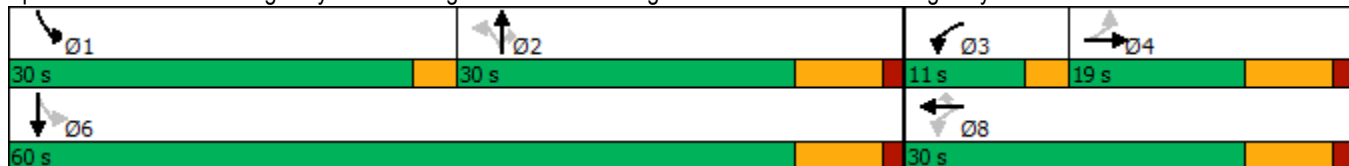


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	19.0	19.0		11.0	30.0	30.0	30.0	30.0	30.0	30.0	60.0	
Total Split (%)	21.1%	21.1%		12.2%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	66.7%	
Maximum Green (s)	11.8	11.8		8.0	22.8	22.8	22.6	22.6	22.6	27.0	52.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	12.3	12.3		27.5	23.3	23.3	22.6	22.6	22.6	56.4	52.0	
Actuated g/C Ratio	0.14	0.14		0.31	0.27	0.27	0.26	0.26	0.26	0.64	0.59	
v/c Ratio	0.11	0.64		0.71	0.44	0.73	0.02	0.76	0.45	0.96	0.44	
Control Delay	35.8	49.2		37.8	30.6	8.0	25.0	42.5	6.4	42.8	11.4	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.8	49.2		37.8	30.6	8.0	25.0	42.5	6.4	42.8	11.4	
LOS	D	D		D	C	A	C	D	A	D	B	
Approach Delay		48.1			19.4			27.4			29.9	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	87.9
Natural Cycle:	90
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	26.5
Intersection LOS:	C
Intersection Capacity Utilization:	94.4%
ICU Level of Service:	F
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	153	269	214	646	4	358	258	686	475
v/c Ratio	0.11	0.64	0.71	0.44	0.73	0.02	0.76	0.45	0.96	0.44
Control Delay	35.8	49.2	37.8	30.6	8.0	25.0	42.5	6.4	42.8	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.8	49.2	37.8	30.6	8.0	25.0	42.5	6.4	42.8	11.4
Queue Length 50th (m)	2.3	26.4	39.7	32.4	0.0	0.5	59.8	0.0	83.9	42.8
Queue Length 95th (m)	8.0	#50.4	#69.2	53.6	31.0	3.2	#99.6	18.3	#160.0	64.9
Internal Link Dist (m)		510.9		1608.3			644.8			296.5
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	138	250	377	499	891	250	491	586	721	1114
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.61	0.71	0.43	0.73	0.02	0.73	0.44	0.95	0.43

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	144	3	258	205	620	4	344	248	659	432	24
Future Volume (vph)	13	144	3	258	205	620	4	344	248	659	432	24
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	1736	1825	
Flt Permitted	0.62	1.00		0.53	1.00	1.00	0.49	1.00	1.00	0.28	1.00	
Satd. Flow (perm)	956	1710		958	1845	1553	934	1827	1482	520	1825	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	150	3	269	214	646	4	358	258	686	450	25
RTOR Reduction (vph)	0	1	0	0	0	475	0	0	192	0	2	0
Lane Group Flow (vph)	14	152	0	269	214	171	4	358	66	686	473	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	11.3	11.3		22.3	22.3	22.3	21.6	21.6	21.6	51.0	51.0	
Effective Green, g (s)	12.3	12.3		23.3	23.3	23.3	22.6	22.6	22.6	52.0	52.0	
Actuated g/C Ratio	0.14	0.14		0.27	0.27	0.27	0.26	0.26	0.26	0.59	0.59	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	133	239		331	489	411	240	469	381	686	1079	
v/s Ratio Prot		c0.09		c0.08	0.12			c0.20		c0.31	0.26	
v/s Ratio Perm	0.01			0.13		0.11	0.00		0.04	0.28		
v/c Ratio	0.11	0.64		0.81	0.44	0.42	0.02	0.76	0.17	1.00	0.44	
Uniform Delay, d1	33.0	35.7		29.0	26.9	26.7	24.4	30.2	25.4	18.4	9.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	5.5		14.1	0.6	0.7	0.0	7.7	0.3	34.4	0.4	
Delay (s)	33.3	41.2		43.1	27.5	27.4	24.4	37.8	25.7	52.7	10.3	
Level of Service	C	D		D	C	C	C	D	C	D	B	
Approach Delay (s)		40.5			31.1			32.7			35.4	
Approach LOS		D			C			C			D	

### Intersection Summary

HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	16.6
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



# Lanes, Volumes, Timings

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	851	28	43	992	108	34	7	51	82	5	56
Future Volume (vph)	67	851	28	43	992	108	34	7	51	82	5	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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
Frt			0.850			0.850		0.867			0.862	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1377	0	1770	1606	0
Flt Permitted	0.154			0.232			0.716			0.718		
Satd. Flow (perm)	287	1792	1205	370	1827	1583	1106	1377	0	1337	1606	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			36			70		53				57
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			84.6				63.5
Travel Time (s)		73.5			28.8			6.1				4.6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Adj. Flow (vph)	69	877	29	44	1023	111	35	7	53	85	5	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	877	29	44	1023	111	35	60	0	85	63	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4

# Lanes, Volumes, Timings

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

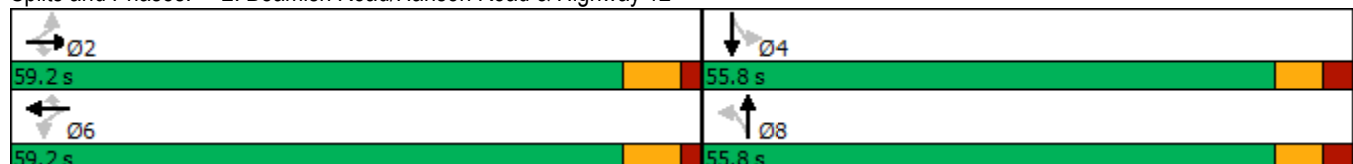


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	59.2	59.2	59.2	59.2	59.2	59.2	55.8	55.8		55.8	55.8	
Total Split (%)	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%	48.5%	48.5%		48.5%	48.5%	
Maximum Green (s)	52.4	52.4	52.4	52.4	52.4	52.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)							15.0	15.0		15.0	15.0	
Flash Dont Walk (s)							34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)							0	0		0	0	
Act Effct Green (s)	53.4	53.4	53.4	53.4	53.4	53.4	12.2	12.2		12.2	12.2	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
v/c Ratio	0.35	0.71	0.03	0.17	0.81	0.10	0.20	0.23		0.40	0.21	
Control Delay	11.3	11.5	1.5	6.5	15.6	2.2	31.1	12.6		35.4	11.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	11.3	11.5	1.5	6.5	15.6	2.2	31.1	12.6		35.4	11.5	
LOS	B	B	A	A	B	A	C	B		D	B	
Approach Delay		11.2			14.0			19.4			25.2	
Approach LOS		B			B			B			C	

### Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 77.2  
 Natural Cycle: 145  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.81  
 Intersection Signal Delay: 13.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 76.6%  
 ICU Level of Service D  
 Analysis Period (min) 15

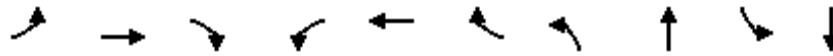
Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12



Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	69	877	29	44	1023	111	35	60	85	63
v/c Ratio	0.35	0.71	0.03	0.17	0.81	0.10	0.20	0.23	0.40	0.21
Control Delay	11.3	11.5	1.5	6.5	15.6	2.2	31.1	12.6	35.4	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.3	11.5	1.5	6.5	15.6	2.2	31.1	12.6	35.4	11.5
Queue Length 50th (m)	3.4	63.8	0.0	1.9	86.5	1.6	4.8	0.9	11.9	0.8
Queue Length 95th (m)	13.6	127.0	2.1	6.8	#188.0	6.8	12.9	10.9	25.2	10.8
Internal Link Dist (m)	1608.3				615.3				60.6	39.5
Turn Bay Length (m)	30.0		115.0	93.0				75.0		
Base Capacity (vph)	198	1240	845	255	1264	1117	716	910	866	1060
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.71	0.03	0.17	0.81	0.10	0.05	0.07	0.10	0.06

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	851	28	43	992	108	34	7	51	82	5	56
Future Volume (vph)	67	851	28	43	992	108	34	7	51	82	5	56
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1377		1770	1606	
Flt Permitted	0.15	1.00	1.00	0.23	1.00	1.00	0.72	1.00		0.72	1.00	
Satd. Flow (perm)	286	1792	1205	370	1827	1583	1106	1377		1337	1606	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	69	877	29	44	1023	111	35	7	53	85	5	58
RTOR Reduction (vph)	0	0	9	0	0	22	0	45	0	0	48	0
Lane Group Flow (vph)	69	877	20	44	1023	89	35	15	0	85	15	0
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	52.4	52.4	52.4	52.4	52.4	52.4	11.2	11.2		11.2	11.2	
Effective Green, g (s)	53.4	53.4	53.4	53.4	53.4	53.4	12.2	12.2		12.2	12.2	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	197	1239	833	255	1263	1094	174	217		211	253	
v/s Ratio Prot		0.49			c0.56			0.01				0.01
v/s Ratio Perm	0.24		0.02	0.12		0.06	0.03			c0.06		
v/c Ratio	0.35	0.71	0.02	0.17	0.81	0.08	0.20	0.07		0.40	0.06	
Uniform Delay, d1	4.8	7.2	3.7	4.2	8.3	3.9	28.3	27.7		29.2	27.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	1.9	0.0	0.3	3.9	0.0	0.6	0.1		1.3	0.1	
Delay (s)	5.9	9.1	3.7	4.5	12.3	3.9	28.8	27.8		30.5	27.7	
Level of Service	A	A	A	A	B	A	C	C		C	C	
Approach Delay (s)		8.7			11.2			28.2			29.3	
Approach LOS		A			B			C			C	

Intersection Summary		
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio	0.73	
Actuated Cycle Length (s)	77.2	Sum of lost time (s) 11.6
Intersection Capacity Utilization	76.6%	ICU Level of Service D
Analysis Period (min)	15	
c Critical Lane Group		

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	49.9		15.3			84.6
Travel Time (s)	3.6		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	0.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	51.4		50.1			34.6
Travel Time (s)	3.7		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	0.0% ICU Level of Service A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	134					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	0.0%		ICU Level of Service		A	
Analysis Period (min)	15					



Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	702	102	106	788	299	135	31	172	290	38	214
Future Volume (vph)	176	702	102	106	788	299	135	31	172	290	38	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98		0.99		1.00		
Frt			0.850			0.850		0.873				0.872
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3312	1583	1805	3471	1568	1770	1625	0	1787	1622	0
Flt Permitted	0.216			0.326			0.543			0.611		
Satd. Flow (perm)	410	3312	1549	619	3471	1532	1011	1625	0	1148	1622	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			302		174				216
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Adj. Flow (vph)	178	709	103	107	796	302	136	31	174	293	38	216
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	709	103	107	796	302	136	205	0	293	254	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

# Lanes, Volumes, Timings

## 5: Jones Road & Highway 12

03/04/2021

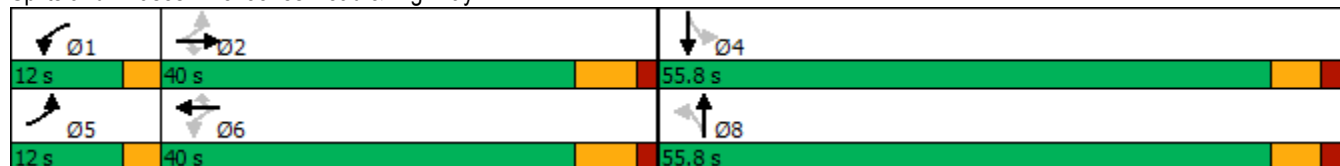


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	42.1	30.5	30.5	40.0	27.0	27.0	27.0	27.0		27.0		27.0
Actuated g/C Ratio	0.54	0.39	0.39	0.51	0.35	0.35	0.35	0.35		0.35		0.35
v/c Ratio	0.45	0.55	0.15	0.24	0.66	0.42	0.39	0.30		0.74		0.36
Control Delay	14.6	23.1	5.5	12.1	26.0	4.7	23.1	5.8		34.7		5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	14.6	23.1	5.5	12.1	26.0	4.7	23.1	5.8		34.7		5.8
LOS	B	C	A	B	C	A	C	A		C		A
Approach Delay		19.7			19.5			12.7				21.3
Approach LOS		B			B			B				C

### Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 78  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.74  
 Intersection Signal Delay: 19.1      Intersection LOS: B  
 Intersection Capacity Utilization 80.6%      ICU Level of Service D  
 Analysis Period (min) 15

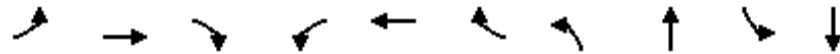
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	178	709	103	107	796	302	136	205	293	254
v/c Ratio	0.45	0.55	0.15	0.24	0.66	0.42	0.39	0.30	0.74	0.36
Control Delay	14.6	23.1	5.5	12.1	26.0	4.7	23.1	5.8	34.7	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.6	23.1	5.5	12.1	26.0	4.7	23.1	5.8	34.7	5.8
Queue Length 50th (m)	12.7	45.8	0.0	7.3	54.0	0.0	15.3	3.1	38.4	3.8
Queue Length 95th (m)	32.7	84.2	11.4	20.9	94.8	18.2	33.5	17.3	74.8	19.6
Internal Link Dist (m)	615.3				306.8		52.2		126.5	
Turn Bay Length (m)	216.0		160.0		80.0		80.0			
Base Capacity (vph)	407	1508	761	486	1580	862	673	1140	764	1152
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.47	0.14	0.22	0.50	0.35	0.20	0.18	0.38	0.22

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	702	102	106	788	299	135	31	172	290	38	214
Future Volume (vph)	176	702	102	106	788	299	135	31	172	290	38	214
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1625		1785	1623	
Flt Permitted	0.22	1.00	1.00	0.33	1.00	1.00	0.54	1.00		0.61	1.00	
Satd. Flow (perm)	410	3312	1550	619	3471	1532	1012	1625		1148	1623	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	178	709	103	107	796	302	136	31	174	293	38	216
RTOR Reduction (vph)	0	0	63	0	0	194	0	114	0	0	142	0
Lane Group Flow (vph)	178	709	40	107	796	108	136	91	0	293	112	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	38.3	29.5	29.5	33.1	26.9	26.9	26.0	26.0		26.0	26.0	
Effective Green, g (s)	39.7	30.5	30.5	35.1	27.9	27.9	27.0	27.0		27.0	27.0	
Actuated g/C Ratio	0.51	0.39	0.39	0.45	0.36	0.36	0.34	0.34		0.34	0.34	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	382	1290	603	386	1236	545	348	560		395	559	
v/s Ratio Prot	c0.06	0.21		0.03	c0.23			0.06				0.07
v/s Ratio Perm	0.18		0.03	0.10		0.07	0.13			c0.26		
v/c Ratio	0.47	0.55	0.07	0.28	0.64	0.20	0.39	0.16		0.74	0.20	
Uniform Delay, d1	11.7	18.6	15.0	12.8	21.1	17.4	19.4	17.8		22.6	18.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.6	0.1	0.4	1.2	0.2	0.7	0.1		7.3	0.2	
Delay (s)	12.6	19.1	15.0	13.2	22.3	17.7	20.2	17.9		29.9	18.2	
Level of Service	B	B	B	B	C	B	C	B		C	B	
Approach Delay (s)		17.5			20.3			18.8			24.5	
Approach LOS		B			C			B			C	
























### Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	78.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	415	714	38	30	641	197	108	117	46	244	57	443
Future Volume (vph)	415	714	38	30	641	197	108	117	46	244	57	443
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.992				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3358	0	1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.332			0.355			0.719			0.679		
Satd. Flow (perm)	618	3358	0	674	3438	1583	1366	1881	1615	1253	1900	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9				205			85			283
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		330.8			413.9			498.1			591.8	
Travel Time (s)		19.8			24.8			29.9			35.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Adj. Flow (vph)	432	744	40	31	668	205	113	122	48	254	59	461
Shared Lane Traffic (%)												
Lane Group Flow (vph)	432	784	0	31	668	205	113	122	48	254	59	461
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

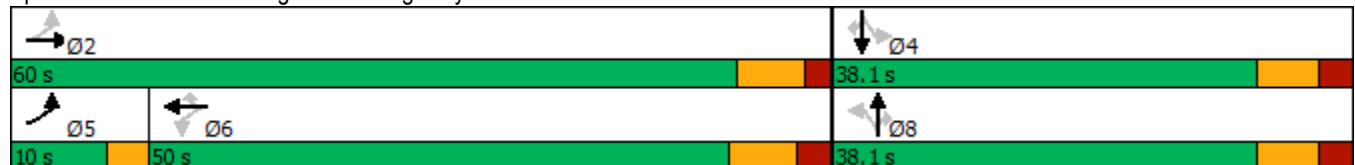


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.6	42.6	42.6	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		42.4	42.4	42.4	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.9	46.9		36.2	36.2	36.2	22.6	22.6	22.6	22.6	22.6	22.6
Actuated g/C Ratio	0.62	0.57		0.44	0.44	0.44	0.28	0.28	0.28	0.28	0.28	0.28
v/c Ratio	0.87	0.41		0.10	0.44	0.25	0.30	0.23	0.09	0.73	0.11	0.71
Control Delay	32.5	11.3		17.0	17.9	3.5	24.7	23.1	1.8	39.5	21.4	16.2
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	11.3		17.0	17.9	3.5	24.7	23.1	1.8	39.5	21.4	16.2
LOS	C	B		B	B	A	C	C	A	D	C	B
Approach Delay		18.9			14.6			20.1			24.3	
Approach LOS		B			B			C			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 81.7  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.87  
 Intersection Signal Delay: 19.1      Intersection LOS: B  
 Intersection Capacity Utilization 86.3%      ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	432	784	31	668	205	113	122	48	254	59	461
v/c Ratio	0.87	0.41	0.10	0.44	0.25	0.30	0.23	0.09	0.73	0.11	0.71
Control Delay	32.5	11.3	17.0	17.9	3.5	24.7	23.1	1.8	39.5	21.4	16.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	11.3	17.0	17.9	3.5	24.7	23.1	1.8	39.5	21.4	16.2
Queue Length 50th (m)	32.3	34.6	2.9	38.7	0.0	14.4	15.3	0.0	37.3	7.1	24.0
Queue Length 95th (m)	#100.4	59.8	9.8	63.5	13.2	27.6	28.0	2.7	63.2	15.7	57.3
Internal Link Dist (m)		306.8		389.9			474.1			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	498	2236	360	1837	941	538	741	688	493	748	801
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	0.87	0.35	0.09	0.36	0.22	0.21	0.16	0.07	0.52	0.08	0.58

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

03/04/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	415	714	38	30	641	197	108	117	46	244	57	443	
Future Volume (vph)	415	714	38	30	641	197	108	117	46	244	57	443	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	3359		1805	3438	1583	1805	1881	1615	1752	1900	1599	
Flt Permitted	0.33	1.00		0.35	1.00	1.00	0.72	1.00	1.00	0.68	1.00	1.00	
Satd. Flow (perm)	619	3359		674	3438	1583	1365	1881	1615	1252	1900	1599	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	432	744	40	31	668	205	112	122	48	254	59	461	
RTOR Reduction (vph)	0	4	0	0	0	114	0	0	35	0	0	205	
Lane Group Flow (vph)	432	780	0	31	668	91	113	122	13	254	59	256	
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.9	45.9		35.3	35.3	35.3	21.6	21.6	21.6	21.6	21.6	21.6	
Effective Green, g (s)	46.9	46.9		36.3	36.3	36.3	22.6	22.6	22.6	22.6	22.6	22.6	
Actuated g/C Ratio	0.57	0.57		0.44	0.44	0.44	0.28	0.28	0.28	0.28	0.28	0.28	
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	468	1930		299	1529	704	378	520	447	346	526	442	
v/s Ratio Prot	c0.09	c0.23			0.19			0.06			0.03		
v/s Ratio Perm	0.44			0.05		0.06	0.08		0.01	c0.20		0.16	
v/c Ratio	0.92	0.40		0.10	0.44	0.13	0.30	0.23	0.03	0.73	0.11	0.58	
Uniform Delay, d1	12.9	9.6		13.2	15.6	13.3	23.3	22.8	21.5	26.8	22.0	25.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	23.8	0.2		0.3	0.3	0.1	0.4	0.2	0.0	7.8	0.1	1.9	
Delay (s)	36.7	9.9		13.4	16.0	13.5	23.7	23.0	21.5	34.6	22.1	27.3	
Level of Service	D	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		19.4			15.3			23.1			29.3		
Approach LOS		B			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			21.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.59										
Actuated Cycle Length (s)			81.6									Sum of lost time (s)	14.7
Intersection Capacity Utilization			86.3%									ICU Level of Service	E
Analysis Period (min)			15										
c Critical Lane Group													



Lanes, Volumes, Timings  
 10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	278	14	19	125	121	325
Future Volume (vph)	278	14	19	125	121	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	30.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.994				0.902	
Flt Protected	0.955			0.993		
Satd. Flow (prot)	1768	0	0	1225	1497	0
Flt Permitted	0.955			0.993		
Satd. Flow (perm)	1768	0	0	1225	1497	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	51.3			34.6	15.3	
Travel Time (s)	3.7			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	62%	48%	2%
Adj. Flow (vph)	302	15	21	136	132	353
Shared Lane Traffic (%)						
Lane Group Flow (vph)	317	0	0	157	485	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	49.3%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	278	14	19	125	121	325
Future Volume (Veh/h)	278	14	19	125	121	325
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	302	15	21	136	132	353
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	486	308	485			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	486	308	485			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	43	98	98			
cM capacity (veh/h)	529	732	1078			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	317	157	485			
Volume Left	302	21	0			
Volume Right	15	0	353			
cSH	536	1078	1700			
Volume to Capacity	0.59	0.02	0.29			
Queue Length 95th (m)	30.4	0.5	0.0			
Control Delay (s)	20.9	1.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	20.9	1.3	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			7.1			
Intersection Capacity Utilization			49.3%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	39	10	5	25
Future Volume (vph)	0	0	39	10	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.992					
Satd. Flow (prot)	1166	0	1133	0	0	1228
Flt Permitted	0.992					
Satd. Flow (perm)	1166	0	1133	0	0	1228
Link Speed (k/h)	50		50		50	
Link Distance (m)	98.0		54.6		39.8	
Travel Time (s)	7.1		3.9		2.9	
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	63%	2%	63%	63%	2%	63%
Adj. Flow (vph)	0	0	42	11	5	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	53	0	0	32
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0		0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free		Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	39	10	5	25
Future Volume (Veh/h)	0	0	39	10	5	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	42	11	5	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	224					
pX, platoon unblocked						
vC, conflicting volume	104	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	104	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	750	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	53	32			
Volume Left	0	0	5			
Volume Right	0	11	0			
cSH	1700	1700	1527			
Volume to Capacity	0.00	0.03	0.00			
Queue Length 95th (m)	0.0	0.0	0.1			
Control Delay (s)	0.0	0.0	1.2			
Lane LOS	A		A			
Approach Delay (s)	0.0	0.0	1.2			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.4			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings  
20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	62	21	22	58	44	64
Future Volume (vph)	62	21	22	58	44	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.965					0.920
Flt Protected	0.964					0.986
Satd. Flow (prot)	1733	0	0	1282	1378	0
Flt Permitted	0.964					0.986
Satd. Flow (perm)	1733	0	0	1282	1378	0
Link Speed (k/h)	50					50
Link Distance (m)	65.4					50.1
Travel Time (s)	4.7					3.6
Confl. Peds. (#/hr)	10	10	10			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	63%	63%	2%
Adj. Flow (vph)	67	23	24	63	48	70
Shared Lane Traffic (%)						
Lane Group Flow (vph)	90	0	0	87	118	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6					0.0
Link Offset(m)	0.0					0.0
Crosswalk Width(m)	4.8					4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			
Sign Control	Stop				Free	Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	24.9%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	21	22	58	44	64
Future Volume (Veh/h)	62	21	22	58	44	64
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	23	24	63	48	70
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	214	103	128			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	214	103	128			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	98	98			
cM capacity (veh/h)	749	936	1446			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	90	87	118			
Volume Left	67	24	0			
Volume Right	23	0	70			
cSH	789	1446	1700			
Volume to Capacity	0.11	0.02	0.07			
Queue Length 95th (m)	3.1	0.4	0.0			
Control Delay (s)	10.1	2.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.1	2.2	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.7			
Intersection Capacity Utilization			24.9%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	144	3	279	205	660	4	366	262	688	460	24
Future Volume (vph)	13	144	3	279	205	660	4	366	262	688	460	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	300.0		0.0
Storage Lanes	1		0	1		1	1		1	2		0
Taper Length (m)	60.0			100.0			68.0			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frt		0.997				0.850			0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1710	0	1719	1845	1553	1805	1827	1482	3367	1826	0
Flt Permitted	0.624			0.546			0.478			0.950		
Satd. Flow (perm)	956	1710	0	988	1845	1553	908	1827	1482	3367	1826	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				668			273			5
Link Speed (k/h)		80			80			80				80
Link Distance (m)		534.9			1632.3			668.8				320.5
Travel Time (s)		24.1			73.5			30.1				14.4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Adj. Flow (vph)	14	150	3	291	214	688	4	381	273	717	479	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	153	0	291	214	688	4	381	273	717	504	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)		3.6			3.6			7.2				7.2
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

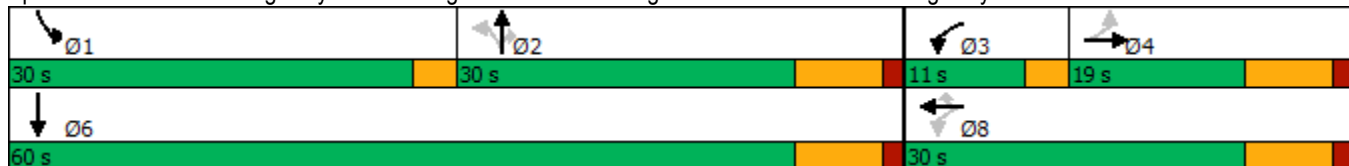


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2			
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	19.0	19.0		11.0	30.0	30.0	30.0	30.0	30.0	30.0	60.0	
Total Split (%)	21.1%	21.1%		12.2%	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	66.7%	
Maximum Green (s)	11.8	11.8		8.0	22.8	22.8	22.6	22.6	22.6	27.0	52.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	12.2	12.2		27.5	23.3	23.3	22.7	22.7	22.7	23.5	48.2	
Actuated g/C Ratio	0.14	0.14		0.33	0.28	0.28	0.27	0.27	0.27	0.28	0.57	
v/c Ratio	0.10	0.61		0.73	0.42	0.75	0.02	0.77	0.46	0.76	0.48	
Control Delay	35.4	46.6		37.2	29.1	9.0	24.8	41.7	6.3	33.8	12.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	35.4	46.6		37.2	29.1	9.0	24.8	41.7	6.3	33.8	12.2	
LOS	D	D		D	C	A	C	D	A	C	B	
Approach Delay		45.6			19.5			26.9			24.9	
Approach LOS		D			B			C			C	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	84.2
Natural Cycle:	75
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.77
Intersection Signal Delay:	24.4
Intersection LOS:	C
Intersection Capacity Utilization:	85.3%
ICU Level of Service:	E
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12





# Queues

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	153	291	214	688	4	381	273	717	504
v/c Ratio	0.10	0.61	0.73	0.42	0.75	0.02	0.77	0.46	0.76	0.48
Control Delay	35.4	46.6	37.2	29.1	9.0	24.8	41.7	6.3	33.8	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	46.6	37.2	29.1	9.0	24.8	41.7	6.3	33.8	12.2
Queue Length 50th (m)	2.1	25.0	40.6	30.3	2.6	0.5	60.5	0.0	58.4	46.5
Queue Length 95th (m)	8.0	#50.4	#79.1	53.6	39.5	3.2	#109.6	18.8	78.3	69.9
Internal Link Dist (m)		510.9		1608.3			644.8			296.5
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0	300.0	
Base Capacity (vph)	145	262	401	524	919	255	515	613	1125	1170
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.58	0.73	0.41	0.75	0.02	0.74	0.45	0.64	0.43

### Intersection Summary

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

Queue shown is maximum after two cycles.

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	144	3	279	205	660	4	366	262	688	460	24
Future Volume (vph)	13	144	3	279	205	660	4	366	262	688	460	24
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	3367	1826	
Flt Permitted	0.62	1.00		0.55	1.00	1.00	0.48	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	956	1710		988	1845	1553	909	1827	1482	3367	1826	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	150	3	291	214	688	4	381	273	717	479	25
RTOR Reduction (vph)	0	1	0	0	0	483	0	0	199	0	2	0
Lane Group Flow (vph)	14	152	0	291	214	205	4	381	74	717	502	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	11.3	11.3		22.3	22.3	22.3	21.7	21.7	21.7	22.5	47.2	
Effective Green, g (s)	12.3	12.3		23.3	23.3	23.3	22.7	22.7	22.7	23.5	48.2	
Actuated g/C Ratio	0.15	0.15		0.28	0.28	0.28	0.27	0.27	0.27	0.28	0.57	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	139	250		351	511	430	245	493	400	940	1046	
v/s Ratio Prot		c0.09		c0.09	0.12			c0.21		c0.21	0.27	
v/s Ratio Perm	0.01			0.14		0.13	0.00		0.05			
v/c Ratio	0.10	0.61		0.83	0.42	0.48	0.02	0.77	0.18	0.76	0.48	
Uniform Delay, d1	31.1	33.6		27.3	24.9	25.3	22.5	28.3	23.6	27.7	10.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	4.2		14.8	0.6	0.8	0.0	7.8	0.3	3.7	0.5	
Delay (s)	31.4	37.8		42.2	25.4	26.2	22.5	36.1	23.9	31.5	11.0	
Level of Service	C	D		D	C	C	C	D	C	C	B	
Approach Delay (s)		37.3			29.9			31.0			23.0	
Approach LOS		D			C			C			C	

### Intersection Summary

HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	84.1	Sum of lost time (s)	16.6
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	895	28	43	1052	108	34	7	51	82	5	56
Future Volume (vph)	67	895	28	43	1052	108	34	7	51	82	5	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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
Frt			0.850			0.850		0.867			0.862	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1377	0	1770	1606	0
Flt Permitted	0.120			0.207			0.716			0.718		
Satd. Flow (perm)	224	1792	1205	331	1827	1583	1106	1377	0	1337	1606	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			36			66		53			47	
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		1632.3			639.3			84.6			63.5	
Travel Time (s)		73.5			28.8			6.1			4.6	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Adj. Flow (vph)	69	923	29	44	1085	111	35	7	53	85	5	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	69	923	29	44	1085	111	35	60	0	85	63	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	

# Lanes, Volumes, Timings

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

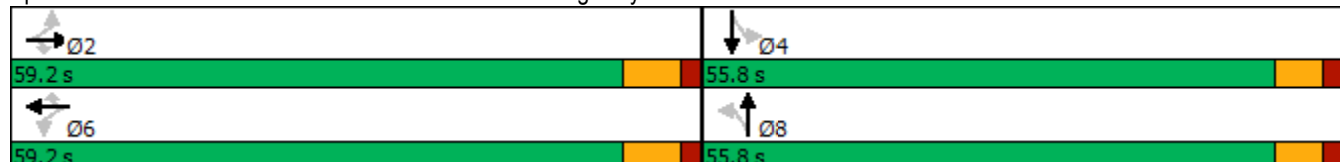


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	59.2	59.2	59.2	59.2	59.2	59.2	55.8	55.8		55.8	55.8	
Total Split (%)	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%	48.5%	48.5%		48.5%	48.5%	
Maximum Green (s)	52.4	52.4	52.4	52.4	52.4	52.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	15.0	15.0		15.0	15.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	53.4	53.4	53.4	53.4	53.4	53.4	12.2	12.2		12.2	12.2	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
v/c Ratio	0.45	0.74	0.03	0.19	0.86	0.10	0.20	0.23		0.40	0.22	
Control Delay	17.2	12.7	1.5	7.1	18.7	2.3	31.1	12.6		35.4	14.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	17.2	12.7	1.5	7.1	18.7	2.3	31.1	12.6		35.4	14.3	
LOS	B	B	A	A	B	A	C	B		D	B	
Approach Delay		12.7			16.8			19.4			26.4	
Approach LOS		B			B			B			C	

### Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 77.2  
 Natural Cycle: 145  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 15.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 76.6%  
 ICU Level of Service D  
 Analysis Period (min) 15

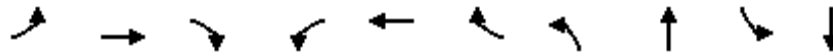
Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12



Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	69	923	29	44	1085	111	35	60	85	63
v/c Ratio	0.45	0.74	0.03	0.19	0.86	0.10	0.20	0.23	0.40	0.22
Control Delay	17.2	12.7	1.5	7.1	18.7	2.3	31.1	12.6	35.4	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.2	12.7	1.5	7.1	18.7	2.3	31.1	12.6	35.4	14.3
Queue Length 50th (m)	3.7	70.9	0.0	1.9	99.5	1.7	4.8	0.9	11.9	2.1
Queue Length 95th (m)	19.1	142.3	2.1	7.1	#235.5	7.0	12.9	10.9	25.2	12.2
Internal Link Dist (m)	1608.3				615.3				60.6	39.5
Turn Bay Length (m)	30.0		115.0	93.0				75.0		
Base Capacity (vph)	155	1240	845	229	1264	1115	716	910	866	1057
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.74	0.03	0.19	0.86	0.10	0.05	0.07	0.10	0.06

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	67	895	28	43	1052	108	34	7	51	82	5	56
Future Volume (vph)	67	895	28	43	1052	108	34	7	51	82	5	56
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1377		1770	1606	
Flt Permitted	0.12	1.00	1.00	0.21	1.00	1.00	0.72	1.00		0.72	1.00	
Satd. Flow (perm)	224	1792	1205	331	1827	1583	1106	1377		1337	1606	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	69	923	29	44	1085	111	35	7	53	85	5	58
RTOR Reduction (vph)	0	0	9	0	0	20	0	45	0	0	40	0
Lane Group Flow (vph)	69	923	20	44	1085	91	35	15	0	85	23	0
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	52.4	52.4	52.4	52.4	52.4	52.4	11.2	11.2		11.2	11.2	
Effective Green, g (s)	53.4	53.4	53.4	53.4	53.4	53.4	12.2	12.2		12.2	12.2	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	154	1239	833	228	1263	1094	174	217		211	253	
v/s Ratio Prot		0.51			c0.59			0.01				0.01
v/s Ratio Perm	0.31		0.02	0.13		0.06	0.03			c0.06		
v/c Ratio	0.45	0.74	0.02	0.19	0.86	0.08	0.20	0.07		0.40	0.09	
Uniform Delay, d1	5.3	7.6	3.7	4.2	9.0	3.9	28.3	27.7		29.2	27.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	2.5	0.0	0.4	6.0	0.0	0.6	0.1		1.3	0.2	
Delay (s)	7.4	10.0	3.7	4.6	15.1	3.9	28.8	27.8		30.5	27.9	
Level of Service	A	B	A	A	B	A	C	C		C	C	
Approach Delay (s)		9.7			13.7			28.2			29.4	
Approach LOS		A			B			C			C	

### Intersection Summary

HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	77.2	Sum of lost time (s)	11.6
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	49.9		15.3			84.6
Travel Time (s)	3.6		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%		ICU Level of Service A			
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0			0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0			0	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	1023	1085			1623	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			



Lanes, Volumes, Timings

4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	51.4		50.1			34.6
Travel Time (s)	3.7		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	134					
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	19.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	746	102	106	849	299	135	31	172	290	38	214
Future Volume (vph)	176	746	102	106	849	299	135	31	172	290	38	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98		0.99		1.00		
Fr <sub>t</sub>			0.850			0.850		0.873				0.872
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3312	1583	1805	3471	1568	1770	1625	0	1787	1622	0
Fl <sub>t</sub> Permitted	0.190			0.303			0.539			0.607		
Satd. Flow (perm)	361	3312	1549	575	3471	1532	1004	1625	0	1140	1622	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			103			302		174				216
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Adj. Flow (vph)	178	754	103	107	858	302	136	31	174	293	38	216
Shared Lane Traffic (%)												
Lane Group Flow (vph)	178	754	103	107	858	302	136	205	0	293	254	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

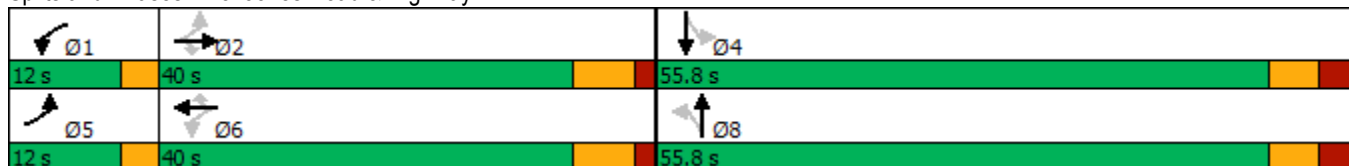


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	43.8	32.2	32.2	41.6	28.6	28.6	27.4	27.4		27.4		27.4
Actuated g/C Ratio	0.55	0.40	0.40	0.52	0.36	0.36	0.34	0.34		0.34		0.34
v/c Ratio	0.47	0.57	0.15	0.24	0.69	0.41	0.40	0.31		0.75		0.36
Control Delay	15.0	23.3	5.4	12.1	26.7	4.6	24.1	5.9		36.6		5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	15.0	23.3	5.4	12.1	26.7	4.6	24.1	5.9		36.6		5.9
LOS	B	C	A	B	C	A	C	A		D		A
Approach Delay		20.1			20.2			13.1				22.3
Approach LOS		C			C			B				C

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 80.1  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.75  
 Intersection Signal Delay: 19.8  
 Intersection LOS: B  
 Intersection Capacity Utilization 82.3%  
 ICU Level of Service E  
 Analysis Period (min) 15

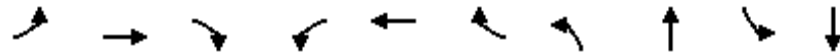
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	178	754	103	107	858	302	136	205	293	254
v/c Ratio	0.47	0.57	0.15	0.24	0.69	0.41	0.40	0.31	0.75	0.36
Control Delay	15.0	23.3	5.4	12.1	26.7	4.6	24.1	5.9	36.6	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	23.3	5.4	12.1	26.7	4.6	24.1	5.9	36.6	5.9
Queue Length 50th (m)	12.9	50.1	0.0	7.4	60.2	0.0	16.3	3.3	40.8	4.1
Queue Length 95th (m)	32.7	90.5	11.4	20.9	104.0	18.2	33.6	17.3	75.1	19.6
Internal Link Dist (m)		615.3			306.8			52.2		126.5
Turn Bay Length (m)	216.0		160.0	80.0		80.0				
Base Capacity (vph)	384	1468	744	467	1537	847	650	1113	738	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.51	0.14	0.23	0.56	0.36	0.21	0.18	0.40	0.23

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	746	102	106	849	299	135	31	172	290	38	214
Future Volume (vph)	176	746	102	106	849	299	135	31	172	290	38	214
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1625		1785	1623	
Flt Permitted	0.19	1.00	1.00	0.30	1.00	1.00	0.54	1.00		0.61	1.00	
Satd. Flow (perm)	362	3312	1550	576	3471	1532	1003	1625		1140	1623	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	178	754	103	107	858	302	136	31	174	293	38	216
RTOR Reduction (vph)	0	0	62	0	0	192	0	115	0	0	142	0
Lane Group Flow (vph)	178	754	41	107	858	110	136	90	0	293	112	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	40.0	31.1	31.1	34.4	28.3	28.3	26.4	26.4		26.4	26.4	
Effective Green, g (s)	41.2	32.1	32.1	36.4	29.3	29.3	27.4	27.4		27.4	27.4	
Actuated g/C Ratio	0.51	0.40	0.40	0.45	0.37	0.37	0.34	0.34		0.34	0.34	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	364	1325	620	370	1268	559	342	555		389	554	
v/s Ratio Prot	c0.06	0.23		0.03	c0.25			0.06				0.07
v/s Ratio Perm	0.19		0.03	0.11		0.07	0.14			c0.26		
v/c Ratio	0.49	0.57	0.07	0.29	0.68	0.20	0.40	0.16		0.75	0.20	
Uniform Delay, d1	12.0	18.7	14.8	12.9	21.5	17.4	20.1	18.4		23.4	18.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.6	0.1	0.4	1.5	0.2	0.8	0.1		8.0	0.2	
Delay (s)	13.1	19.3	14.9	13.3	23.0	17.6	20.9	18.5		31.4	18.8	
Level of Service	B	B	B	B	C	B	C	B		C	B	
Approach Delay (s)		17.8			20.9			19.5			25.6	
Approach LOS		B			C			B			C	
























### Intersection Summary

HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	80.2	Sum of lost time (s)	13.6
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	431	742	38	30	676	197	108	117	46	244	57	468
Future Volume (vph)	431	742	38	30	676	197	108	117	46	244	57	468
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3361	0	1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.293			0.345			0.719			0.679		
Satd. Flow (perm)	546	3361	0	656	3438	1583	1366	1881	1615	1253	1900	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				205			78			341
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		330.8			413.9			498.1			591.8	
Travel Time (s)		19.8			24.8			29.9			35.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Adj. Flow (vph)	449	773	40	31	704	205	113	122	48	254	59	488
Shared Lane Traffic (%)												
Lane Group Flow (vph)	449	813	0	31	704	205	113	122	48	254	59	488
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

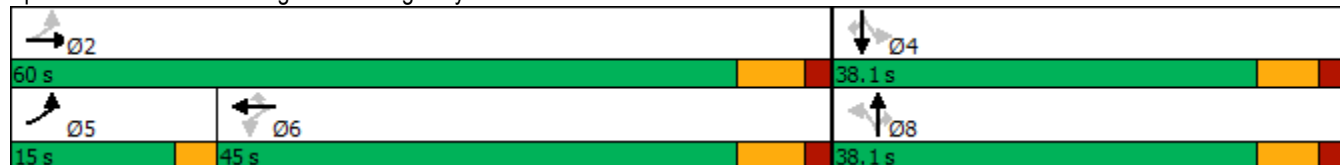


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		34.4	34.4	34.4	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	15.0	60.0		45.0	45.0	45.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	15.3%	61.2%		45.9%	45.9%	45.9%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	12.0	53.0		38.0	38.0	38.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	55.4	51.3		36.2	36.2	36.2	23.3	23.3	23.3	23.3	23.3	23.3
Actuated g/C Ratio	0.64	0.59		0.42	0.42	0.42	0.27	0.27	0.27	0.27	0.27	0.27
v/c Ratio	0.84	0.41		0.11	0.49	0.26	0.31	0.24	0.10	0.76	0.12	0.72
Control Delay	27.3	11.1		19.2	21.0	3.8	27.1	25.5	2.6	44.0	23.7	15.0
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	11.1		19.2	21.0	3.8	27.1	25.5	2.6	44.0	23.7	15.0
LOS	C	B		B	C	A	C	C	A	D	C	B
Approach Delay		16.9			17.2			22.3			24.9	
Approach LOS		B			B			C			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 86.8  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 19.4  
 Intersection LOS: B  
 Intersection Capacity Utilization 86.1%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12





Queues

6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	449	813	31	704	205	113	122	48	254	59	488
v/c Ratio	0.84	0.41	0.11	0.49	0.26	0.31	0.24	0.10	0.76	0.12	0.72
Control Delay	27.3	11.1	19.2	21.0	3.8	27.1	25.5	2.6	44.0	23.7	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	11.1	19.2	21.0	3.8	27.1	25.5	2.6	44.0	23.7	15.0
Queue Length 50th (m)	35.2	37.5	3.3	47.0	0.0	15.5	16.4	0.0	40.0	7.7	20.4
Queue Length 95th (m)	#98.7	61.8	10.5	72.5	13.7	30.5	31.2	3.7	70.1	17.3	58.0
Internal Link Dist (m)		306.8		389.9			474.1			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	533	2109	297	1556	828	507	698	649	465	705	808
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	0.84	0.39	0.10	0.45	0.25	0.22	0.17	0.07	0.55	0.08	0.60

Intersection Summary

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

# HCM Signalized Intersection Capacity Analysis

## 6: King Street & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	431	742	38	30	676	197	108	117	46	244	57	468
Future Volume (vph)	431	742	38	30	676	197	108	117	46	244	57	468
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3360		1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.29	1.00		0.34	1.00	1.00	0.72	1.00	1.00	0.68	1.00	1.00
Satd. Flow (perm)	545	3360		655	3438	1583	1365	1881	1615	1252	1900	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	449	773	40	31	704	205	112	122	48	254	59	488
RTOR Reduction (vph)	0	3	0	0	0	119	0	0	35	0	0	249
Lane Group Flow (vph)	449	810	0	31	704	86	113	122	13	254	59	239
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	50.3	50.3		35.2	35.2	35.2	22.3	22.3	22.3	22.3	22.3	22.3
Effective Green, g (s)	51.3	51.3		36.2	36.2	36.2	23.3	23.3	23.3	23.3	23.3	23.3
Actuated g/C Ratio	0.59	0.59		0.42	0.42	0.42	0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	507	1988		273	1435	660	366	505	434	336	510	429
v/s Ratio Prot	c0.13	0.24			c0.20			0.06				0.03
v/s Ratio Perm	0.39			0.05		0.05	0.08		0.01	c0.20		0.15
v/c Ratio	0.89	0.41		0.11	0.49	0.13	0.31	0.24	0.03	0.76	0.12	0.56
Uniform Delay, d1	11.0	9.5		15.4	18.5	15.5	25.3	24.8	23.4	29.1	23.9	27.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.8	0.2		0.3	0.5	0.2	0.5	0.2	0.0	9.3	0.1	1.6
Delay (s)	27.7	9.8		15.8	19.0	15.7	25.8	25.0	23.4	38.4	24.0	28.8
Level of Service	C	A		B	B	B	C	C	C	D	C	C
Approach Delay (s)		16.1			18.1			25.0			31.5	
Approach LOS		B			B			C			C	

### Intersection Summary

HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	14.1
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	63	57	0
Future Volume (vph)	0	0	0	63	57	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	30.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1173	1284	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1173	1284	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	51.3			34.6	15.3	
Travel Time (s)	3.7			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	62%	48%	2%
Adj. Flow (vph)	0	0	0	68	62	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	68	62	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	13.3%			ICU Level of Service A		
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	63	57	0
Future Volume (Veh/h)	0	0	0	63	57	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	68	62	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	130	62	62			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130	62	62			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	864	1003	1541			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	68	62			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1541	1700			
Volume to Capacity	0.00	0.00	0.04			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	13.3%		ICU Level of Service	A		
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	0	39	10	5	25
Future Volume (vph)	6	0	39	10	5	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.972					
Flt Protected	0.950					0.992
Satd. Flow (prot)	1107	0	1133	0	0	1228
Flt Permitted	0.950					0.992
Satd. Flow (perm)	1107	0	1133	0	0	1228
Link Speed (k/h)	50					50
Link Distance (m)	98.0					39.8
Travel Time (s)	7.1					2.9
Confl. Peds. (#/hr)	10	10			10	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	63%	2%	63%	63%	2%	63%
Adj. Flow (vph)	7	0	42	11	5	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	7	0	53	0	0	32
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6					0.0
Link Offset(m)	0.0					0.0
Crosswalk Width(m)	4.8					4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15			15	25
Sign Control	Stop			Free		

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	0	39	10	5	25
Future Volume (Veh/h)	6	0	39	10	5	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	42	11	5	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						224
pX, platoon unblocked						
vC, conflicting volume	104	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	104	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	750	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	7	53	32			
Volume Left	7	0	5			
Volume Right	0	11	0			
cSH	750	1700	1527			
Volume to Capacity	0.01	0.03	0.00			
Queue Length 95th (m)	0.2	0.0	0.1			
Control Delay (s)	9.8	0.0	1.2			
Lane LOS	A		A			
Approach Delay (s)	9.8	0.0	1.2			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			1.2			
Intersection Capacity Utilization			19.0%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	39	30	0
Future Volume (vph)	0	0	0	39	30	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1166	1166	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1166	1166	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	65.4			39.8	50.1	
Travel Time (s)	4.7			2.9	3.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	63%	63%	2%
Adj. Flow (vph)	0	0	0	42	33	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	42	33	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	19.0%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	39	30	0
Future Volume (Veh/h)	0	0	0	39	30	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	42	33	0
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	95	53	43			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95	53	43			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	890	998	1553			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	42	33			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1553	1700			
Volume to Capacity	0.00	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			



# APPENDIX

# H

SYNCHRO

WORKSHEETS

- FUTURE

TOTAL

CONDITIONS



Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	181	7	151	75	283	3	338	238	217	240	9
Future Volume (vph)	13	181	7	151	75	283	3	338	238	217	240	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.995				0.850			0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1794	0	1656	1743	1495	1347	1792	1524	1703	1754	0
Flt Permitted	0.700			0.471			0.581			0.325		
Satd. Flow (perm)	1073	1794	0	821	1743	1495	824	1792	1524	583	1754	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				333			280			4
Link Speed (k/h)		80			80			80				80
Link Distance (m)		218.2			1632.3			668.8				164.2
Travel Time (s)		9.8			73.5			30.1				7.4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Adj. Flow (vph)	15	213	8	178	88	333	4	398	280	255	282	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	221	0	178	88	333	4	398	280	255	293	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

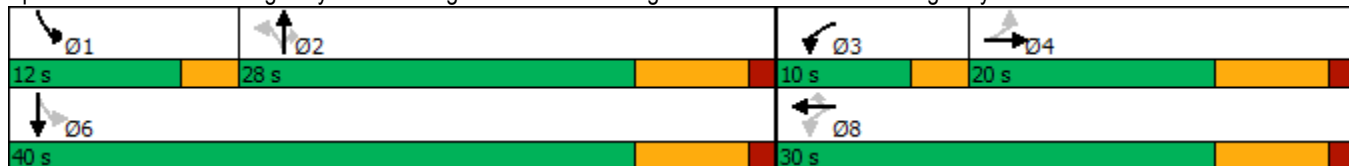


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	20.0	20.0		10.0	30.0	30.0	28.0	28.0	28.0	12.0	40.0	
Total Split (%)	28.6%	28.6%		14.3%	42.9%	42.9%	40.0%	40.0%	40.0%	17.1%	57.1%	
Maximum Green (s)	12.8	12.8		7.0	22.8	22.8	20.6	20.6	20.6	9.0	32.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	12.9	12.9		27.2	22.9	22.9	21.4	21.4	21.4	37.4	33.0	
Actuated g/C Ratio	0.19	0.19		0.40	0.33	0.33	0.31	0.31	0.31	0.55	0.48	
v/c Ratio	0.07	0.65		0.42	0.15	0.46	0.02	0.71	0.42	0.54	0.35	
Control Delay	24.2	35.6		17.6	17.0	4.6	17.3	29.9	4.8	13.0	12.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	24.2	35.6		17.6	17.0	4.6	17.3	29.9	4.8	13.0	12.5	
LOS	C	D		B	B	A	B	C	A	B	B	
Approach Delay		34.9			10.3			19.6			12.7	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	68.6
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.71
Intersection Signal Delay:	16.8
Intersection LOS:	B
Intersection Capacity Utilization:	71.0%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



Queues

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	15	221	178	88	333	4	398	280	255	293
v/c Ratio	0.07	0.65	0.42	0.15	0.46	0.02	0.71	0.42	0.54	0.35
Control Delay	24.2	35.6	17.6	17.0	4.6	17.3	29.9	4.8	13.0	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	35.6	17.6	17.0	4.6	17.3	29.9	4.8	13.0	12.5
Queue Length 50th (m)	1.7	27.9	16.0	8.3	0.0	0.4	48.3	0.0	17.4	23.4
Queue Length 95th (m)	6.1	46.0	27.6	16.7	13.1	2.3	72.5	12.9	27.9	37.0
Internal Link Dist (m)		194.2		1608.3			644.8			140.2
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	215	362	422	605	736	259	564	671	481	862
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.61	0.42	0.15	0.45	0.02	0.71	0.42	0.53	0.34

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	181	7	151	75	283	3	338	238	217	240	9
Future Volume (vph)	13	181	7	151	75	283	3	338	238	217	240	9
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1794		1656	1743	1495	1347	1792	1524	1703	1754	
Flt Permitted	0.70	1.00		0.47	1.00	1.00	0.58	1.00	1.00	0.32	1.00	
Satd. Flow (perm)	1072	1794		820	1743	1495	823	1792	1524	582	1754	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	213	8	178	88	333	4	398	280	255	282	11
RTOR Reduction (vph)	0	2	0	0	0	222	0	0	193	0	2	0
Lane Group Flow (vph)	15	219	0	178	88	111	4	398	87	255	291	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	11.9	11.9		21.9	21.9	21.9	20.4	20.4	20.4	32.1	32.1	
Effective Green, g (s)	12.9	12.9		22.9	22.9	22.9	21.4	21.4	21.4	33.1	33.1	
Actuated g/C Ratio	0.19	0.19		0.33	0.33	0.33	0.31	0.31	0.31	0.48	0.48	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	201	337		371	581	499	256	559	475	439	846	
v/s Ratio Prot		c0.12		c0.06	0.05			c0.22		c0.08	0.17	
v/s Ratio Perm	0.01			0.10		0.07	0.00		0.06	0.20		
v/c Ratio	0.07	0.65		0.48	0.15	0.22	0.02	0.71	0.18	0.58	0.34	
Uniform Delay, d1	22.9	25.8		17.2	16.0	16.4	16.3	20.9	17.2	11.6	11.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	4.5		1.0	0.1	0.2	0.0	4.6	0.3	2.0	0.3	
Delay (s)	23.1	30.2		18.1	16.2	16.7	16.4	25.4	17.5	13.6	11.3	
Level of Service	C	C		B	B	B	B	C	B	B	B	
Approach Delay (s)		29.8			17.0			22.1			12.4	
Approach LOS		C			B			C			B	

### Intersection Summary

HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	16.6
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	594	51	48	457	59	31	0	50	98	2	50
Future Volume (vph)	31	594	51	48	457	59	31	0	50	98	2	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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	0.99		0.95			0.95	0.98	0.98		0.99	0.96	
Frt			0.850			0.850		0.850			0.855	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1127	0	1770	1533	0
Flt Permitted	0.443			0.334			0.721			0.722		
Satd. Flow (perm)	819	1810	1133	447	1759	1511	975	1127	0	1330	1533	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			54			63		93				53
Link Speed (k/h)		80			80			50				50
Link Distance (m)		1632.3			639.3			85.1				78.9
Travel Time (s)		73.5			28.8			6.1				5.7
Confl. Peds. (#/hr)	10		10	10		10	20		20	20		20
Peak Hour 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
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Adj. Flow (vph)	33	632	54	51	486	63	33	0	53	104	2	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	33	632	54	51	486	63	33	53	0	104	55	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

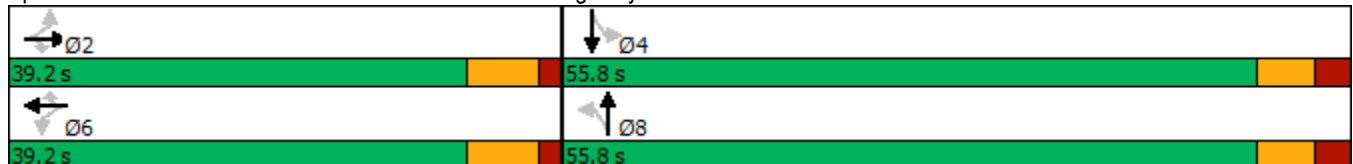


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	39.2	39.2	39.2	39.2	39.2	39.2	55.8	55.8		55.8	55.8	
Total Split (%)	41.3%	41.3%	41.3%	41.3%	41.3%	41.3%	58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	32.4	32.4	32.4	32.4	32.4	32.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	15.0	15.0		15.0	15.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	32.2	32.2	32.2	32.2	32.2	32.2	11.8	11.8		11.8	11.8	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58	0.58	0.21	0.21		0.21	0.21	
v/c Ratio	0.07	0.60	0.08	0.20	0.48	0.07	0.16	0.17		0.37	0.15	
Control Delay	5.9	10.8	2.3	8.2	8.9	2.1	20.4	3.2		23.5	7.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	5.9	10.8	2.3	8.2	8.9	2.1	20.4	3.2		23.5	7.7	
LOS	A	B	A	A	A	A	C	A		C	A	
Approach Delay		9.9			8.1			9.8			18.1	
Approach LOS		A			A			A			B	

Intersection Summary

Area Type:	Other
Cycle Length:	95
Actuated Cycle Length:	55.7
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.60
Intersection Signal Delay:	10.1
Intersection LOS:	B
Intersection Capacity Utilization:	75.6%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12

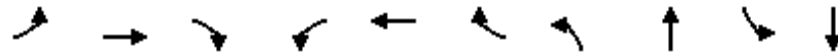




Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	33	632	54	51	486	63	33	53	104	55
v/c Ratio	0.07	0.60	0.08	0.20	0.48	0.07	0.16	0.17	0.37	0.15
Control Delay	5.9	10.8	2.3	8.2	8.9	2.1	20.4	3.2	23.5	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.9	10.8	2.3	8.2	8.9	2.1	20.4	3.2	23.5	7.7
Queue Length 50th (m)	1.3	35.9	0.0	2.1	24.8	0.0	3.0	0.0	9.8	0.2
Queue Length 95th (m)	4.8	72.1	3.8	8.0	50.2	4.0	9.3	3.4	21.9	7.5
Internal Link Dist (m)	1608.3			615.3			61.1			54.9
Turn Bay Length (m)	30.0		115.0	93.0		75.0				
Base Capacity (vph)	492	1088	702	268	1058	933	877	1024	1197	1385
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.58	0.08	0.19	0.46	0.07	0.04	0.05	0.09	0.04

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	594	51	48	457	59	31	0	50	98	2	50
Future Volume (vph)	31	594	51	48	457	59	31	0	50	98	2	50
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00	0.96	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1757	1810	1146	1265	1759	1528	1294	1132		1758	1546	
Flt Permitted	0.44	1.00	1.00	0.33	1.00	1.00	0.72	1.00		0.72	1.00	
Satd. Flow (perm)	820	1810	1146	445	1759	1528	982	1132		1337	1546	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	632	54	51	486	63	33	0	53	104	2	53
RTOR Reduction (vph)	0	0	23	0	0	27	0	42	0	0	42	0
Lane Group Flow (vph)	33	632	31	51	486	36	33	11	0	104	13	0
Confl. Peds. (#/hr)	10		10	10		10	20		20	20		20
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	31.2	31.2	31.2	31.2	31.2	31.2	10.8	10.8		10.8	10.8	
Effective Green, g (s)	32.2	32.2	32.2	32.2	32.2	32.2	11.8	11.8		11.8	11.8	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58	0.58	0.21	0.21		0.21	0.21	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	474	1048	663	257	1018	884	208	240		283	328	
v/s Ratio Prot		c0.35			0.28			0.01				0.01
v/s Ratio Perm	0.04		0.03	0.11		0.02	0.03			c0.08		
v/c Ratio	0.07	0.60	0.05	0.20	0.48	0.04	0.16	0.05		0.37	0.04	
Uniform Delay, d1	5.1	7.6	5.1	5.6	6.8	5.0	17.9	17.4		18.7	17.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.0	0.0	0.4	0.4	0.0	0.4	0.1		0.8	0.1	
Delay (s)	5.2	8.6	5.1	5.9	7.2	5.1	18.2	17.5		19.5	17.5	
Level of Service	A	A	A	A	A	A	B	B		B	B	
Approach Delay (s)		8.1			6.8			17.8			18.8	
Approach LOS		A			A			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			9.3	HCM 2000 Level of Service				A				
HCM 2000 Volume to Capacity ratio			0.54									
Actuated Cycle Length (s)			55.6	Sum of lost time (s)				11.6				
Intersection Capacity Utilization			75.6%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	55.0		14.8			85.1
Travel Time (s)	4.0		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	14.4%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

























03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0				0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0				0
tC, single (s)	6.4	6.2				4.1
tC, 2 stage (s)						
tF (s)	3.5	3.3				2.2
p0 queue free %	100	100				100
cM capacity (veh/h)	1023	1085				1623
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	14.4%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	496	111	50	414	230	43	11	23	169	23	102
Future Volume (vph)	130	496	111	50	414	230	43	11	23	169	23	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								0.99		1.00		
Frt			0.850			0.850		0.897				0.878
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1626	0	1736	1589	0
Flt Permitted	0.442			0.443			0.667			0.732		
Satd. Flow (perm)	831	3343	1455	842	3406	1553	975	1626	0	1335	1589	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125			258			26			115
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)									3	3		
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
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Adj. Flow (vph)	146	557	125	56	465	258	48	12	26	190	26	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	146	557	125	56	465	258	48	38	0	190	141	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

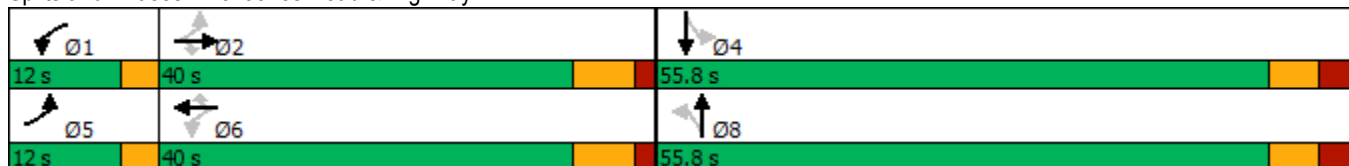


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	36.0	26.6	26.6	33.3	21.3	21.3	15.4	15.4		15.4		15.4
Actuated g/C Ratio	0.61	0.45	0.45	0.56	0.36	0.36	0.26	0.26		0.26		0.26
v/c Ratio	0.23	0.37	0.17	0.09	0.38	0.36	0.19	0.09		0.55		0.28
Control Delay	6.8	14.0	4.2	6.3	16.3	4.2	18.9	9.5		25.6		7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	6.8	14.0	4.2	6.3	16.3	4.2	18.9	9.5		25.6		7.2
LOS	A	B	A	A	B	A	B	A		C		A
Approach Delay		11.3			11.6			14.7				17.8
Approach LOS		B			B			B				B

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 59.5  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.55  
 Intersection Signal Delay: 12.6  
 Intersection LOS: B  
 Intersection Capacity Utilization 62.5%  
 ICU Level of Service B  
 Analysis Period (min) 15

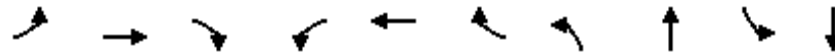
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	146	557	125	56	465	258	48	38	190	141
v/c Ratio	0.23	0.37	0.17	0.09	0.38	0.36	0.19	0.09	0.55	0.28
Control Delay	6.8	14.0	4.2	6.3	16.3	4.2	18.9	9.5	25.6	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.8	14.0	4.2	6.3	16.3	4.2	18.9	9.5	25.6	7.2
Queue Length 50th (m)	5.8	23.6	0.0	2.1	19.6	0.0	4.2	1.0	18.5	2.2
Queue Length 95th (m)	16.5	43.5	9.9	7.6	37.2	14.1	11.7	6.8	36.3	13.2
Internal Link Dist (m)	615.3		306.8				52.2		126.5	
Turn Bay Length (m)	216.0		160.0		80.0		80.0			
Base Capacity (vph)	667	1935	894	661	1972	1008	825	1380	1130	1362
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.29	0.14	0.08	0.24	0.26	0.06	0.03	0.17	0.10

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	496	111	50	414	230	43	11	23	169	23	102
Future Volume (vph)	130	496	111	50	414	230	43	11	23	169	23	102
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1628		1734	1588	
Flt Permitted	0.44	1.00	1.00	0.44	1.00	1.00	0.67	1.00		0.73	1.00	
Satd. Flow (perm)	831	3343	1455	842	3406	1553	975	1628		1336	1588	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	146	557	125	56	465	258	48	12	26	190	26	115
RTOR Reduction (vph)	0	0	70	0	0	162	0	19	0	0	86	0
Lane Group Flow (vph)	146	557	55	56	465	96	48	19	0	190	55	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	32.7	25.6	25.6	25.7	21.6	21.6	14.4	14.4		14.4	14.4	
Effective Green, g (s)	33.7	26.6	26.6	27.7	22.6	22.6	15.4	15.4		15.4	15.4	
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.37	0.37	0.25	0.25		0.25	0.25	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	604	1464	637	465	1268	578	247	413		338	402	
v/s Ratio Prot	c0.04	c0.17		0.01	0.14			0.01				0.03
v/s Ratio Perm	0.10		0.04	0.04		0.06	0.05			c0.14		
v/c Ratio	0.24	0.38	0.09	0.12	0.37	0.17	0.19	0.05		0.56	0.14	
Uniform Delay, d1	6.6	11.5	10.0	9.3	13.8	12.7	17.8	17.1		19.7	17.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.1	0.1	0.2	0.2	0.4	0.0		2.1	0.2	
Delay (s)	6.8	11.7	10.0	9.4	14.1	12.9	18.2	17.1		21.9	17.7	
Level of Service	A	B	B	A	B	B	B	B		C	B	
Approach Delay (s)		10.6			13.3			17.7			20.1	
Approach LOS		B			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			13.5			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.43									
Actuated Cycle Length (s)			60.7			Sum of lost time (s)			13.6			
Intersection Capacity Utilization			62.5%			ICU Level of Service			B			
Analysis Period (min)			15									

c Critical Lane Group



Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	329	71	86	446	250	29	47	30	97	84	219
Future Volume (vph)	287	329	71	86	446	250	29	47	30	97	84	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00					0.99			0.99	1.00		
Frt		0.973				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3271	0	1805	3374	1583	1805	1759	1615	1736	1845	1553
Flt Permitted	0.436			0.487			0.694			0.722		
Satd. Flow (perm)	796	3271	0	925	3374	1563	1319	1759	1594	1318	1845	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42				287			78			252
Link Speed (k/h)		60			60			50				50
Link Distance (m)		330.8			413.9			201.9				591.8
Travel Time (s)		19.8			24.8			14.5				42.6
Confl. Peds. (#/hr)	1					1			1	1		
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Adj. Flow (vph)	330	378	82	99	513	287	33	54	34	111	97	252
Shared Lane Traffic (%)												
Lane Group Flow (vph)	330	460	0	99	513	287	33	54	34	111	97	252
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

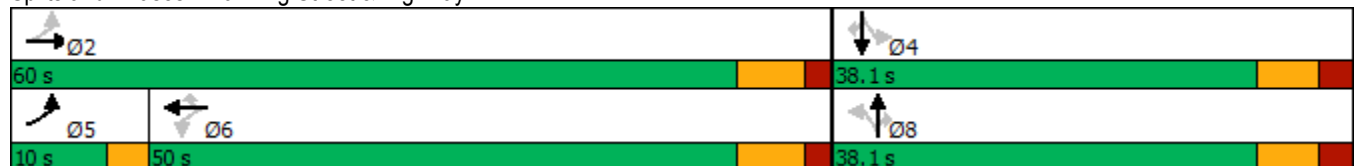


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.0	42.0	42.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		43.0	43.0	43.0	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.0	2.0	2.0	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Min	Min	Min	Min	Min	Min	Min	Min	Min
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.0	46.0		36.0	36.0	36.0	13.2	13.2	13.2	13.2	13.2	13.2
Actuated g/C Ratio	0.70	0.65		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19
v/c Ratio	0.50	0.22		0.21	0.30	0.31	0.14	0.17	0.10	0.46	0.29	0.51
Control Delay	7.2	5.3		12.1	11.3	2.5	25.3	25.4	1.4	32.3	27.1	7.7
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	5.3		12.1	11.3	2.5	25.3	25.4	1.4	32.3	27.1	7.7
LOS	A	A		B	B	A	C	C	A	C	C	A
Approach Delay		6.1			8.6			18.6			17.7	
Approach LOS		A			A			B			B	

Intersection Summary

Area Type:	Other
Cycle Length:	98.1
Actuated Cycle Length:	71.3
Natural Cycle:	95
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.51
Intersection Signal Delay:	10.1
Intersection LOS:	B
Intersection Capacity Utilization:	73.0%
ICU Level of Service:	C
Analysis Period (min):	15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	330	460	99	513	287	33	54	34	111	97	252
v/c Ratio	0.50	0.22	0.21	0.30	0.31	0.14	0.17	0.10	0.46	0.29	0.51
Control Delay	7.2	5.3	12.1	11.3	2.5	25.3	25.4	1.4	32.3	27.1	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.2	5.3	12.1	11.3	2.5	25.3	25.4	1.4	32.3	27.1	7.7
Queue Length 50th (m)	12.9	10.2	7.0	19.9	0.0	3.9	6.5	0.0	14.1	11.9	0.0
Queue Length 95th (m)	28.5	19.4	17.4	33.3	10.8	10.6	14.8	1.1	27.3	23.3	15.6
Internal Link Dist (m)		306.8		389.9			177.9			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	664	2489	571	2083	1074	592	789	759	592	828	836
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	0.50	0.18	0.17	0.25	0.27	0.06	0.07	0.04	0.19	0.12	0.30

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 6: King Street & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	287	329	71	86	446	250	29	47	30	97	84	219
Future Volume (vph)	287	329	71	86	446	250	29	47	30	97	84	219
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1735	3272		1805	3374	1563	1805	1759	1594	1734	1845	1553
Flt Permitted	0.44	1.00		0.49	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00
Satd. Flow (perm)	796	3272		926	3374	1563	1319	1759	1594	1318	1845	1553
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	330	378	82	99	513	287	33	54	34	111	97	252
RTOR Reduction (vph)	0	15	0	0	0	142	0	0	28	0	0	205
Lane Group Flow (vph)	330	445	0	99	513	145	33	54	6	111	97	47
Confl. Peds. (#/hr)	1					1			1	1		
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.2	12.2	12.2	12.2	12.2	12.2
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.2	13.2	13.2	13.2	13.2	13.2
Actuated g/C Ratio	0.65	0.65		0.51	0.51	0.51	0.18	0.18	0.18	0.18	0.18	0.18
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	619	2112		468	1705	790	243	325	294	243	341	287
v/s Ratio Prot	c0.06	0.14			c0.15			0.03			0.05	
v/s Ratio Perm	0.28			0.11		0.09	0.03		0.00	c0.08		0.03
v/c Ratio	0.53	0.21		0.21	0.30	0.18	0.14	0.17	0.02	0.46	0.28	0.16
Uniform Delay, d1	5.6	5.2		9.8	10.3	9.6	24.3	24.5	23.8	25.9	25.0	24.5
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1		0.4	0.2	0.2	0.3	0.2	0.0	1.4	0.5	0.3
Delay (s)	6.5	5.3		10.2	10.5	9.8	24.6	24.7	23.8	27.3	25.5	24.7
Level of Service	A	A		B	B	A	C	C	C	C	C	C
Approach Delay (s)		5.8			10.2			24.4			25.5	
Approach LOS		A			B			C			C	

Intersection Summary		
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service
HCM 2000 Volume to Capacity ratio	0.36	B
Actuated Cycle Length (s)	71.4	Sum of lost time (s)
Intersection Capacity Utilization	73.0%	14.1
Analysis Period (min)	15	ICU Level of Service
		C

c Critical Lane Group

Lanes, Volumes, Timings  
 10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	63	84	0
Future Volume (vph)	0	0	0	63	84	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1145	1242	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1145	1242	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	46.1			34.8	14.8	
Travel Time (s)	3.3			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	66%	53%	2%
Adj. Flow (vph)	0	0	0	68	91	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	68	91	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
<b>Two way Left Turn Lane</b>						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	14.4%
	ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	63	84	0
Future Volume (Veh/h)	0	0	0	63	84	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	68	91	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				100		
pX, platoon unblocked						
vC, conflicting volume	159	91	91			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	159	91	91			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	832	967	1504			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	68	91			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1504	1700			
Volume to Capacity	0.00	0.00	0.05			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	14.4%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
18: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	12	25	6	10	25
Future Volume (vph)	6	12	25	6	10	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.912		0.972			
Flt Protected	0.983					0.986
Satd. Flow (prot)	1250	0	923	0	0	1092
Flt Permitted	0.983					0.986
Satd. Flow (perm)	1250	0	923	0	0	1092
Link Speed (k/h)	50		50			50
Link Distance (m)	95.4		55.5			40.5
Travel Time (s)	6.9		4.0			2.9
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	100%	2%	100%	100%	2%	100%
Adj. Flow (vph)	7	13	27	7	11	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	20	0	34	0	0	38
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	21.4%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 18: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	12	25	6	10	25
Future Volume (Veh/h)	6	12	25	6	10	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	13	27	7	11	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						225
pX, platoon unblocked						
vC, conflicting volume	100	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	100	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	99	99			99	
cM capacity (veh/h)	692	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	20	34	38			
Volume Left	7	0	11			
Volume Right	13	7	0			
cSH	865	1700	1551			
Volume to Capacity	0.02	0.02	0.01			
Queue Length 95th (m)	0.6	0.0	0.2			
Control Delay (s)	9.3	0.0	2.2			
Lane LOS	A		A			
Approach Delay (s)	9.3	0.0	2.2			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			2.9			
Intersection Capacity Utilization			21.4%		ICU Level of Service	A
Analysis Period (min)			15			



Lanes, Volumes, Timings  
20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	25	8	12	25	27	35
Future Volume (vph)	25	8	12	25	27	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.966					0.923
Flt Protected	0.964					0.984
Satd. Flow (prot)	1735	0	0	1112	1214	0
Flt Permitted	0.964					0.984
Satd. Flow (perm)	1735	0	0	1112	1214	0
Link Speed (k/h)	50					50
Link Distance (m)	48.4					49.5
Travel Time (s)	3.5					3.6
Confl. Peds. (#/hr)	10	10	10			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	100%	100%	2%
Adj. Flow (vph)	27	9	13	27	29	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	36	0	0	40	67	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6					0.0
Link Offset(m)	0.0					0.0
Crosswalk Width(m)	4.8					4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			
Sign Control	Stop				Free	Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	21.5%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	8	12	25	27	35
Future Volume (Veh/h)	25	8	12	25	27	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	9	13	27	29	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	121	68	77			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	121	68	77			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	852	979	1509			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	36	40	67			
Volume Left	27	13	0			
Volume Right	9	0	38			
cSH	881	1509	1700			
Volume to Capacity	0.04	0.01	0.04			
Queue Length 95th (m)	1.0	0.2	0.0			
Control Delay (s)	9.3	2.5	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.3	2.5	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			3.0			
Intersection Capacity Utilization			21.5%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings  
 26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	56.1		49.5			34.8
Travel Time (s)	4.0		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
 26: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021


























Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	135					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	0.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	139	3	238	205	450	4	312	236	455	392	24
Future Volume (vph)	13	139	3	238	205	450	4	312	236	455	392	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	110.0		0.0	90.0		110.0	127.0		80.0	0.0		0.0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (m)	60.0			100.0			68.0			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
Frt		0.997				0.850			0.850		0.991	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1456	1710	0	1719	1845	1553	1805	1827	1482	1736	1822	0
Flt Permitted	0.624			0.567			0.511			0.417		
Satd. Flow (perm)	956	1710	0	1026	1845	1553	971	1827	1482	762	1822	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				469			246			6
Link Speed (k/h)		80			80			80				80
Link Distance (m)		534.9			1632.3			668.8				320.5
Travel Time (s)		24.1			73.5			30.1				14.4
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Adj. Flow (vph)	14	145	3	248	214	469	4	325	246	474	408	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	148	0	248	214	469	4	325	246	474	433	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0	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	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1		6

Lanes, Volumes, Timings

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021

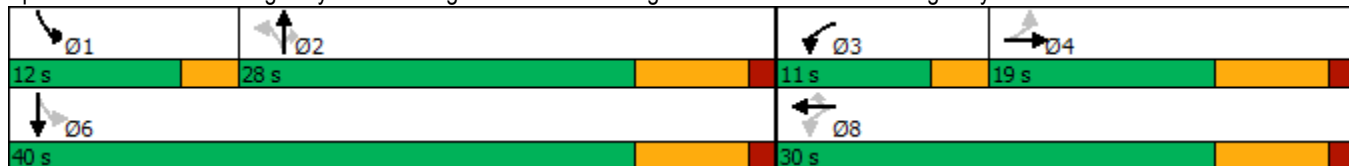


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8		8	2		2	6		
Detector Phase	4	4		3	8	8	2	2	2	1	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		7.0	10.0	10.0	20.0	20.0	20.0	7.0	20.0	
Minimum Split (s)	17.2	17.2		10.0	30.0	30.0	27.4	27.4	27.4	10.0	30.0	
Total Split (s)	19.0	19.0		11.0	30.0	30.0	28.0	28.0	28.0	12.0	40.0	
Total Split (%)	27.1%	27.1%		15.7%	42.9%	42.9%	40.0%	40.0%	40.0%	17.1%	57.1%	
Maximum Green (s)	11.8	11.8		8.0	22.8	22.8	20.6	20.6	20.6	9.0	32.6	
Yellow Time (s)	5.9	5.9		3.0	5.9	5.9	5.9	5.9	5.9	3.0	5.9	
All-Red Time (s)	1.3	1.3		0.0	1.3	1.3	1.5	1.5	1.5	0.0	1.5	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes			Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Recall Mode	Min	Min		None	Min	Min	Min	Min	Min	None	Min	
Act Effct Green (s)	11.9	11.9		27.1	22.9	22.9	21.2	21.2	21.2	37.7	33.3	
Actuated g/C Ratio	0.17	0.17		0.39	0.33	0.33	0.31	0.31	0.31	0.55	0.48	
v/c Ratio	0.08	0.50		0.50	0.35	0.57	0.01	0.58	0.39	0.85	0.49	
Control Delay	25.3	32.0		18.9	19.3	4.9	17.0	25.0	4.9	28.3	14.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	25.3	32.0		18.9	19.3	4.9	17.0	25.0	4.9	28.3	14.3	
LOS	C	C		B	B	A	B	C	A	C	B	
Approach Delay		31.4			11.9			16.4			21.6	
Approach LOS		C			B			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	70
Actuated Cycle Length:	68.8
Natural Cycle:	70
Control Type:	Semi Act-Uncoord
Maximum v/c Ratio:	0.85
Intersection Signal Delay:	17.6
Intersection LOS:	B
Intersection Capacity Utilization:	80.6%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12



# Queues

## 1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

03/04/2021



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	14	148	248	214	469	4	325	246	474	433
v/c Ratio	0.08	0.50	0.50	0.35	0.57	0.01	0.58	0.39	0.85	0.49
Control Delay	25.3	32.0	18.9	19.3	4.9	17.0	25.0	4.9	28.3	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.3	32.0	18.9	19.3	4.9	17.0	25.0	4.9	28.3	14.3
Queue Length 50th (m)	1.6	18.1	22.8	21.3	0.0	0.4	36.7	0.0	36.7	36.9
Queue Length 95th (m)	6.3	35.2	40.5	38.3	18.5	2.4	62.1	14.8	#82.7	61.3
Internal Link Dist (m)		510.9		1608.3			644.8			296.5
Turn Bay Length (m)	110.0		90.0		110.0	127.0		80.0		
Base Capacity (vph)	178	319	495	638	844	305	573	634	558	893
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.46	0.50	0.34	0.56	0.01	0.57	0.39	0.85	0.48

### Intersection Summary

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

Queue shown is maximum after two cycles.

Lanes, Volumes, Timings  
2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	730	54	81	820	107	61	0	86	76	2	40
Future Volume (vph)	53	730	54	81	820	107	61	0	86	76	2	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		115.0	93.0		0.0	75.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	7.5			100.0			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			0.92			0.92	0.98	0.97		0.99	0.96	
Frt			0.850			0.850		0.850			0.857	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1290	0	1770	1531	0
Flt Permitted	0.249			0.300			0.729			0.699		
Satd. Flow (perm)	464	1792	1106	479	1827	1453	1101	1290	0	1286	1531	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			56			84		114			41	
Link Speed (k/h)		80			80			50			50	
Link Distance (m)		1632.3			639.3			84.6			63.5	
Travel Time (s)		73.5			28.8			6.1			4.6	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Adj. Flow (vph)	55	753	56	84	845	110	63	0	89	78	2	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	753	56	84	845	110	63	89	0	78	43	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	



Lanes, Volumes, Timings  
 2: Beamish Road/Hanson Road & Highway 12

03/04/2021

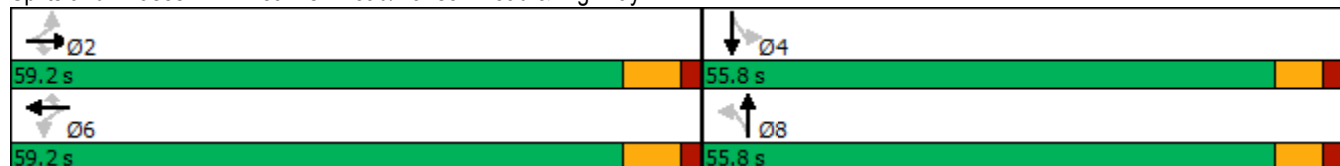


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2		2	6		6	8			4		
Detector Phase	2	2	2	6	6	6	8	8		4	4	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	26.8	26.8	26.8	26.8	26.8	26.8	55.8	55.8		55.8	55.8	
Total Split (s)	59.2	59.2	59.2	59.2	59.2	59.2	55.8	55.8		55.8	55.8	
Total Split (%)	51.5%	51.5%	51.5%	51.5%	51.5%	51.5%	48.5%	48.5%		48.5%	48.5%	
Maximum Green (s)	52.4	52.4	52.4	52.4	52.4	52.4	49.0	49.0		49.0	49.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.1	4.1		4.1	4.1	
All-Red Time (s)	1.8	1.8	1.8	1.8	1.8	1.8	2.7	2.7		2.7	2.7	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0	-1.0	
Total Lost Time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min		Min	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	15.0	15.0		15.0	15.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	34.0	34.0		34.0	34.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	
Act Effct Green (s)	53.4	53.4	53.4	53.4	53.4	53.4	12.1	12.1		12.1	12.1	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
v/c Ratio	0.17	0.61	0.07	0.25	0.67	0.11	0.37	0.30		0.39	0.16	
Control Delay	6.0	9.1	1.6	7.1	10.3	1.9	35.6	6.6		35.3	11.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	6.0	9.1	1.6	7.1	10.3	1.9	35.6	6.6		35.3	11.5	
LOS	A	A	A	A	B	A	D	A		D	B	
Approach Delay		8.4			9.2			18.6			26.9	
Approach LOS		A			A			B			C	

Intersection Summary

Area Type: Other  
 Cycle Length: 115  
 Actuated Cycle Length: 77.1  
 Natural Cycle: 115  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.67  
 Intersection Signal Delay: 10.5  
 Intersection LOS: B  
 Intersection Capacity Utilization 99.8%  
 ICU Level of Service F  
 Analysis Period (min) 15

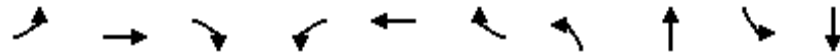
Splits and Phases: 2: Beamish Road/Hanson Road & Highway 12



Queues

2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	55	753	56	84	845	110	63	89	78	43
v/c Ratio	0.17	0.61	0.07	0.25	0.67	0.11	0.37	0.30	0.39	0.16
Control Delay	6.0	9.1	1.6	7.1	10.3	1.9	35.6	6.6	35.3	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.0	9.1	1.6	7.1	10.3	1.9	35.6	6.6	35.3	11.5
Queue Length 50th (m)	2.3	48.0	0.0	3.8	58.1	1.0	8.8	0.0	10.9	0.3
Queue Length 95th (m)	7.7	92.2	3.4	11.7	112.5	5.9	20.4	8.2	23.7	8.6
Internal Link Dist (m)	1608.3			615.3			60.6			39.5
Turn Bay Length (m)	30.0		115.0	93.0		75.0				
Base Capacity (vph)	321	1242	783	332	1266	1032	714	876	834	1008
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.61	0.07	0.25	0.67	0.11	0.09	0.10	0.09	0.04

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 2: Beamish Road/Hanson Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↗		↖	↗	
Traffic Volume (vph)	53	730	54	81	820	107	61	0	86	76	2	40
Future Volume (vph)	53	730	54	81	820	107	61	0	86	76	2	40
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.94	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1756	1792	1131	1501	1827	1485	1446	1296		1755	1542	
Flt Permitted	0.25	1.00	1.00	0.30	1.00	1.00	0.73	1.00		0.70	1.00	
Satd. Flow (perm)	461	1792	1131	474	1827	1485	1109	1296		1292	1542	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	55	753	56	84	845	110	63	0	89	78	2	41
RTOR Reduction (vph)	0	0	17	0	0	26	0	75	0	0	35	0
Lane Group Flow (vph)	55	753	39	84	845	84	63	14	0	78	8	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	52.4	52.4	52.4	52.4	52.4	52.4	11.1	11.1		11.1	11.1	
Effective Green, g (s)	53.4	53.4	53.4	53.4	53.4	53.4	12.1	12.1		12.1	12.1	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
Clearance Time (s)	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	319	1241	783	328	1265	1028	174	203		202	242	
v/s Ratio Prot		0.42			c0.46			0.01				0.01
v/s Ratio Perm	0.12		0.03	0.18		0.06	0.06			c0.06		
v/c Ratio	0.17	0.61	0.05	0.26	0.67	0.08	0.36	0.07		0.39	0.03	
Uniform Delay, d1	4.1	6.3	3.8	4.4	6.8	3.9	29.1	27.7		29.2	27.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.8	0.0	0.4	1.4	0.0	1.3	0.1		1.2	0.1	
Delay (s)	4.4	7.1	3.8	4.8	8.1	3.9	30.3	27.8		30.4	27.6	
Level of Service	A	A	A	A	A	A	C	C		C	C	
Approach Delay (s)		6.7			7.4			28.9			29.4	
Approach LOS		A			A			C			C	

### Intersection Summary

HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	11.6
Intersection Capacity Utilization	99.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings  
3: Beamish Road & OPP Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
<b>Fr</b>						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	49.9		15.3			84.6
Travel Time (s)	3.6		1.1			6.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	16.6%
Analysis Period (min)	15
	ICU Level of Service A

# HCM Unsignalized Intersection Capacity Analysis

## 3: Beamish Road & OPP Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	85					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	16.6%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings

4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	1863	0	0	1863
Flt Permitted						
Satd. Flow (perm)	1863	0	1863	0	0	1863
Link Speed (k/h)	50		50			50
Link Distance (m)	51.4		50.1			34.6
Travel Time (s)	3.7		3.6			2.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	0.0%		ICU Level of Service A			
Analysis Period (min)	15					

# HCM Unsignalized Intersection Capacity Analysis

## 4: Beamish Road & Bourgeois Midland Nissan Access

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	134					
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	0	0			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1700	1700			
Volume to Capacity	0.00	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	0.0%		ICU Level of Service		A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷	↷	↶	↷	↷	↶	↷	↷	↶	↷	↷
Traffic Volume (vph)	169	625	93	106	684	294	122	33	172	290	38	197
Future Volume (vph)	169	625	93	106	684	294	122	33	172	290	38	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	216.0		160.0	80.0		80.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		1	1		0	1		0
Taper Length (m)	100.0			80.0			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98		0.99		1.00		
Fr <sub>t</sub>			0.850			0.850		0.874				0.874
Fl <sub>t</sub> Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3312	1583	1805	3471	1568	1770	1627	0	1787	1625	0
Fl <sub>t</sub> Permitted	0.267			0.375			0.572			0.614		
Satd. Flow (perm)	507	3312	1549	712	3471	1532	1065	1627	0	1153	1625	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			94			297			174			199
Link Speed (k/h)		80			60			50				50
Link Distance (m)		639.3			330.8			76.2				150.5
Travel Time (s)		28.8			19.8			5.5				10.8
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Adj. Flow (vph)	171	631	94	107	691	297	123	33	174	293	38	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	171	631	94	107	691	297	123	207	0	293	237	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)		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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4				9.4
Detector 2 Size(m)		0.6			0.6			0.6				0.6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				0.0



Lanes, Volumes, Timings  
5: Jones Road & Highway 12

03/04/2021

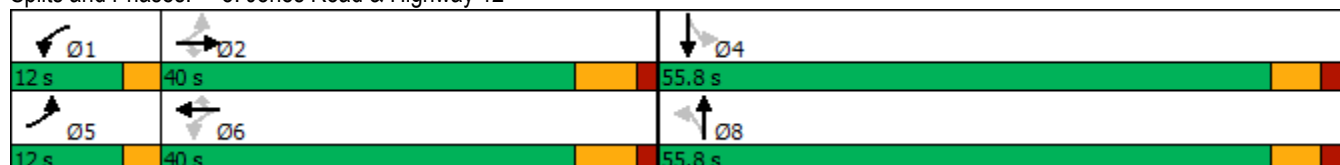


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Detector Phase	5	2	2	1	6	6	8	8		4		4
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	20.0	20.0	10.0	10.0		10.0		10.0
Minimum Split (s)	10.0	26.8	26.8	10.0	26.8	26.8	55.8	55.8		55.8		55.8
Total Split (s)	12.0	40.0	40.0	12.0	40.0	40.0	55.8	55.8		55.8		55.8
Total Split (%)	11.1%	37.1%	37.1%	11.1%	37.1%	37.1%	51.8%	51.8%		51.8%		51.8%
Maximum Green (s)	9.0	33.2	33.2	9.0	33.2	33.2	49.0	49.0		49.0		49.0
Yellow Time (s)	3.0	5.0	5.0	3.0	5.0	5.0	4.1	4.1		4.1		4.1
All-Red Time (s)	0.0	1.8	1.8	0.0	1.8	1.8	2.7	2.7		2.7		2.7
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0		-1.0		-1.0
Total Lost Time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8		5.8
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0		3.0
Recall Mode	None	Min	Min	None	Min	Min	Min	Min		Min		Min
Walk Time (s)							15.0	15.0		15.0		15.0
Flash Dont Walk (s)							34.0	34.0		34.0		34.0
Pedestrian Calls (#/hr)							0	0		0		0
Act Effct Green (s)	40.1	28.6	28.6	38.3	25.3	25.3	26.3	26.3		26.3		26.3
Actuated g/C Ratio	0.53	0.38	0.38	0.51	0.34	0.34	0.35	0.35		0.35		0.35
v/c Ratio	0.39	0.50	0.15	0.22	0.59	0.42	0.33	0.30		0.73		0.34
Control Delay	13.6	22.5	5.8	11.9	24.7	4.9	20.9	5.7		33.1		5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	13.6	22.5	5.8	11.9	24.7	4.9	20.9	5.7		33.1		5.7
LOS	B	C	A	B	C	A	C	A		C		A
Approach Delay		19.0			18.1			11.3				20.9
Approach LOS		B			B			B				C

Intersection Summary

Area Type: Other  
 Cycle Length: 107.8  
 Actuated Cycle Length: 75.5  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.73  
 Intersection Signal Delay: 18.1  
 Intersection LOS: B  
 Intersection Capacity Utilization 77.5%  
 ICU Level of Service D  
 Analysis Period (min) 15

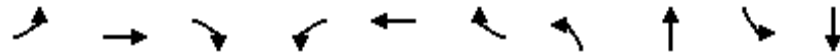
Splits and Phases: 5: Jones Road & Highway 12



Queues

5: Jones Road & Highway 12

03/04/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	171	631	94	107	691	297	123	207	293	237
v/c Ratio	0.39	0.50	0.15	0.22	0.59	0.42	0.33	0.30	0.73	0.34
Control Delay	13.6	22.5	5.8	11.9	24.7	4.9	20.9	5.7	33.1	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.6	22.5	5.8	11.9	24.7	4.9	20.9	5.7	33.1	5.7
Queue Length 50th (m)	11.5	38.2	0.0	6.9	43.6	0.0	12.4	3.0	35.2	3.5
Queue Length 95th (m)	31.7	73.7	10.8	21.0	80.5	17.9	29.9	17.5	74.8	19.0
Internal Link Dist (m)		615.3			306.8			52.2		126.5
Turn Bay Length (m)	216.0		160.0	80.0		80.0				
Base Capacity (vph)	449	1560	779	524	1634	878	733	1174	793	1180
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.40	0.12	0.20	0.42	0.34	0.17	0.18	0.37	0.20

Intersection Summary

# HCM Signalized Intersection Capacity Analysis

## 5: Jones Road & Highway 12

03/04/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↑		↘	↗	
Traffic Volume (vph)	169	625	93	106	684	294	122	33	172	290	38	197
Future Volume (vph)	169	625	93	106	684	294	122	33	172	290	38	197
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1628		1785	1626	
Flt Permitted	0.27	1.00	1.00	0.38	1.00	1.00	0.57	1.00		0.61	1.00	
Satd. Flow (perm)	508	3312	1550	712	3471	1532	1066	1628		1153	1626	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	171	631	94	107	691	297	123	33	174	293	38	199
RTOR Reduction (vph)	0	0	59	0	0	195	0	113	0	0	130	0
Lane Group Flow (vph)	171	631	35	107	691	102	123	94	0	293	107	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	36.2	27.5	27.5	31.2	25.0	25.0	25.3	25.3		25.3	25.3	
Effective Green, g (s)	37.7	28.5	28.5	33.2	26.0	26.0	26.3	26.3		26.3	26.3	
Actuated g/C Ratio	0.50	0.38	0.38	0.44	0.34	0.34	0.35	0.35		0.35	0.35	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	419	1248	584	416	1193	526	370	566		401	565	
v/s Ratio Prot	c0.05	0.19		0.02	c0.20			0.06				0.07
v/s Ratio Perm	0.15		0.02	0.09		0.07	0.12			c0.25		
v/c Ratio	0.41	0.51	0.06	0.26	0.58	0.19	0.33	0.17		0.73	0.19	
Uniform Delay, d1	11.2	18.1	15.0	12.7	20.3	17.4	18.2	17.1		21.6	17.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.4	0.1	0.3	0.8	0.2	0.5	0.1		6.7	0.2	
Delay (s)	11.8	18.5	15.1	13.0	21.1	17.7	18.7	17.2		28.3	17.4	
Level of Service	B	B	B	B	C	B	B	B		C	B	
Approach Delay (s)		16.9			19.4			17.8			23.4	
Approach LOS		B			B			B			C	
























### Intersection Summary

HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	385	669	33	41	575	184	102	125	52	235	63	407
Future Volume (vph)	385	669	33	41	575	184	102	125	52	235	63	407
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	145.0		0.0	130.0		90.0	45.0		0.0	115.0		0.0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (m)	60.0			100.0			65.0			85.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.993				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3360	0	1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.350			0.374			0.714			0.674		
Satd. Flow (perm)	652	3360	0	711	3438	1583	1357	1881	1615	1243	1900	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8				192			85			313
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		330.8			413.9			498.1			591.8	
Travel Time (s)		19.8			24.8			29.9			35.5	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Adj. Flow (vph)	401	697	34	43	599	192	106	130	54	245	66	424
Shared Lane Traffic (%)												
Lane Group Flow (vph)	401	731	0	43	599	192	106	130	54	245	66	424
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
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
Detector 1 Position(m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	

Lanes, Volumes, Timings  
6: King Street & Highway 12

03/04/2021

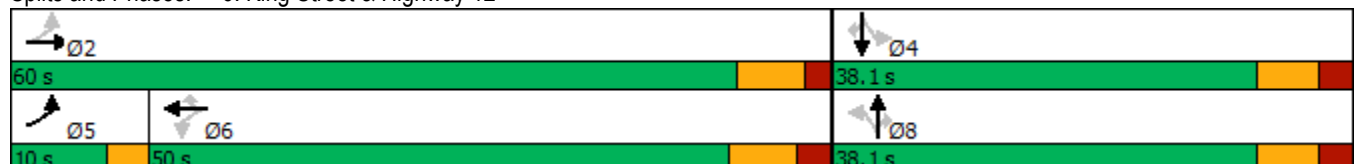


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	2			6		6	8		8	4		4
Detector Phase	5	2		6	6	6	8	8	8	4	4	4
Switch Phase												
Minimum Initial (s)	6.0	20.0		35.0	35.0	35.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	10.0	42.0		42.6	42.6	42.6	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (s)	10.0	60.0		50.0	50.0	50.0	38.1	38.1	38.1	38.1	38.1	38.1
Total Split (%)	10.2%	61.2%		51.0%	51.0%	51.0%	38.8%	38.8%	38.8%	38.8%	38.8%	38.8%
Maximum Green (s)	7.0	53.0		42.4	42.4	42.4	31.0	31.0	31.0	31.0	31.0	31.0
Yellow Time (s)	3.0	5.0		5.0	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
All-Red Time (s)	0.0	2.0		2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min		Ped	Ped	Ped	Min	Min	Min	Ped	Ped	Ped
Walk Time (s)		15.0		15.0	15.0	15.0	17.0	17.0	17.0	17.0	17.0	17.0
Flash Dont Walk (s)		10.0		10.0	10.0	10.0	13.0	13.0	13.0	13.0	13.0	13.0
Pedestrian Calls (#/hr)		0		0	0	0	0	0	0	0	0	0
Act Effct Green (s)	50.6	46.6		36.0	36.0	36.0	31.2	31.2	31.2	31.2	31.2	31.2
Actuated g/C Ratio	0.56	0.52		0.40	0.40	0.40	0.35	0.35	0.35	0.35	0.35	0.35
v/c Ratio	0.86	0.42		0.15	0.44	0.26	0.23	0.20	0.09	0.57	0.10	0.56
Control Delay	33.9	14.1		19.2	20.9	3.7	22.4	21.6	2.2	30.1	20.4	9.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	14.1		19.2	20.9	3.7	22.4	21.6	2.2	30.1	20.4	9.5
LOS	C	B		B	C	A	C	C	A	C	C	A
Approach Delay		21.1			16.8			18.3			17.4	
Approach LOS		C			B			B			B	

Intersection Summary

Area Type: Other  
 Cycle Length: 98.1  
 Actuated Cycle Length: 89.9  
 Natural Cycle: 95  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.86  
 Intersection Signal Delay: 18.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 90.8%  
 ICU Level of Service E  
 Analysis Period (min) 15

Splits and Phases: 6: King Street & Highway 12



Queues

6: King Street & Highway 12

03/04/2021


























Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	401	731	43	599	192	106	130	54	245	66	424
v/c Ratio	0.86	0.42	0.15	0.44	0.26	0.23	0.20	0.09	0.57	0.10	0.56
Control Delay	33.9	14.1	19.2	20.9	3.7	22.4	21.6	2.2	30.1	20.4	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.9	14.1	19.2	20.9	3.7	22.4	21.6	2.2	30.1	20.4	9.5
Queue Length 50th (m)	38.2	40.1	4.9	40.5	0.0	13.5	16.4	0.0	35.8	8.0	14.0
Queue Length 95th (m)	#81.5	55.1	12.6	56.3	12.8	26.2	29.6	3.8	60.7	17.0	41.0
Internal Link Dist (m)		306.8		389.9			474.1			567.8	
Turn Bay Length (m)	145.0		130.0		90.0	45.0			115.0		
Base Capacity (vph)	466	2021	343	1659	863	483	669	629	442	676	770
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	0.86	0.36	0.13	0.36	0.22	0.22	0.19	0.09	0.55	0.10	0.55

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

03/04/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	385	669	33	41	575	184	102	125	52	235	63	407	
Future Volume (vph)	385	669	33	41	575	184	102	125	52	235	63	407	
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	3361		1805	3438	1583	1805	1881	1615	1752	1900	1599	
Flt Permitted	0.35	1.00		0.37	1.00	1.00	0.71	1.00	1.00	0.67	1.00	1.00	
Satd. Flow (perm)	652	3361		710	3438	1583	1357	1881	1615	1243	1900	1599	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	401	697	34	43	599	192	106	130	54	245	66	424	
RTOR Reduction (vph)	0	4	0	0	0	115	0	0	35	0	0	204	
Lane Group Flow (vph)	401	727	0	43	599	77	106	130	19	245	66	220	
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.6	45.6		35.0	35.0	35.0	30.2	30.2	30.2	30.2	30.2	30.2	
Effective Green, g (s)	46.6	46.6		36.0	36.0	36.0	31.2	31.2	31.2	31.2	31.2	31.2	
Actuated g/C Ratio	0.52	0.52		0.40	0.40	0.40	0.35	0.35	0.35	0.35	0.35	0.35	
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	437	1742		284	1376	633	470	652	560	431	659	554	
v/s Ratio Prot	c0.08	c0.22			0.17			0.07				0.03	
v/s Ratio Perm	0.39			0.06		0.05	0.08		0.01	c0.20		0.14	
v/c Ratio	0.92	0.42		0.15	0.44	0.12	0.23	0.20	0.03	0.57	0.10	0.40	
Uniform Delay, d1	17.5	13.3		17.2	19.6	17.0	20.8	20.6	19.4	23.9	19.9	22.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	23.9	0.3		0.4	0.4	0.1	0.2	0.2	0.0	1.7	0.1	0.5	
Delay (s)	41.4	13.6		17.6	20.0	17.1	21.0	20.7	19.4	25.6	19.9	22.7	
Level of Service	D	B		B	B	B	C	C	B	C	B	C	
Approach Delay (s)		23.4			19.2			20.6			23.4		
Approach LOS		C			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			22.0									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.54										
Actuated Cycle Length (s)			89.9									Sum of lost time (s)	14.7
Intersection Capacity Utilization			90.8%									ICU Level of Service	E
Analysis Period (min)			15										
c	Critical Lane Group												

Lanes, Volumes, Timings  
10: Beamish Road & Phase 2 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	125	118	0
Future Volume (vph)	0	0	0	125	118	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	30.0	0.0			0.0
Storage Lanes	1	0	0			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1863	0	0	1173	1284	0
Flt Permitted						
Satd. Flow (perm)	1863	0	0	1173	1284	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	51.3			34.6	15.3	
Travel Time (s)	3.7			2.5	1.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	62%	48%	2%
Adj. Flow (vph)	0	0	0	136	128	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	136	128	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	16.6%			ICU Level of Service A		
Analysis Period (min)	15					



# HCM Unsignalized Intersection Capacity Analysis

## 10: Beamish Road & Phase 2 driveway

03/04/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	125	118	0
Future Volume (Veh/h)	0	0	0	125	118	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	136	128	0
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						100
pX, platoon unblocked						
vC, conflicting volume	264	128	128			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	264	128	128			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	725	922	1458			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	0	136	128			
Volume Left	0	0	0			
Volume Right	0	0	0			
cSH	1700	1458	1700			
Volume to Capacity	0.00	0.00	0.08			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	16.6%			ICU Level of Service	A	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	6	22	39	10	23	25
Future Volume (vph)	6	22	39	10	23	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.895		0.972			
Flt Protected	0.989					0.977
Satd. Flow (prot)	1453	0	1133	0	0	1389
Flt Permitted	0.989					0.977
Satd. Flow (perm)	1453	0	1133	0	0	1389
Link Speed (k/h)	50		50			50
Link Distance (m)	98.0		54.6			39.8
Travel Time (s)	7.1		3.9			2.9
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	63%	2%	63%	63%	2%	63%
Adj. Flow (vph)	7	24	42	11	25	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	31	0	53	0	0	52
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		0.0			0.0
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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	22.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

03/04/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	22	39	10	23	25
Future Volume (Veh/h)	6	22	39	10	23	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	24	42	11	25	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	224					
pX, platoon unblocked						
vC, conflicting volume	144	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	144	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	99	98			98	
cM capacity (veh/h)	700	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	31	53	52			
Volume Left	7	0	25			
Volume Right	24	11	0			
cSH	898	1700	1527			
Volume to Capacity	0.03	0.03	0.02			
Queue Length 95th (m)	0.9	0.0	0.4			
Control Delay (s)	9.2	0.0	3.6			
Lane LOS	A		A			
Approach Delay (s)	9.2	0.0	3.6			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			3.5			
Intersection Capacity Utilization			22.1%	ICU Level of Service		A
Analysis Period (min)	15					

Lanes, Volumes, Timings  
20: Beamish Road & Phase 1 driveway

03/04/2021



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	62	21	22	39	27	64
Future Volume (vph)	62	21	22	39	27	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.965					0.905
Flt Protected	0.964					0.982
Satd. Flow (prot)	1733	0	0	1325	1434	0
Flt Permitted	0.964					0.982
Satd. Flow (perm)	1733	0	0	1325	1434	0
Link Speed (k/h)	50					50
Link Distance (m)	65.4					50.1
Travel Time (s)	4.7					3.6
Confl. Peds. (#/hr)	10	10	10			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	63%	63%	2%
Adj. Flow (vph)	67	23	24	42	29	70
Shared Lane Traffic (%)						
Lane Group Flow (vph)	90	0	0	66	99	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6					0.0
Link Offset(m)	0.0					0.0
Crosswalk Width(m)	4.8					4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			
Sign Control	Stop				Free	Free

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	23.9%
ICU Level of Service	A
Analysis Period (min)	15

# HCM Unsignalized Intersection Capacity Analysis

## 20: Beamish Road & Phase 1 driveway

03/04/2021



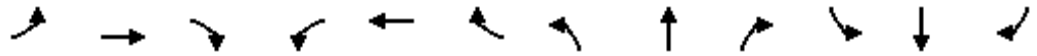
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	21	22	39	27	64
Future Volume (Veh/h)	62	21	22	39	27	64
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	23	24	42	29	70
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	174	84	109			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	174	84	109			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	98	98			
cM capacity (veh/h)	789	959	1469			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	90	66	99			
Volume Left	67	24	0			
Volume Right	23	0	70			
cSH	827	1469	1700			
Volume to Capacity	0.11	0.02	0.06			
Queue Length 95th (m)	2.9	0.4	0.0			
Control Delay (s)	9.9	2.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.9	2.8	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			4.2			
Intersection Capacity Utilization			23.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2026> AM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	13	196	7	171	81	321	3	351	267	242	250	9	
Future Volume (vph)	13	196	7	171	81	321	3	351	267	242	250	9	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1456	1795		1656	1743	1495	1347	1792	1524	1703	1754		
Flt Permitted	0.70	1.00		0.43	1.00	1.00	0.57	1.00	1.00	0.32	1.00		
Satd. Flow (perm)	1066	1795		751	1743	1495	814	1792	1524	572	1754		
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Adj. Flow (vph)	15	231	8	201	95	378	4	413	314	285	294	11	
RTOR Reduction (vph)	0	2	0	0	0	247	0	0	208	0	2	0	
Lane Group Flow (vph)	15	237	0	201	95	131	4	413	106	285	303	0	
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%	
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		
Protected Phases		4		3	8			2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	15.0	15.0		26.0	26.0	26.0	25.4	25.4	25.4	37.4	37.4		
Effective Green, g (s)	16.0	16.0		27.0	27.0	27.0	26.4	26.4	26.4	38.4	38.4		
Actuated g/C Ratio	0.21	0.21		0.35	0.35	0.35	0.34	0.34	0.34	0.49	0.49		
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0		
Lane Grp Cap (vph)	218	368		364	603	517	275	606	515	426	863		
v/s Ratio Prot		c0.13		c0.06	0.05			c0.23		c0.09	0.17		
v/s Ratio Perm	0.01			0.13		0.09	0.00		0.07	0.24			
v/c Ratio	0.07	0.65		0.55	0.16	0.25	0.01	0.68	0.21	0.67	0.35		
Uniform Delay, d1	25.0	28.4		19.2	17.6	18.3	17.2	22.2	18.3	13.2	12.2		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	3.9		1.8	0.1	0.3	0.0	3.4	0.3	4.0	0.3		
Delay (s)	25.1	32.3		21.0	17.8	18.5	17.2	25.6	18.6	17.1	12.5		
Level of Service	C	C		C	B	B	B	C	B	B	B		
Approach Delay (s)		31.8			19.2			22.6			14.7		
Approach LOS		C			B			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			20.5		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.64										
Actuated Cycle Length (s)			78.0		Sum of lost time (s)					16.6			
Intersection Capacity Utilization			72.7%		ICU Level of Service					C			
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2026> AM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↗		↖	↗	
Traffic Volume (vph)	41	550	148	158	419	29	100	0	124	43	3	78
Future Volume (vph)	41	550	148	158	419	29	100	0	124	43	3	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.94	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.98	1.00	1.00	1.00	1.00	1.00	0.99	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1729	1810	1114	1269	1759	1486	1290	1129		1756	1539	
Flt Permitted	0.50	1.00	1.00	0.23	1.00	1.00	0.70	1.00		0.67	1.00	
Satd. Flow (perm)	919	1810	1114	312	1759	1486	952	1129		1243	1539	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	585	157	168	446	31	106	0	132	46	3	83
RTOR Reduction (vph)	0	0	87	0	0	11	0	105	0	0	66	0
Lane Group Flow (vph)	44	585	70	168	446	20	106	27	0	46	20	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.1	33.1	33.1	48.2	48.2	48.2	14.6	14.6		14.6	14.6	
Effective Green, g (s)	34.1	34.1	34.1	49.2	49.2	49.2	15.6	15.6		15.6	15.6	
Actuated g/C Ratio	0.45	0.45	0.45	0.64	0.64	0.64	0.20	0.20		0.20	0.20	
Clearance Time (s)	6.8	6.8	6.8	4.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	410	807	497	352	1132	956	194	230		253	314	
v/s Ratio Prot		c0.32		c0.08	0.25			0.02				0.01
v/s Ratio Perm	0.05		0.06	0.23		0.01	c0.11			0.04		
v/c Ratio	0.11	0.72	0.14	0.48	0.39	0.02	0.55	0.12		0.18	0.06	
Uniform Delay, d1	12.3	17.3	12.5	8.4	6.5	4.9	27.2	24.8		25.1	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	3.3	0.1	1.0	0.2	0.0	3.1	0.2		0.3	0.1	
Delay (s)	12.4	20.6	12.6	9.4	6.7	4.9	30.4	25.0		25.5	24.6	
Level of Service	B	C	B	A	A	A	C	C		C	C	
Approach Delay (s)		18.5			7.3			27.4			24.9	
Approach LOS		B			A			C			C	

Intersection Summary

HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	14.6
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2026> AM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	131	475	111	50	457	233	43	12	23	169	23	103	
Future Volume (vph)	131	475	111	50	457	233	43	12	23	169	23	103	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.88		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1630		1734	1588		
Flt Permitted	0.41	1.00	1.00	0.45	1.00	1.00	0.67	1.00		0.73	1.00		
Satd. Flow (perm)	769	3343	1455	861	3406	1553	974	1630		1335	1588		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
Adj. Flow (vph)	147	534	125	56	513	262	48	13	26	190	26	116	
RTOR Reduction (vph)	0	0	70	0	0	164	0	19	0	0	87	0	
Lane Group Flow (vph)	147	534	55	56	513	98	48	20	0	190	55	0	
Confl. Peds. (#/hr)									3	3			
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			8			4		
Permitted Phases	2		2	6		6	8			4			
Actuated Green, G (s)	32.9	25.8	25.8	25.9	21.8	21.8	14.3	14.3		14.3	14.3		
Effective Green, g (s)	33.9	26.8	26.8	27.9	22.8	22.8	15.3	15.3		15.3	15.3		
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.38	0.38	0.25	0.25		0.25	0.25		
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8		
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	581	1473	641	474	1277	582	245	410		335	399		
v/s Ratio Prot	c0.04	c0.16		0.01	0.15			0.01				0.03	
v/s Ratio Perm	0.10		0.04	0.04		0.06	0.05			c0.14			
v/c Ratio	0.25	0.36	0.09	0.12	0.40	0.17	0.20	0.05		0.57	0.14		
Uniform Delay, d1	6.6	11.3	9.9	9.2	14.0	12.7	17.9	17.2		19.9	17.6		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.2	0.2	0.1	0.1	0.3	0.2	0.4	0.0		2.2	0.2		
Delay (s)	6.8	11.5	10.0	9.3	14.2	12.8	18.3	17.3		22.1	17.8		
Level of Service	A	B	A	A	B	B	B	B		C	B		
Approach Delay (s)		10.4			13.5			17.8			20.2		
Approach LOS		B			B			B			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.5		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.42										
Actuated Cycle Length (s)			60.8		Sum of lost time (s)					13.6			
Intersection Capacity Utilization			62.5%		ICU Level of Service					B			
Analysis Period (min)			15										

c Critical Lane Group



HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2026> AM  
09/29/2021

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	278	318	71	91	478	257	28	49	31	113	92	235	
Future Volume (vph)	278	318	71	91	478	257	28	49	31	113	92	235	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1735	3270		1805	3374	1563	1805	1759	1594	1734	1845	1553	
Flt Permitted	0.41	1.00		0.49	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00	
Satd. Flow (perm)	754	3270		937	3374	1563	1308	1759	1594	1315	1845	1553	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	320	366	82	105	549	295	32	56	36	130	106	270	
RTOR Reduction (vph)	0	16	0	0	0	148	0	0	29	0	0	218	
Lane Group Flow (vph)	320	432	0	105	549	148	32	56	7	130	106	52	
Confl. Peds. (#/hr)	1					1			1	1			
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	13.0	13.0	13.0	13.0	13.0	13.0	
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	14.0	14.0	14.0	14.0	14.0	14.0	
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19	
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	590	2087		468	1687	781	253	341	309	254	357	301	
v/s Ratio Prot	c0.06	0.13			c0.16			0.03			0.06		
v/s Ratio Perm	0.29			0.11		0.09	0.02		0.00	c0.10		0.03	
v/c Ratio	0.54	0.21		0.22	0.33	0.19	0.13	0.16	0.02	0.51	0.30	0.17	
Uniform Delay, d1	5.9	5.4		10.2	10.8	10.0	24.0	24.2	23.6	26.0	24.9	24.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.1		0.4	0.2	0.2	0.2	0.2	0.0	1.7	0.5	0.3	
Delay (s)	6.9	5.5		10.6	11.0	10.2	24.3	24.5	23.6	27.8	25.4	24.6	
Level of Service	A	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		6.1			10.7			24.2			25.6		
Approach LOS		A			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.1		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.40										
Actuated Cycle Length (s)			72.2		Sum of lost time (s)						14.1		
Intersection Capacity Utilization			73.8%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
10: Beamish Road & Phase 2 driveway

<Future Total 2026> AM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	144	3	7	61	85	206
Future Volume (Veh/h)	144	3	7	61	85	206
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	157	3	8	66	92	224
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	286	204	316			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	286	204	316			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	100	99			
cM capacity (veh/h)	700	837	1244			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	160	74	316			
Volume Left	157	8	0			
Volume Right	3	0	224			
cSH	702	1244	1700			
Volume to Capacity	0.23	0.01	0.19			
Queue Length 95th (m)	7.0	0.2	0.0			
Control Delay (s)	11.6	0.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.6	0.9	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.5			
Intersection Capacity Utilization			32.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 18: Beamish Road & Prospect Boulevard

<Future Total 2026> AM  
 09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	22	25	6	14	25
Future Volume (Veh/h)	6	22	25	6	14	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	24	27	7	15	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						225
pX, platoon unblocked						
vC, conflicting volume	108	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	108	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	682	1001			1551	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	31	34	42			
Volume Left	7	0	15			
Volume Right	24	7	0			
cSH	905	1700	1551			
Volume to Capacity	0.03	0.02	0.01			
Queue Length 95th (m)	0.9	0.0	0.2			
Control Delay (s)	9.1	0.0	2.7			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	2.7			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			3.7			
Intersection Capacity Utilization			21.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<Future Total 2026> AM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	8	15	32	31	35
Future Volume (Veh/h)	23	8	15	32	31	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	9	16	35	34	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	140	73	82			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	140	73	82			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	830	973	1503			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	34	51	72			
Volume Left	25	16	0			
Volume Right	9	0	38			
cSH	863	1503	1700			
Volume to Capacity	0.04	0.01	0.04			
Queue Length 95th (m)	1.0	0.3	0.0			
Control Delay (s)	9.3	2.4	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.3	2.4	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			2.8			
Intersection Capacity Utilization			22.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2026> PM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	156	3	266	221	504	4	324	269	522	406	24
Future Volume (vph)	13	156	3	266	221	504	4	324	269	522	406	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	1736	1823	
Flt Permitted	0.62	1.00		0.50	1.00	1.00	0.50	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	943	1710		901	1845	1553	957	1827	1482	632	1823	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	162	3	277	230	525	4	338	280	544	423	25
RTOR Reduction (vph)	0	1	0	0	0	363	0	0	202	0	2	0
Lane Group Flow (vph)	14	165	0	277	230	162	4	338	78	544	446	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	10.7	10.7		25.2	25.2	25.2	22.7	22.7	22.7	45.1	45.1	
Effective Green, g (s)	11.7	11.7		26.2	26.2	26.2	23.7	23.7	23.7	46.1	46.1	
Actuated g/C Ratio	0.14	0.14		0.31	0.31	0.31	0.28	0.28	0.28	0.54	0.54	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	129	235		398	569	479	267	510	413	608	989	
v/s Ratio Prot		c0.10		c0.10	0.12			c0.19		c0.21	0.24	
v/s Ratio Perm	0.01			0.11		0.10	0.00		0.05	0.27		
v/c Ratio	0.11	0.70		0.70	0.40	0.34	0.01	0.66	0.19	0.89	0.45	
Uniform Delay, d1	32.0	34.9		24.3	23.2	22.7	22.2	27.1	23.3	14.1	11.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	9.2		5.2	0.5	0.4	0.0	3.6	0.3	15.6	0.4	
Delay (s)	32.4	44.1		29.5	23.7	23.1	22.2	30.6	23.6	29.7	12.2	
Level of Service	C	D		C	C	C	C	C	C	C	B	
Approach Delay (s)		43.2			24.9			27.4			21.8	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	16.6
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2026> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	698	164	218	796	63	158	0	196	45	2	59
Future Volume (vph)	87	698	164	218	796	63	158	0	196	45	2	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1324		1770	1592	
Flt Permitted	0.33	1.00	1.00	0.11	1.00	1.00	0.72	1.00		0.55	1.00	
Satd. Flow (perm)	614	1792	1205	170	1827	1583	1106	1324		1029	1592	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	90	720	169	225	821	65	163	0	202	46	2	61
RTOR Reduction (vph)	0	0	92	0	0	19	0	157	0	0	47	0
Lane Group Flow (vph)	90	720	77	225	821	46	163	45	0	46	16	0
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	34.7	34.7	34.7	51.3	51.3	51.3	17.3	17.3		17.3	17.3	
Effective Green, g (s)	35.7	35.7	35.7	52.3	52.3	52.3	18.3	18.3		18.3	18.3	
Actuated g/C Ratio	0.43	0.43	0.43	0.64	0.64	0.64	0.22	0.22		0.22	0.22	
Clearance Time (s)	6.8	6.8	6.8	4.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	266	778	523	331	1162	1007	246	294		229	354	
v/s Ratio Prot		c0.40		0.11	c0.45			0.03				0.01
v/s Ratio Perm	0.15		0.06	0.32		0.03	c0.15			0.04		
v/c Ratio	0.34	0.93	0.15	0.68	0.71	0.05	0.66	0.15		0.20	0.04	
Uniform Delay, d1	15.4	22.0	14.0	17.8	9.9	5.6	29.1	25.7		26.0	25.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	16.7	0.1	5.5	2.0	0.0	6.6	0.2		0.4	0.1	
Delay (s)	16.2	38.7	14.2	23.3	11.9	5.6	35.7	26.0		26.4	25.1	
Level of Service	B	D	B	C	B	A	D	C		C	C	
Approach Delay (s)		32.4			13.8			30.3			25.7	
Approach LOS		C			B			C			C	

Intersection Summary

HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	82.2	Sum of lost time (s)	14.6
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2026> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (vph)	170	676	93	106	755	296	122	33	172	290	38	200
Future Volume (vph)	170	676	93	106	755	296	122	33	172	290	38	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1628		1785	1625	
Flt Permitted	0.23	1.00	1.00	0.34	1.00	1.00	0.56	1.00		0.61	1.00	
Satd. Flow (perm)	438	3312	1550	649	3471	1532	1051	1628		1146	1625	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	172	683	94	107	763	299	123	33	174	293	38	202
RTOR Reduction (vph)	0	0	58	0	0	194	0	114	0	0	132	0
Lane Group Flow (vph)	172	683	36	107	763	105	123	93	0	293	108	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	37.7	28.9	28.9	32.5	26.3	26.3	25.9	25.9		25.9	25.9	
Effective Green, g (s)	39.1	29.9	29.9	34.5	27.3	27.3	26.9	26.9		26.9	26.9	
Actuated g/C Ratio	0.50	0.39	0.39	0.44	0.35	0.35	0.35	0.35		0.35	0.35	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	393	1276	597	395	1221	538	364	564		397	563	
v/s Ratio Prot	c0.06	0.21		0.03	c0.22			0.06			0.07	
v/s Ratio Perm	0.17		0.02	0.10		0.07	0.12			c0.26		
v/c Ratio	0.44	0.54	0.06	0.27	0.62	0.20	0.34	0.17		0.74	0.19	
Uniform Delay, d1	11.5	18.5	15.0	12.8	20.9	17.5	18.8	17.6		22.3	17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.5	0.1	0.4	1.1	0.2	0.6	0.1		7.0	0.2	
Delay (s)	12.3	19.0	15.1	13.2	22.0	17.7	19.3	17.7		29.3	17.9	
Level of Service	B	B	B	B	C	B	B	B		C	B	
Approach Delay (s)		17.4			20.1			18.3			24.2	
Approach LOS		B			C			B			C	
























Intersection Summary

HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	77.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2026> PM  
09/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	402	700	35	48	617	198	104	134	55	243	72	437
Future Volume (vph)	402	700	35	48	617	198	104	134	55	243	72	437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3360		1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.35	1.00		0.36	1.00	1.00	0.71	1.00	1.00	0.67	1.00	1.00
Satd. Flow (perm)	644	3360		687	3438	1583	1346	1881	1615	1232	1900	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	419	729	36	50	643	206	108	140	57	253	75	455
RTOR Reduction (vph)	0	3	0	0	0	114	0	0	41	0	0	212
Lane Group Flow (vph)	419	762	0	50	643	92	108	140	16	253	75	243
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	45.9	45.9		35.3	35.3	35.3	21.7	21.7	21.7	21.7	21.7	21.7
Effective Green, g (s)	46.9	46.9		36.3	36.3	36.3	22.7	22.7	22.7	22.7	22.7	22.7
Actuated g/C Ratio	0.57	0.57		0.44	0.44	0.44	0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	479	1928		305	1527	703	373	522	448	342	527	444
v/s Ratio Prot	c0.09	c0.23			0.19			0.07			0.04	
v/s Ratio Perm	0.42			0.07		0.06	0.08		0.01	c0.21		0.15
v/c Ratio	0.87	0.40		0.16	0.42	0.13	0.29	0.27	0.04	0.74	0.14	0.55
Uniform Delay, d1	12.1	9.6		13.6	15.5	13.4	23.2	23.0	21.5	26.8	22.2	25.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.2	0.2		0.4	0.3	0.1	0.4	0.3	0.0	8.1	0.1	1.4
Delay (s)	28.3	9.8		14.0	15.8	13.5	23.6	23.3	21.5	35.0	22.3	26.5
Level of Service	C	A		B	B	B	C	C	C	C	C	C
Approach Delay (s)		16.3			15.2			23.1			28.8	
Approach LOS		B			B			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.8	HCM 2000 Level of Service				B				
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			81.7	Sum of lost time (s)				14.7				
Intersection Capacity Utilization			92.2%	ICU Level of Service				F				
Analysis Period (min)			15									
c Critical Lane Group												



HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<Future Total 2026> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	207	10	20	125	128	238
Future Volume (Veh/h)	207	10	20	125	128	238
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	225	11	22	136	139	259
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	448	268	398			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	448	268	398			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	99	98			
cM capacity (veh/h)	557	770	1161			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	236	158	398			
Volume Left	225	22	0			
Volume Right	11	0	259			
cSH	565	1161	1700			
Volume to Capacity	0.42	0.02	0.23			
Queue Length 95th (m)	16.4	0.5	0.0			
Control Delay (s)	15.9	1.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.9	1.3	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			5.0			
Intersection Capacity Utilization			42.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

<Future Total 2026> PM  
 09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	37	39	10	34	25
Future Volume (Veh/h)	6	37	39	10	34	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	40	42	11	37	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	224					
pX, platoon unblocked						
vC, conflicting volume	168	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	99	96			98	
cM capacity (veh/h)	671	979			1527	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	47	53	64			
Volume Left	7	0	37			
Volume Right	40	11	0			
cSH	917	1700	1527			
Volume to Capacity	0.05	0.03	0.02			
Queue Length 95th (m)	1.3	0.0	0.6			
Control Delay (s)	9.1	0.0	4.4			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	4.4			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			4.3			
Intersection Capacity Utilization			22.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<Future Total 2026> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	22	17	59	37	74
Future Volume (Veh/h)	62	22	17	59	37	74
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	24	18	64	40	80
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	200	100	130			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	200	100	130			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	97	99			
cM capacity (veh/h)	766	940	1443			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	91	82	120			
Volume Left	67	18	0			
Volume Right	24	0	80			
cSH	805	1443	1700			
Volume to Capacity	0.11	0.01	0.07			
Queue Length 95th (m)	3.0	0.3	0.0			
Control Delay (s)	10.0	1.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.0	1.7	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.6			
Intersection Capacity Utilization			24.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2031> AM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	190	7	174	81	453	3	374	272	300	266	9
Future Volume (vph)	13	190	7	174	81	453	3	374	272	300	266	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1794		1656	1743	1495	1347	1792	1524	3303	1755	
Flt Permitted	0.70	1.00		0.42	1.00	1.00	0.56	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1066	1794		732	1743	1495	800	1792	1524	3303	1755	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	224	8	205	95	533	4	440	320	353	313	11
RTOR Reduction (vph)	0	2	0	0	0	328	0	0	210	0	1	0
Lane Group Flow (vph)	15	230	0	205	95	205	4	440	110	353	323	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	14.4	14.4		24.5	24.5	24.5	26.8	26.8	26.8	12.1	41.9	
Effective Green, g (s)	15.4	15.4		25.5	25.5	25.5	27.8	27.8	27.8	13.1	42.9	
Actuated g/C Ratio	0.19	0.19		0.31	0.31	0.31	0.34	0.34	0.34	0.16	0.53	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	202	341		322	548	470	274	615	523	534	929	
v/s Ratio Prot		c0.13		c0.06	0.05			c0.25		c0.11	0.18	
v/s Ratio Perm	0.01			0.14		0.14	0.00		0.07			
v/c Ratio	0.07	0.68		0.64	0.17	0.44	0.01	0.72	0.21	0.66	0.35	
Uniform Delay, d1	26.9	30.5		21.9	20.1	22.0	17.6	23.2	18.8	31.9	11.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	5.2		4.1	0.2	0.7	0.0	4.2	0.3	3.1	0.3	
Delay (s)	27.1	35.7		26.0	20.3	22.7	17.6	27.4	19.1	34.9	11.3	
Level of Service	C	D		C	C	C	B	C	B	C	B	
Approach Delay (s)		35.2			23.2			23.9			23.6	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	72.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2031> AM  
09/29/2021

























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	646	148	158	483	31	100	2	124	58	6	37
Future Volume (vph)	20	646	148	158	483	31	100	2	124	58	6	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1161		1770	1621	
Flt Permitted	0.47	1.00	1.00	0.18	1.00	1.00	0.73	1.00		0.67	1.00	
Satd. Flow (perm)	883	1810	1188	242	1759	1583	1002	1161		1250	1621	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	687	157	168	514	33	106	2	132	62	6	39
RTOR Reduction (vph)	0	0	82	0	0	11	0	107	0	0	32	0
Lane Group Flow (vph)	21	687	75	168	514	22	106	27	0	62	13	0
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	37.5	37.5	37.5	52.5	52.5	52.5	14.1	14.1		14.1	14.1	
Effective Green, g (s)	38.5	38.5	38.5	53.5	53.5	53.5	15.1	15.1		15.1	15.1	
Actuated g/C Ratio	0.48	0.48	0.48	0.67	0.67	0.67	0.19	0.19		0.19	0.19	
Clearance Time (s)	6.8	6.8	6.8	4.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	423	868	570	315	1173	1055	188	218		235	305	
v/s Ratio Prot		c0.38		c0.08	0.29			0.02				0.01
v/s Ratio Perm	0.02		0.06	0.28		0.01	c0.11			0.05		
v/c Ratio	0.05	0.79	0.13	0.53	0.44	0.02	0.56	0.12		0.26	0.04	
Uniform Delay, d1	11.1	17.5	11.6	9.9	6.3	4.5	29.6	27.0		27.8	26.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	5.0	0.1	1.7	0.3	0.0	3.8	0.3		0.6	0.1	
Delay (s)	11.2	22.5	11.7	11.6	6.5	4.5	33.4	27.3		28.4	26.7	
Level of Service	B	C	B	B	A	A	C	C		C	C	
Approach Delay (s)		20.2			7.6			30.0			27.7	
Approach LOS		C			A			C			C	

Intersection Summary

HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.2	Sum of lost time (s)	14.6
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12
























<Future Total 2031> AM  
09/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	570	122	50	520	236	47	9	23	169	23	106
Future Volume (vph)	137	570	122	50	520	236	47	9	23	169	23	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1624		1734	1587	
Flt Permitted	0.36	1.00	1.00	0.41	1.00	1.00	0.66	1.00		0.73	1.00	
Satd. Flow (perm)	678	3343	1455	777	3406	1553	971	1624		1339	1587	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	154	640	137	56	584	265	53	10	26	190	26	119
RTOR Reduction (vph)	0	0	76	0	0	165	0	19	0	0	89	0
Lane Group Flow (vph)	154	640	61	56	584	100	53	17	0	190	56	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.6	26.5	26.5	26.4	22.3	22.3	14.8	14.8		14.8	14.8	
Effective Green, g (s)	34.6	27.5	27.5	28.4	23.3	23.3	15.8	15.8		15.8	15.8	
Actuated g/C Ratio	0.56	0.44	0.44	0.46	0.38	0.38	0.25	0.25		0.25	0.25	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	544	1482	645	440	1279	583	247	413		341	404	
v/s Ratio Prot	c0.04	c0.19		0.01	0.17			0.01				0.04
v/s Ratio Perm	0.12		0.04	0.05		0.06	0.05			c0.14		
v/c Ratio	0.28	0.43	0.09	0.13	0.46	0.17	0.21	0.04		0.56	0.14	
Uniform Delay, d1	6.8	11.9	10.0	9.4	14.6	12.9	18.2	17.4		20.1	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.1	0.1	0.3	0.2	0.4	0.0		2.0	0.2	
Delay (s)	7.1	12.1	10.1	9.5	14.9	13.1	18.6	17.4		22.0	18.0	
Level of Service	A	B	B	A	B	B	B	B		C	B	
Approach Delay (s)		11.0			14.0			18.2			20.3	
Approach LOS		B			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			13.9				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			62.0				Sum of lost time (s)			13.6		
Intersection Capacity Utilization			62.9%				ICU Level of Service			B		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2031> AM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	309	382	74	91	517	254	29	50	31	108	95	256	
Future Volume (vph)	309	382	74	91	517	254	29	50	31	108	95	256	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1735	3275		1805	3374	1563	1805	1759	1594	1734	1845	1553	
Flt Permitted	0.39	1.00		0.46	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00	
Satd. Flow (perm)	709	3275		870	3374	1563	1305	1759	1594	1314	1845	1553	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	355	439	85	105	594	292	33	57	36	124	109	294	
RTOR Reduction (vph)	0	13	0	0	0	145	0	0	29	0	0	238	
Lane Group Flow (vph)	355	511	0	105	594	147	33	57	7	124	109	56	
Confl. Peds. (#/hr)	1					1			1	1			
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.7	12.7	12.7	12.7	12.7	12.7	
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.7	13.7	13.7	13.7	13.7	13.7	
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19	
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	568	2099		436	1694	784	248	335	303	250	351	295	
v/s Ratio Prot	c0.07	0.16			c0.18			0.03			0.06		
v/s Ratio Perm	0.33			0.12		0.09	0.03		0.00	c0.09		0.04	
v/c Ratio	0.62	0.24		0.24	0.35	0.19	0.13	0.17	0.02	0.50	0.31	0.19	
Uniform Delay, d1	6.0	5.5		10.1	10.8	9.8	24.2	24.3	23.7	26.0	25.0	24.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	0.1		0.5	0.2	0.2	0.2	0.2	0.0	1.5	0.5	0.3	
Delay (s)	8.1	5.6		10.6	11.0	10.0	24.4	24.6	23.7	27.6	25.5	24.8	
Level of Service	A	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		6.6			10.7			24.3			25.6		
Approach LOS		A			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.1		HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio			0.42										
Actuated Cycle Length (s)			71.9		Sum of lost time (s)					14.1			
Intersection Capacity Utilization			73.6%		ICU Level of Service					D			
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<Future Total 2031> AM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	144	3	7	61	88	206
Future Volume (Veh/h)	144	3	7	61	88	206
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	157	3	8	66	96	224
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	290	208	320			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	290	208	320			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	77	100	99			
cM capacity (veh/h)	696	832	1240			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	160	74	320			
Volume Left	157	8	0			
Volume Right	3	0	224			
cSH	698	1240	1700			
Volume to Capacity	0.23	0.01	0.19			
Queue Length 95th (m)	7.0	0.2	0.0			
Control Delay (s)	11.7	0.9	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.7	0.9	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.5			
Intersection Capacity Utilization			32.1%	ICU Level of Service	A	
Analysis Period (min)			15			



HCM Unsignalized Intersection Capacity Analysis  
 18: Beamish Road & Prospect Boulevard

<Future Total 2031> AM  
 09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	22	25	6	17	25
Future Volume (Veh/h)	6	22	25	6	17	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	24	27	7	18	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						225
pX, platoon unblocked						
vC, conflicting volume	114	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	114	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	99	98			99	
cM capacity (veh/h)	674	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	31	34	45			
Volume Left	7	0	18			
Volume Right	24	7	0			
cSH	902	1700	1551			
Volume to Capacity	0.03	0.02	0.01			
Queue Length 95th (m)	0.9	0.0	0.3			
Control Delay (s)	9.1	0.0	3.0			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	3.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			3.8			
Intersection Capacity Utilization		21.8%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<Future Total 2031> AM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	8	15	32	34	35
Future Volume (Veh/h)	23	8	15	32	34	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	9	16	35	37	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	143	76	85			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	143	76	85			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	827	969	1499			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	34	51	75			
Volume Left	25	16	0			
Volume Right	9	0	38			
cSH	860	1499	1700			
Volume to Capacity	0.04	0.01	0.04			
Queue Length 95th (m)	1.0	0.3	0.0			
Control Delay (s)	9.4	2.4	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.4	2.4	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			2.7			
Intersection Capacity Utilization			22.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2031> PM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	156	3	283	220	649	4	344	275	699	432	24
Future Volume (vph)	13	156	3	283	220	649	4	344	275	699	432	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	3.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	3367	1825	
Flt Permitted	0.62	1.00		0.51	1.00	1.00	0.49	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	943	1710		920	1845	1553	934	1827	1482	3367	1825	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	162	3	295	229	676	4	358	286	728	450	25
RTOR Reduction (vph)	0	1	0	0	0	445	0	0	203	0	2	0
Lane Group Flow (vph)	14	165	0	295	229	231	4	358	83	728	473	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	11.4	11.4		22.4	22.4	22.4	23.6	23.6	23.6	20.4	48.0	
Effective Green, g (s)	12.4	12.4		23.4	23.4	23.4	24.6	24.6	24.6	21.4	49.0	
Actuated g/C Ratio	0.15	0.15		0.28	0.28	0.28	0.29	0.29	0.29	0.25	0.58	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	4.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	137	249		337	507	427	270	528	428	847	1052	
v/s Ratio Prot		c0.10		c0.09	0.12			c0.20		c0.22	0.26	
v/s Ratio Perm	0.01			0.15		0.15	0.00		0.06			
v/c Ratio	0.10	0.66		0.88	0.45	0.54	0.01	0.68	0.19	0.86	0.45	
Uniform Delay, d1	31.5	34.3		28.2	25.5	26.2	21.6	26.7	22.7	30.4	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	6.5		21.5	0.6	1.4	0.0	3.8	0.3	8.7	0.4	
Delay (s)	31.8	40.8		49.7	26.1	27.6	21.6	30.5	23.0	39.1	10.7	
Level of Service	C	D		D	C	C	C	C	C	D	B	
Approach Delay (s)		40.1			32.8			27.1			27.9	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.6
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2031> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations	↖	↑	↗	↖	↑	↗	↖	↗		↖	↗		
Traffic Volume (vph)	62	795	164	218	936	103	158	7	196	77	5	51	
Future Volume (vph)	62	795	164	218	936	103	158	7	196	77	5	51	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	5.8	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.93	1.00	0.96		1.00	0.93		
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	0.95	1.00		0.98	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.86		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1755	1792	1115	1517	1827	1465	1392	1281		1731	1498		
Flt Permitted	0.21	1.00	1.00	0.09	1.00	1.00	0.72	1.00		0.50	1.00		
Satd. Flow (perm)	391	1792	1115	147	1827	1465	1054	1281		908	1498		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	64	820	169	225	965	106	163	7	202	79	5	53	
RTOR Reduction (vph)	0	0	81	0	0	29	0	158	0	0	41	0	
Lane Group Flow (vph)	64	820	88	225	965	77	163	51	0	79	17	0	
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20	
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA		
Protected Phases		2		1	6			8			4		
Permitted Phases	2		2	6		6	8			4			
Actuated Green, G (s)	48.8	48.8	48.8	65.8	65.8	65.8	20.9	20.9		20.9	20.9		
Effective Green, g (s)	49.8	49.8	49.8	66.8	66.8	66.8	21.9	21.9		21.9	21.9		
Actuated g/C Ratio	0.50	0.50	0.50	0.67	0.67	0.67	0.22	0.22		0.22	0.22		
Clearance Time (s)	6.8	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	194	889	553	302	1216	975	230	279		198	327		
v/s Ratio Prot		c0.46		0.11	c0.53			0.04			0.01		
v/s Ratio Perm	0.16		0.08	0.38		0.05	c0.15			0.09			
v/c Ratio	0.33	0.92	0.16	0.75	0.79	0.08	0.71	0.18		0.40	0.05		
Uniform Delay, d1	15.2	23.5	13.8	25.0	11.9	5.9	36.3	31.9		33.6	31.0		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	1.0	14.8	0.1	9.6	3.6	0.0	9.6	0.3		1.3	0.1		
Delay (s)	16.2	38.2	13.9	34.6	15.5	5.9	45.8	32.2		34.9	31.0		
Level of Service	B	D	B	C	B	A	D	C		C	C		
Approach Delay (s)		33.0			18.0			38.2			33.3		
Approach LOS		C			B			D			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			26.9		HCM 2000 Level of Service						C		
HCM 2000 Volume to Capacity ratio			0.84										
Actuated Cycle Length (s)			100.3		Sum of lost time (s)						13.6		
Intersection Capacity Utilization			108.3%		ICU Level of Service						G		
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2031> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑↑	↗	↙	↑↑	↗	↙	↑		↙	↗	
Traffic Volume (vph)	176	791	102	106	907	299	135	31	172	290	38	214
Future Volume (vph)	176	791	102	106	907	299	135	31	172	290	38	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1625		1785	1623	
Flt Permitted	0.17	1.00	1.00	0.28	1.00	1.00	0.54	1.00		0.60	1.00	
Satd. Flow (perm)	317	3312	1550	531	3471	1532	998	1625		1135	1623	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	178	799	103	107	916	302	136	31	174	293	38	216
RTOR Reduction (vph)	0	0	61	0	0	190	0	115	0	0	143	0
Lane Group Flow (vph)	178	799	42	107	916	112	136	90	0	293	111	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	41.0	32.0	32.0	35.2	29.1	29.1	26.6	26.6		26.6	26.6	
Effective Green, g (s)	42.1	33.0	33.0	37.2	30.1	30.1	27.6	27.6		27.6	27.6	
Actuated g/C Ratio	0.52	0.41	0.41	0.46	0.37	0.37	0.34	0.34		0.34	0.34	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	347	1344	629	354	1285	567	338	551		385	550	
v/s Ratio Prot	c0.06	0.24		0.03	c0.26			0.06			0.07	
v/s Ratio Perm	0.20		0.03	0.11		0.07	0.14			c0.26		
v/c Ratio	0.51	0.59	0.07	0.30	0.71	0.20	0.40	0.16		0.76	0.20	
Uniform Delay, d1	12.4	18.9	14.7	13.0	21.9	17.4	20.5	18.8		23.9	19.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.8	0.1	0.5	2.0	0.2	0.8	0.1		8.6	0.2	
Delay (s)	13.7	19.7	14.8	13.5	23.9	17.6	21.3	18.9		32.5	19.2	
Level of Service	B	B	B	B	C	B	C	B		C	B	
Approach Delay (s)		18.2			21.6			19.9			26.3	
Approach LOS		B			C			B			C	
























Intersection Summary

HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2031> PM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	447	770	38	48	710	197	108	139	55	244	75	492	
Future Volume (vph)	447	770	38	48	710	197	108	139	55	244	75	492	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	3360		1805	3438	1583	1805	1881	1615	1752	1900	1599	
Flt Permitted	0.27	1.00		0.34	1.00	1.00	0.71	1.00	1.00	0.66	1.00	1.00	
Satd. Flow (perm)	505	3360		637	3438	1583	1342	1881	1615	1226	1900	1599	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	466	802	40	50	740	205	112	145	57	254	78	512	
RTOR Reduction (vph)	0	3	0	0	0	123	0	0	42	0	0	265	
Lane Group Flow (vph)	466	839	0	50	740	82	113	145	15	254	78	248	
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	53.0	53.0		35.3	35.3	35.3	23.6	23.6	23.6	23.6	23.6	23.6	
Effective Green, g (s)	54.0	54.0		36.3	36.3	36.3	24.6	24.6	24.6	24.6	24.6	24.6	
Actuated g/C Ratio	0.60	0.60		0.40	0.40	0.40	0.27	0.27	0.27	0.27	0.27	0.27	
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	511	2000		254	1375	633	363	510	438	332	515	433	
v/s Ratio Prot	c0.15	0.25			c0.22			0.08			0.04		
v/s Ratio Perm	0.39			0.08		0.05	0.08		0.01	c0.21		0.15	
v/c Ratio	0.91	0.42		0.20	0.54	0.13	0.31	0.28	0.04	0.77	0.15	0.57	
Uniform Delay, d1	11.9	9.9		17.7	20.8	17.2	26.3	26.1	24.3	30.4	25.1	28.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	20.6	0.2		0.7	0.6	0.2	0.5	0.3	0.0	10.1	0.1	1.8	
Delay (s)	32.5	10.1		18.4	21.4	17.4	26.8	26.4	24.4	40.5	25.3	30.3	
Level of Service	C	B		B	C	B	C	C	C	D	C	C	
Approach Delay (s)		18.1			20.4			26.2			32.9		
Approach LOS		B			C			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			23.1									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.68										
Actuated Cycle Length (s)			90.7									Sum of lost time (s)	14.7
Intersection Capacity Utilization			94.8%									ICU Level of Service	F
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<Future Total 2031> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	207	10	20	125	131	238
Future Volume (Veh/h)	207	10	20	125	131	238
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	225	11	22	136	142	259
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	452	272	401			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	452	272	401			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	99	98			
cM capacity (veh/h)	555	767	1158			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	236	158	401			
Volume Left	225	22	0			
Volume Right	11	0	259			
cSH	562	1158	1700			
Volume to Capacity	0.42	0.02	0.24			
Queue Length 95th (m)	16.5	0.5	0.0			
Control Delay (s)	16.0	1.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	16.0	1.3	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			5.0			
Intersection Capacity Utilization			42.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

<Future Total 2031> PM  
 09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	37	39	10	37	25
Future Volume (Veh/h)	6	37	39	10	37	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	40	42	11	40	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						224
pX, platoon unblocked						
vC, conflicting volume	174	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	174	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	99	96			97	
cM capacity (veh/h)	664	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	47	53	67			
Volume Left	7	0	40			
Volume Right	40	11	0			
cSH	915	1700	1527			
Volume to Capacity	0.05	0.03	0.03			
Queue Length 95th (m)	1.3	0.0	0.6			
Control Delay (s)	9.1	0.0	4.5			
Lane LOS	A		A			
Approach Delay (s)	9.1	0.0	4.5			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			4.4			
Intersection Capacity Utilization		23.0%		ICU Level of Service		A
Analysis Period (min)			15			



HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<Future Total 2031> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	22	17	59	40	74
Future Volume (Veh/h)	62	22	17	59	40	74
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	24	18	64	43	80
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	203	103	133			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	203	103	133			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	97	99			
cM capacity (veh/h)	763	936	1440			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	91	82	123			
Volume Left	67	18	0			
Volume Right	24	0	80			
cSH	802	1440	1700			
Volume to Capacity	0.11	0.01	0.07			
Queue Length 95th (m)	3.1	0.3	0.0			
Control Delay (s)	10.1	1.7	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.1	1.7	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.6			
Intersection Capacity Utilization			24.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
10: Beamish Road & Phase 2 driveway

<FT 2036-Two Outbound Lanes> AM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	144	3	7	61	88	206
Future Volume (Veh/h)	144	3	7	61	88	206
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	157	3	8	66	96	224
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	290	208	320			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	290	208	320			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	77	100	99			
cM capacity (veh/h)	696	832	1240			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>EB 2</b>	<b>NB 1</b>	<b>SB 1</b>		
Volume Total	157	3	74	320		
Volume Left	157	0	8	0		
Volume Right	0	3	0	224		
cSH	696	832	1240	1700		
Volume to Capacity	0.23	0.00	0.01	0.19		
Queue Length 95th (m)	6.9	0.1	0.2	0.0		
Control Delay (s)	11.7	9.3	0.9	0.0		
Lane LOS	B	A	A			
Approach Delay (s)	11.6		0.9	0.0		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.5			
Intersection Capacity Utilization			31.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
20: Beamish Road & Phase 1 driveway

<FT 2036-Two Outbound Lanes> AM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	8	15	32	34	35
Future Volume (Veh/h)	23	8	15	32	34	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	9	16	35	37	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	143	76	85			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	143	76	85			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	99			
cM capacity (veh/h)	827	969	1499			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1		
Volume Total	25	9	51	75		
Volume Left	25	0	16	0		
Volume Right	0	9	0	38		
cSH	827	969	1499	1700		
Volume to Capacity	0.03	0.01	0.01	0.04		
Queue Length 95th (m)	0.7	0.2	0.3	0.0		
Control Delay (s)	9.5	8.8	2.4	0.0		
Lane LOS	A	A	A			
Approach Delay (s)	9.3		2.4	0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			22.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<FT 2036-Two Outbound Lanes> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	207	10	20	125	131	238
Future Volume (Veh/h)	207	10	20	125	131	238
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	225	11	22	136	142	259
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)	4					
Median type				None	None	
Median storage veh						
Upstream signal (m)	100					
pX, platoon unblocked						
vC, conflicting volume	452	272	401			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	452	272	401			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	59	99	98			
cM capacity (veh/h)	555	767	1158			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	236	158	401			
Volume Left	225	22	0			
Volume Right	11	0	259			
cSH	582	1158	1700			
Volume to Capacity	0.41	0.02	0.24			
Queue Length 95th (m)	15.7	0.5	0.0			
Control Delay (s)	15.6	1.3	0.0			
Lane LOS	C	A				
Approach Delay (s)	15.6	1.3	0.0			
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay	4.9					
Intersection Capacity Utilization	41.7%			ICU Level of Service	A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<FT 2036-Two Outbound Lanes> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	62	22	17	59	40	74
Future Volume (Veh/h)	62	22	17	59	40	74
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	24	18	64	43	80
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	203	103	133			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	203	103	133			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	97	99			
cM capacity (veh/h)	763	936	1440			
Direction, Lane #	EB 1	EB 2	NB 1	SB 1		
Volume Total	67	24	82	123		
Volume Left	67	0	18	0		
Volume Right	0	24	0	80		
cSH	763	936	1440	1700		
Volume to Capacity	0.09	0.03	0.01	0.07		
Queue Length 95th (m)	2.3	0.6	0.3	0.0		
Control Delay (s)	10.2	8.9	1.7	0.0		
Lane LOS	B	A	A			
Approach Delay (s)	9.8	1.7		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			3.5			
Intersection Capacity Utilization			23.6%	ICU Level of Service	A	
Analysis Period (min)			15			

# APPENDIX



SYNCHRO

WORKSHEETS

- SENSITIVITY

ANALYSIS



HCM Signalized Intersection Capacity Analysis

<Future Total 2026-RIRO> AM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	13	197	7	171	81	321	3	351	268	243	250	9	
Future Volume (vph)	13	197	7	171	81	321	3	351	268	243	250	9	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1456	1795		1656	1743	1495	1347	1792	1524	1703	1754		
Flt Permitted	0.70	1.00		0.43	1.00	1.00	0.57	1.00	1.00	0.32	1.00		
Satd. Flow (perm)	1066	1795		746	1743	1495	814	1792	1524	574	1754		
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	
Adj. Flow (vph)	15	232	8	201	95	378	4	413	315	286	294	11	
RTOR Reduction (vph)	0	2	0	0	0	247	0	0	208	0	2	0	
Lane Group Flow (vph)	15	238	0	201	95	131	4	413	107	286	303	0	
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%	
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA		
Protected Phases		4		3	8			2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)	15.0	15.0		26.0	26.0	26.0	25.5	25.5	25.5	37.5	37.5		
Effective Green, g (s)	16.0	16.0		27.0	27.0	27.0	26.5	26.5	26.5	38.5	38.5		
Actuated g/C Ratio	0.20	0.20		0.35	0.35	0.35	0.34	0.34	0.34	0.49	0.49		
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0		
Lane Grp Cap (vph)	218	367		362	602	516	276	608	517	427	864		
v/s Ratio Prot		c0.13		c0.06	0.05			c0.23		c0.09	0.17		
v/s Ratio Perm	0.01			0.13		0.09	0.00		0.07	0.24			
v/c Ratio	0.07	0.65		0.56	0.16	0.25	0.01	0.68	0.21	0.67	0.35		
Uniform Delay, d1	25.0	28.5		19.3	17.7	18.3	17.1	22.2	18.3	13.2	12.1		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	3.9		1.8	0.1	0.3	0.0	3.3	0.3	4.0	0.3		
Delay (s)	25.2	32.4		21.1	17.8	18.6	17.2	25.4	18.6	17.1	12.5		
Level of Service	C	C		C	B	B	B	C	B	B	B		
Approach Delay (s)		32.0			19.2			22.5			14.7		
Approach LOS		C			B			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			20.5		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.64										
Actuated Cycle Length (s)			78.1		Sum of lost time (s)					16.6			
Intersection Capacity Utilization			72.8%		ICU Level of Service					C			
Analysis Period (min)			15										
c	Critical Lane Group												



HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2026-RIRO> AM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	550	152	163	428	29	31	0	50	43	3	78
Future Volume (vph)	41	550	152	163	428	29	31	0	50	43	3	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.94	1.00	1.00	0.94	1.00	0.98		1.00	0.97	
Flpb, ped/bikes	0.98	1.00	1.00	1.00	1.00	1.00	0.99	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1733	1810	1118	1268	1759	1491	1291	1130		1755	1541	
Flt Permitted	0.50	1.00	1.00	0.25	1.00	1.00	0.70	1.00		0.72	1.00	
Satd. Flow (perm)	913	1810	1118	337	1759	1491	953	1130		1335	1541	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	44	585	162	173	455	31	33	0	53	46	3	83
RTOR Reduction (vph)	0	0	87	0	0	10	0	45	0	0	70	0
Lane Group Flow (vph)	44	585	75	173	455	21	33	8	0	46	16	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	31.8	31.8	31.8	46.8	46.8	46.8	10.3	10.3		10.3	10.3	
Effective Green, g (s)	32.8	32.8	32.8	47.8	47.8	47.8	11.3	11.3		11.3	11.3	
Actuated g/C Ratio	0.46	0.46	0.46	0.68	0.68	0.68	0.16	0.16		0.16	0.16	
Clearance Time (s)	6.8	6.8	6.8	4.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	423	839	518	385	1189	1008	152	180		213	246	
v/s Ratio Prot		c0.32		c0.08	0.26			0.01				0.01
v/s Ratio Perm	0.05		0.07	0.23		0.01	c0.03			0.03		
v/c Ratio	0.10	0.70	0.15	0.45	0.38	0.02	0.22	0.05		0.22	0.07	
Uniform Delay, d1	10.7	15.0	10.9	6.7	5.0	3.8	25.9	25.1		25.8	25.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.5	0.1	0.8	0.2	0.0	0.7	0.1		0.5	0.1	
Delay (s)	10.8	17.6	11.0	7.5	5.2	3.8	26.6	25.3		26.4	25.3	
Level of Service	B	B	B	A	A	A	C	C		C	C	
Approach Delay (s)		15.8			5.7			25.8			25.7	
Approach LOS		B			A			C			C	

Intersection Summary

HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	70.7	Sum of lost time (s)	14.6
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2026-RIRO> AM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↗	↖	↖	↗↗	↖	↖	↗		↖	↗	
Traffic Volume (vph)	131	461	111	50	463	233	112	12	97	169	23	103
Future Volume (vph)	131	461	111	50	463	233	112	12	97	169	23	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1606		1734	1588	
Flt Permitted	0.40	1.00	1.00	0.46	1.00	1.00	0.67	1.00		0.68	1.00	
Satd. Flow (perm)	755	3343	1455	875	3406	1553	974	1606		1239	1588	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	147	518	125	56	520	262	126	13	109	190	26	116
RTOR Reduction (vph)	0	0	70	0	0	164	0	81	0	0	86	0
Lane Group Flow (vph)	147	518	55	56	520	98	126	41	0	190	56	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.1	26.0	26.0	26.1	22.0	22.0	15.1	15.1		15.1	15.1	
Effective Green, g (s)	34.1	27.0	27.0	28.1	23.0	23.0	16.1	16.1		16.1	16.1	
Actuated g/C Ratio	0.55	0.44	0.44	0.45	0.37	0.37	0.26	0.26		0.26	0.26	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	568	1460	635	474	1267	577	253	418		322	413	
v/s Ratio Prot	c0.04	0.15		0.01	c0.15			0.03			0.04	
v/s Ratio Perm	0.10		0.04	0.04		0.06	0.13			c0.15		
v/c Ratio	0.26	0.35	0.09	0.12	0.41	0.17	0.50	0.10		0.59	0.14	
Uniform Delay, d1	6.9	11.6	10.2	9.5	14.4	13.0	19.4	17.3		20.0	17.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.1	0.1	0.3	0.2	1.5	0.1		2.9	0.2	
Delay (s)	7.1	11.8	10.3	9.6	14.6	13.2	21.0	17.4		22.9	17.7	
Level of Service	A	B	B	A	B	B	C	B		C	B	
Approach Delay (s)		10.7			13.8			19.2			20.6	
Approach LOS		B			B			B			C	
























Intersection Summary

HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	61.8	Sum of lost time (s)	13.6
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2026-RIRO> AM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	278	318	71	91	481	257	28	49	31	113	87	237	
Future Volume (vph)	278	318	71	91	481	257	28	49	31	113	87	237	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1735	3270		1805	3374	1563	1805	1759	1594	1734	1845	1553	
Flt Permitted	0.41	1.00		0.49	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00	
Satd. Flow (perm)	750	3270		937	3374	1563	1315	1759	1594	1315	1845	1553	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	320	366	82	105	553	295	32	56	36	130	100	272	
RTOR Reduction (vph)	0	16	0	0	0	148	0	0	29	0	0	219	
Lane Group Flow (vph)	320	432	0	105	553	148	32	56	7	130	100	53	
Confl. Peds. (#/hr)	1					1			1	1			
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	13.0	13.0	13.0	13.0	13.0	13.0	
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	14.0	14.0	14.0	14.0	14.0	14.0	
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19	
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	588	2087		468	1687	781	254	341	309	254	357	301	
v/s Ratio Prot	c0.06	0.13			c0.16			0.03			0.05		
v/s Ratio Perm	0.29			0.11		0.09	0.02		0.00	c0.10		0.03	
v/c Ratio	0.54	0.21		0.22	0.33	0.19	0.13	0.16	0.02	0.51	0.28	0.18	
Uniform Delay, d1	5.9	5.4		10.2	10.8	10.0	24.0	24.2	23.6	26.0	24.8	24.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.1		0.4	0.2	0.2	0.2	0.2	0.0	1.7	0.4	0.3	
Delay (s)	6.9	5.5		10.6	11.0	10.2	24.3	24.5	23.6	27.8	25.2	24.6	
Level of Service	A	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		6.1			10.7			24.2			25.5		
Approach LOS		A			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.1		HCM 2000 Level of Service						B		
HCM 2000 Volume to Capacity ratio			0.40										
Actuated Cycle Length (s)			72.2		Sum of lost time (s)						14.1		
Intersection Capacity Utilization			73.8%		ICU Level of Service						D		
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
10: Beamish Road & Phase 2 driveway

<Future Total 2026-RIRO> AM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↓	↘
Traffic Volume (veh/h)	0	145	0	63	80	221
Future Volume (Veh/h)	0	145	0	63	80	221
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	158	0	68	87	240
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						100
pX, platoon unblocked						
vC, conflicting volume	275	207	327			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	275	207	327			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	100			
cM capacity (veh/h)	715	833	1233			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	158	68	327			
Volume Left	0	0	0			
Volume Right	158	0	240			
cSH	833	1700	1700			
Volume to Capacity	0.19	0.04	0.19			
Queue Length 95th (m)	5.6	0.0	0.0			
Control Delay (s)	10.3	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.3	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.0			
Intersection Capacity Utilization			33.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
18: Beamish Road & Prospect Boulevard

<Future Total 2026-RIRO> AM  
09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	12	25	6	156	25
Future Volume (Veh/h)	6	12	25	6	156	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	13	27	7	170	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						225
pX, platoon unblocked						
vC, conflicting volume	418	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	418	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	98	99			89	
cM capacity (veh/h)	388	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	20	34	197			
Volume Left	7	0	170			
Volume Right	13	7	0			
cSH	644	1700	1551			
Volume to Capacity	0.03	0.02	0.11			
Queue Length 95th (m)	0.8	0.0	2.9			
Control Delay (s)	10.8	0.0	6.7			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	6.7			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			6.1			
Intersection Capacity Utilization			29.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<Future Total 2026-RIRO> AM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	8	12	25	173	35
Future Volume (Veh/h)	25	8	12	25	173	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	9	13	27	188	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	280	227	236			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	280	227	236			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	99			
cM capacity (veh/h)	691	799	1320			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	36	40	226			
Volume Left	27	13	0			
Volume Right	9	0	38			
cSH	715	1320	1700			
Volume to Capacity	0.05	0.01	0.13			
Queue Length 95th (m)	1.3	0.2	0.0			
Control Delay (s)	10.3	2.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.3	2.6	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			24.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2026-RIRO> PM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	157	3	266	221	504	4	324	271	525	406	24
Future Volume (vph)	13	157	3	266	221	504	4	324	271	525	406	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	1736	1823	
Flt Permitted	0.62	1.00		0.49	1.00	1.00	0.50	1.00	1.00	0.35	1.00	
Satd. Flow (perm)	943	1710		895	1845	1553	957	1827	1482	633	1823	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	164	3	277	230	525	4	338	282	547	423	25
RTOR Reduction (vph)	0	1	0	0	0	363	0	0	203	0	2	0
Lane Group Flow (vph)	14	166	0	277	230	162	4	338	79	547	446	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	10.7	10.7		25.2	25.2	25.2	22.8	22.8	22.8	45.2	45.2	
Effective Green, g (s)	11.7	11.7		26.2	26.2	26.2	23.8	23.8	23.8	46.2	46.2	
Actuated g/C Ratio	0.14	0.14		0.31	0.31	0.31	0.28	0.28	0.28	0.54	0.54	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	129	235		397	568	478	267	511	414	608	990	
v/s Ratio Prot		c0.10		c0.10	0.12			c0.19		c0.22	0.24	
v/s Ratio Perm	0.01			0.11		0.10	0.00		0.05	0.27		
v/c Ratio	0.11	0.71		0.70	0.40	0.34	0.01	0.66	0.19	0.90	0.45	
Uniform Delay, d1	32.1	35.0		24.3	23.2	22.7	22.1	27.0	23.3	14.1	11.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	9.3		5.3	0.5	0.4	0.0	3.5	0.3	16.1	0.4	
Delay (s)	32.5	44.3		29.6	23.7	23.1	22.2	30.6	23.6	30.3	12.2	
Level of Service	C	D		C	C	C	C	C	C	C	B	
Approach Delay (s)		43.4			25.0			27.4			22.1	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2026-RIRO> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	698	170	227	837	63	61	0	86	45	2	59
Future Volume (vph)	87	698	170	227	837	63	61	0	86	45	2	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1324		1770	1592	
Flt Permitted	0.34	1.00	1.00	0.14	1.00	1.00	0.72	1.00		0.70	1.00	
Satd. Flow (perm)	638	1792	1205	229	1827	1583	1106	1324		1303	1592	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	90	720	175	234	863	65	63	0	89	46	2	61
RTOR Reduction (vph)	0	0	90	0	0	15	0	75	0	0	51	0
Lane Group Flow (vph)	90	720	85	234	863	50	63	14	0	46	12	0
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	34.4	34.4	34.4	51.5	51.5	51.5	11.0	11.0		11.0	11.0	
Effective Green, g (s)	35.4	35.4	35.4	52.5	52.5	52.5	12.0	12.0		12.0	12.0	
Actuated g/C Ratio	0.47	0.47	0.47	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
Clearance Time (s)	6.8	6.8	6.8	4.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	296	833	560	396	1260	1092	174	208		205	251	
v/s Ratio Prot		c0.40		0.11	c0.47			0.01				0.01
v/s Ratio Perm	0.14		0.07	0.30		0.03	c0.06			0.04		
v/c Ratio	0.30	0.86	0.15	0.59	0.68	0.05	0.36	0.07		0.22	0.05	
Uniform Delay, d1	12.7	18.2	11.7	10.8	6.9	3.8	28.6	27.3		28.0	27.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	9.3	0.1	2.4	1.6	0.0	1.3	0.1		0.6	0.1	
Delay (s)	13.3	27.5	11.8	13.2	8.5	3.8	29.9	27.4		28.5	27.3	
Level of Service	B	C	B	B	A	A	C	C		C	C	
Approach Delay (s)		23.4			9.2			28.5			27.8	
Approach LOS		C			A			C			C	























Intersection Summary

HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	76.1	Sum of lost time (s)	14.6
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			




























HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2026-RIRO> PM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	170	622	93	106	764	296	219	33	282	290	38	200	
Future Volume (vph)	170	622	93	106	764	296	219	33	282	290	38	200	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00		
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.87		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1610		1785	1625		
Flt Permitted	0.21	1.00	1.00	0.36	1.00	1.00	0.57	1.00		0.47	1.00		
Satd. Flow (perm)	402	3312	1550	688	3471	1532	1058	1610		891	1625		
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	
Adj. Flow (vph)	172	628	94	107	772	299	221	33	285	293	38	202	
RTOR Reduction (vph)	0	0	59	0	0	198	0	175	0	0	124	0	
Lane Group Flow (vph)	172	628	35	107	772	101	221	143	0	293	116	0	
Confl. Peds. (#/hr)	2		1	1		2			3	3			
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			8			4		
Permitted Phases	2		2	6		6	8			4			
Actuated Green, G (s)	39.4	30.5	30.5	34.0	27.8	27.8	31.9	31.9		31.9	31.9		
Effective Green, g (s)	40.7	31.5	31.5	36.0	28.8	28.8	32.9	32.9		32.9	32.9		
Actuated g/C Ratio	0.48	0.37	0.37	0.42	0.34	0.34	0.39	0.39		0.39	0.39		
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8		
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	355	1224	573	385	1173	517	408	621		344	627		
v/s Ratio Prot	c0.06	0.19		0.02	c0.22			0.09			0.07		
v/s Ratio Perm	0.18		0.02	0.09		0.07	0.21			c0.33			
v/c Ratio	0.48	0.51	0.06	0.28	0.66	0.20	0.54	0.23		0.85	0.19		
Uniform Delay, d1	14.1	20.9	17.3	15.2	24.0	20.0	20.3	17.6		23.9	17.3		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	1.0	0.4	0.1	0.4	1.4	0.2	1.5	0.2		18.0	0.1		
Delay (s)	15.1	21.3	17.4	15.6	25.4	20.2	21.8	17.8		41.9	17.4		
Level of Service	B	C	B	B	C	C	C	B		D	B		
Approach Delay (s)		19.7			23.2			19.4			30.9		
Approach LOS		B			C			B			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			22.9	HCM 2000 Level of Service						C			
HCM 2000 Volume to Capacity ratio			0.72										
Actuated Cycle Length (s)			85.2	Sum of lost time (s)						13.6			
Intersection Capacity Utilization			85.9%	ICU Level of Service						E			
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2026-RIRO> PM  
09/29/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	402	700	35	48	622	198	104	134	55	243	65	440
Future Volume (vph)	402	700	35	48	622	198	104	134	55	243	65	440
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3360		1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.34	1.00		0.36	1.00	1.00	0.71	1.00	1.00	0.67	1.00	1.00
Satd. Flow (perm)	639	3360		687	3438	1583	1354	1881	1615	1232	1900	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	419	729	36	50	648	206	108	140	57	253	68	458
RTOR Reduction (vph)	0	3	0	0	0	114	0	0	41	0	0	210
Lane Group Flow (vph)	419	762	0	50	648	92	108	140	16	253	68	248
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	45.9	45.9		35.3	35.3	35.3	21.7	21.7	21.7	21.7	21.7	21.7
Effective Green, g (s)	46.9	46.9		36.3	36.3	36.3	22.7	22.7	22.7	22.7	22.7	22.7
Actuated g/C Ratio	0.57	0.57		0.44	0.44	0.44	0.28	0.28	0.28	0.28	0.28	0.28
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	477	1928		305	1527	703	376	522	448	342	527	444
v/s Ratio Prot	c0.09	c0.23			0.19			0.07			0.04	
v/s Ratio Perm	0.42			0.07		0.06	0.08		0.01	c0.21		0.16
v/c Ratio	0.88	0.40		0.16	0.42	0.13	0.29	0.27	0.04	0.74	0.13	0.56
Uniform Delay, d1	12.2	9.6		13.6	15.5	13.4	23.2	23.0	21.5	26.8	22.1	25.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.6	0.2		0.4	0.3	0.1	0.4	0.3	0.0	8.1	0.1	1.5
Delay (s)	28.7	9.8		14.0	15.9	13.5	23.6	23.3	21.5	35.0	22.2	26.7
Level of Service	C	A		B	B	B	C	C	C	C	C	C
Approach Delay (s)		16.5			15.2			23.1			29.0	
Approach LOS		B			B			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			19.8				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			81.7				Sum of lost time (s)			14.7		
Intersection Capacity Utilization			92.2%				ICU Level of Service			F		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Unsignalized Intersection Capacity Analysis  
10: Beamish Road & Phase 2 driveway

<Future Total 2026-RIRO> PM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	223	0	125	113	268
Future Volume (Veh/h)	0	223	0	125	113	268
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	242	0	136	123	291
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	404	268	414			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	404	268	414			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	69	100			
cM capacity (veh/h)	602	770	1145			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	242	136	414			
Volume Left	0	0	0			
Volume Right	242	0	291			
cSH	770	1145	1700			
Volume to Capacity	0.31	0.00	0.24			
Queue Length 95th (m)	10.8	0.0	0.0			
Control Delay (s)	11.8	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.8	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.6			
Intersection Capacity Utilization			42.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
17: Beamish Road & Prospect Boulevard

<Future Total 2026-RIRO> PM  
09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	22	39	10	241	25
Future Volume (Veh/h)	6	22	39	10	241	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	24	42	11	262	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						224
pX, platoon unblocked						
vC, conflicting volume	618	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	618	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	98	98			83	
cM capacity (veh/h)	299	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	31	53	289			
Volume Left	7	0	262			
Volume Right	24	11	0			
cSH	647	1700	1527			
Volume to Capacity	0.05	0.03	0.17			
Queue Length 95th (m)	1.2	0.0	5.0			
Control Delay (s)	10.8	0.0	7.2			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	7.2			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			6.5			
Intersection Capacity Utilization			34.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<Future Total 2026-RIRO> PM  
 09/29/2021



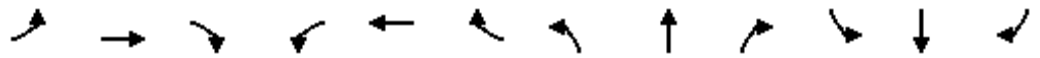
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	16	17	44	250	59
Future Volume (Veh/h)	57	16	17	44	250	59
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	17	18	48	272	64
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	408	324	346			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	324	346			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	98	99			
cM capacity (veh/h)	581	705	1203			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	79	66	336			
Volume Left	62	18	0			
Volume Right	17	0	64			
cSH	604	1203	1700			
Volume to Capacity	0.13	0.01	0.20			
Queue Length 95th (m)	3.6	0.4	0.0			
Control Delay (s)	11.9	2.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.9	2.3	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			2.3			
Intersection Capacity Utilization			30.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2031-RIRO> AM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	191	7	174	81	453	3	374	274	301	266	9
Future Volume (vph)	13	191	7	174	81	453	3	374	274	301	266	9
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1794		1656	1743	1495	1347	1792	1524	3303	1755	
Flt Permitted	0.70	1.00		0.42	1.00	1.00	0.56	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1066	1794		728	1743	1495	800	1792	1524	3303	1755	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	225	8	205	95	533	4	440	322	354	313	11
RTOR Reduction (vph)	0	2	0	0	0	328	0	0	211	0	1	0
Lane Group Flow (vph)	15	231	0	205	95	205	4	440	111	354	323	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	14.4	14.4		24.5	24.5	24.5	26.8	26.8	26.8	12.1	41.9	
Effective Green, g (s)	15.4	15.4		25.5	25.5	25.5	27.8	27.8	27.8	13.1	42.9	
Actuated g/C Ratio	0.19	0.19		0.31	0.31	0.31	0.34	0.34	0.34	0.16	0.53	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	202	341		321	548	470	274	615	523	534	929	
v/s Ratio Prot		c0.13		c0.06	0.05			c0.25		c0.11	0.18	
v/s Ratio Perm	0.01			0.14		0.14	0.00		0.07			
v/c Ratio	0.07	0.68		0.64	0.17	0.44	0.01	0.72	0.21	0.66	0.35	
Uniform Delay, d1	26.9	30.5		21.9	20.1	22.0	17.6	23.2	18.8	31.9	11.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	5.3		4.1	0.2	0.7	0.0	4.2	0.3	3.1	0.3	
Delay (s)	27.1	35.8		26.1	20.3	22.7	17.6	27.4	19.1	35.0	11.3	
Level of Service	C	D		C	C	C	B	C	B	C	B	
Approach Delay (s)		35.3			23.3			23.9			23.7	
Approach LOS		D			C			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			24.7		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			81.0		Sum of lost time (s)					16.6		
Intersection Capacity Utilization			72.6%		ICU Level of Service					C		
Analysis Period (min)			15									
c	Critical Lane Group											

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2031-RIRO> AM  
09/29/2021

























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	646	152	163	492	31	31	2	50	58	6	37
Future Volume (vph)	20	646	152	163	492	31	31	2	50	58	6	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1173		1770	1621	
Flt Permitted	0.47	1.00	1.00	0.20	1.00	1.00	0.73	1.00		0.72	1.00	
Satd. Flow (perm)	876	1810	1188	271	1759	1583	1002	1173		1343	1621	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	687	162	173	523	33	33	2	53	62	6	39
RTOR Reduction (vph)	0	0	81	0	0	10	0	45	0	0	33	0
Lane Group Flow (vph)	21	687	81	173	523	23	33	10	0	62	12	0
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	37.4	37.4	37.4	52.4	52.4	52.4	10.4	10.4		10.4	10.4	
Effective Green, g (s)	38.4	38.4	38.4	53.4	53.4	53.4	11.4	11.4		11.4	11.4	
Actuated g/C Ratio	0.50	0.50	0.50	0.70	0.70	0.70	0.15	0.15		0.15	0.15	
Clearance Time (s)	6.8	6.8	6.8	4.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	440	909	597	346	1229	1106	149	175		200	241	
v/s Ratio Prot		c0.38		c0.08	0.30			0.01				0.01
v/s Ratio Perm	0.02		0.07	0.27		0.01	0.03			c0.05		
v/c Ratio	0.05	0.76	0.14	0.50	0.43	0.02	0.22	0.06		0.31	0.05	
Uniform Delay, d1	9.7	15.2	10.1	8.1	4.9	3.5	28.6	27.9		29.0	27.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	3.6	0.1	1.1	0.2	0.0	0.8	0.1		0.9	0.1	
Delay (s)	9.7	18.9	10.3	9.3	5.2	3.5	29.3	28.0		29.9	27.9	
Level of Service	A	B	B	A	A	A	C	C		C	C	
Approach Delay (s)		17.0			6.1			28.5			29.1	
Approach LOS		B			A			C			C	

Intersection Summary

HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	14.6
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2031-RIRO> AM  
09/29/2021
























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	137	556	122	50	526	236	116	9	97	169	23	106
Future Volume (vph)	137	556	122	50	526	236	116	9	97	169	23	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1603		1734	1587	
Flt Permitted	0.35	1.00	1.00	0.41	1.00	1.00	0.66	1.00		0.68	1.00	
Satd. Flow (perm)	667	3343	1455	788	3406	1553	971	1603		1242	1587	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	154	625	137	56	591	265	130	10	109	190	26	119
RTOR Reduction (vph)	0	0	77	0	0	166	0	80	0	0	88	0
Lane Group Flow (vph)	154	625	60	56	591	99	130	39	0	190	57	0
Confl. Peds. (#/hr)									3	3		
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.9	26.8	26.8	26.7	22.6	22.6	15.5	15.5		15.5	15.5	
Effective Green, g (s)	34.9	27.8	27.8	28.7	23.6	23.6	16.5	16.5		16.5	16.5	
Actuated g/C Ratio	0.55	0.44	0.44	0.46	0.37	0.37	0.26	0.26		0.26	0.26	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	534	1475	642	441	1275	581	254	419		325	415	
v/s Ratio Prot	c0.04	c0.19		0.01	0.17			0.02			0.04	
v/s Ratio Perm	0.12		0.04	0.05		0.06	0.13			c0.15		
v/c Ratio	0.29	0.42	0.09	0.13	0.46	0.17	0.51	0.09		0.58	0.14	
Uniform Delay, d1	7.1	12.1	10.3	9.6	14.9	13.2	19.8	17.6		20.3	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.1	0.1	0.3	0.2	1.7	0.1		2.7	0.2	
Delay (s)	7.4	12.3	10.3	9.8	15.2	13.3	21.6	17.7		22.9	18.0	
Level of Service	A	B	B	A	B	B	C	B		C	B	
Approach Delay (s)		11.2			14.3			19.7			20.8	
Approach LOS		B			B			B			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			14.6		HCM 2000 Level of Service						B	
HCM 2000 Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			63.0		Sum of lost time (s)						13.6	
Intersection Capacity Utilization			62.9%		ICU Level of Service						B	
Analysis Period (min)			15									

c Critical Lane Group



HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2031-RIRO> AM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	309	382	74	91	520	254	29	50	31	108	90	258	
Future Volume (vph)	309	382	74	91	520	254	29	50	31	108	90	258	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1735	3275		1805	3374	1563	1805	1759	1594	1734	1845	1553	
Flt Permitted	0.39	1.00		0.46	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00	
Satd. Flow (perm)	705	3275		870	3374	1563	1312	1759	1594	1314	1845	1553	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	355	439	85	105	598	292	33	57	36	124	103	297	
RTOR Reduction (vph)	0	13	0	0	0	145	0	0	29	0	0	240	
Lane Group Flow (vph)	355	511	0	105	598	147	33	57	7	124	103	57	
Confl. Peds. (#/hr)	1					1			1	1			
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.7	12.7	12.7	12.7	12.7	12.7	
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.7	13.7	13.7	13.7	13.7	13.7	
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19	
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	566	2099		436	1694	784	249	335	303	250	351	295	
v/s Ratio Prot	c0.07	0.16			c0.18			0.03			0.06		
v/s Ratio Perm	0.33			0.12		0.09	0.03		0.00	c0.09		0.04	
v/c Ratio	0.63	0.24		0.24	0.35	0.19	0.13	0.17	0.02	0.50	0.29	0.19	
Uniform Delay, d1	6.0	5.5		10.1	10.8	9.8	24.2	24.3	23.7	26.0	25.0	24.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.2	0.1		0.5	0.2	0.2	0.2	0.2	0.0	1.5	0.5	0.3	
Delay (s)	8.2	5.6		10.6	11.1	10.0	24.4	24.6	23.7	27.6	25.4	24.8	
Level of Service	A	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		6.6			10.7			24.3			25.6		
Approach LOS		A			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.0		HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio			0.42										
Actuated Cycle Length (s)			71.9		Sum of lost time (s)					14.1			
Intersection Capacity Utilization			73.6%		ICU Level of Service					D			
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<Future Total 2031-RIRO> AM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↓	↘
Traffic Volume (veh/h)	0	145	0	63	80	221
Future Volume (Veh/h)	0	145	0	63	80	221
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	158	0	68	87	240
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						100
pX, platoon unblocked						
vC, conflicting volume	275	207	327			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	275	207	327			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	100			
cM capacity (veh/h)	715	833	1233			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	158	68	327			
Volume Left	0	0	0			
Volume Right	158	0	240			
cSH	833	1700	1700			
Volume to Capacity	0.19	0.04	0.19			
Queue Length 95th (m)	5.6	0.0	0.0			
Control Delay (s)	10.3	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.3	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.0			
Intersection Capacity Utilization			33.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
18: Beamish Road & Prospect Boulevard

<Future Total 2031-RIRO> AM  
09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	12	25	6	156	25
Future Volume (Veh/h)	6	12	25	6	156	25
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	13	27	7	170	27
Pedestrians	10		10		10	
Lane Width (m)	3.6		3.6		3.6	
Walking Speed (m/s)	1.2		1.2		1.2	
Percent Blockage	1		1		1	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)	225					
pX, platoon unblocked						
vC, conflicting volume	418	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	418	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	98	99			89	
cM capacity (veh/h)	388	1001			1551	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	20	34	197			
Volume Left	7	0	170			
Volume Right	13	7	0			
cSH	644	1700	1551			
Volume to Capacity	0.03	0.02	0.11			
Queue Length 95th (m)	0.8	0.0	2.9			
Control Delay (s)	10.8	0.0	6.7			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	6.7			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			6.1			
Intersection Capacity Utilization			29.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
20: Beamish Road & Phase 1 driveway

<Future Total 2031-RIRO> AM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	8	12	25	173	35
Future Volume (Veh/h)	25	8	12	25	173	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	9	13	27	188	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	280	227	236			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	280	227	236			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	99			
cM capacity (veh/h)	691	799	1320			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	36	40	226			
Volume Left	27	13	0			
Volume Right	9	0	38			
cSH	715	1320	1700			
Volume to Capacity	0.05	0.01	0.13			
Queue Length 95th (m)	1.3	0.2	0.0			
Control Delay (s)	10.3	2.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.3	2.6	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			24.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2031-RIRO> PM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	157	3	283	220	649	4	344	277	702	432	24
Future Volume (vph)	13	157	3	283	220	649	4	344	277	702	432	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	3.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	3367	1825	
Flt Permitted	0.62	1.00		0.51	1.00	1.00	0.49	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	943	1710		915	1845	1553	934	1827	1482	3367	1825	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	164	3	295	229	676	4	358	289	731	450	25
RTOR Reduction (vph)	0	1	0	0	0	445	0	0	205	0	2	0
Lane Group Flow (vph)	14	166	0	295	229	231	4	358	84	731	473	0
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	11.4	11.4		22.4	22.4	22.4	23.6	23.6	23.6	20.4	48.0	
Effective Green, g (s)	12.4	12.4		23.4	23.4	23.4	24.6	24.6	24.6	21.4	49.0	
Actuated g/C Ratio	0.15	0.15		0.28	0.28	0.28	0.29	0.29	0.29	0.25	0.58	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	4.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	137	249		337	507	427	270	528	428	847	1052	
v/s Ratio Prot		c0.10		c0.09	0.12			c0.20		c0.22	0.26	
v/s Ratio Perm	0.01			0.15		0.15	0.00		0.06			
v/c Ratio	0.10	0.67		0.88	0.45	0.54	0.01	0.68	0.20	0.86	0.45	
Uniform Delay, d1	31.5	34.3		28.2	25.5	26.2	21.6	26.7	22.7	30.4	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	6.6		21.5	0.6	1.4	0.0	3.8	0.3	9.1	0.4	
Delay (s)	31.8	41.0		49.7	26.1	27.6	21.6	30.5	23.1	39.5	10.7	
Level of Service	C	D		D	C	C	C	C	C	D	B	
Approach Delay (s)		40.2			32.8			27.1			28.1	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	17.6
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2031-RIRO> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	795	170	227	976	103	61	7	86	77	5	51
Future Volume (vph)	62	795	170	227	976	103	61	7	86	77	5	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.93	1.00	1.00	0.93	1.00	0.96		1.00	0.94	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	0.95	1.00		0.97	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1753	1792	1121	1517	1827	1473	1399	1305		1723	1505	
Flt Permitted	0.25	1.00	1.00	0.14	1.00	1.00	0.72	1.00		0.69	1.00	
Satd. Flow (perm)	459	1792	1121	226	1827	1473	1059	1305		1260	1505	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	64	820	175	234	1006	106	63	7	89	79	5	53
RTOR Reduction (vph)	0	0	76	0	0	22	0	76	0	0	45	0
Lane Group Flow (vph)	64	820	99	234	1006	84	63	20	0	79	13	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	48.4	48.4	48.4	65.4	65.4	65.4	12.0	12.0		12.0	12.0	
Effective Green, g (s)	49.4	49.4	49.4	66.4	66.4	66.4	13.0	13.0		13.0	13.0	
Actuated g/C Ratio	0.54	0.54	0.54	0.73	0.73	0.73	0.14	0.14		0.14	0.14	
Clearance Time (s)	6.8	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	249	972	608	377	1333	1074	151	186		180	215	
v/s Ratio Prot		c0.46		0.10	c0.55			0.02				0.01
v/s Ratio Perm	0.14		0.09	0.35		0.06	0.06			c0.06		
v/c Ratio	0.26	0.84	0.16	0.62	0.75	0.08	0.42	0.11		0.44	0.06	
Uniform Delay, d1	11.1	17.5	10.4	13.5	7.4	3.5	35.5	33.9		35.7	33.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	6.8	0.1	3.2	2.5	0.0	1.9	0.3		1.7	0.1	
Delay (s)	11.6	24.3	10.6	16.6	9.9	3.6	37.4	34.2		37.4	33.8	
Level of Service	B	C	B	B	A	A	D	C		D	C	
Approach Delay (s)		21.3			10.6			35.5			35.9	
Approach LOS		C			B			D			D	

Intersection Summary

HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	91.0	Sum of lost time (s)	13.6
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2031-RIRO> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↗		↘	↗	
Traffic Volume (vph)	176	737	102	106	916	299	232	31	282	290	38	214
Future Volume (vph)	176	737	102	106	916	299	232	31	282	290	38	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1608		1785	1623	
Flt Permitted	0.15	1.00	1.00	0.29	1.00	1.00	0.54	1.00		0.47	1.00	
Satd. Flow (perm)	277	3312	1550	556	3471	1532	1014	1608		882	1623	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	178	744	103	107	925	302	234	31	285	293	38	216
RTOR Reduction (vph)	0	0	63	0	0	196	0	166	0	0	134	0
Lane Group Flow (vph)	178	744	40	107	925	106	234	150	0	293	120	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	42.2	33.1	33.1	36.4	30.2	30.2	32.8	32.8		32.8	32.8	
Effective Green, g (s)	43.3	34.1	34.1	38.4	31.2	31.2	33.8	33.8		33.8	33.8	
Actuated g/C Ratio	0.49	0.38	0.38	0.43	0.35	0.35	0.38	0.38		0.38	0.38	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	309	1273	595	342	1220	538	386	612		336	618	
v/s Ratio Prot	c0.07	0.22		0.03	c0.27			0.09			0.07	
v/s Ratio Perm	0.22		0.03	0.11		0.07	0.23			c0.33		
v/c Ratio	0.58	0.58	0.07	0.31	0.76	0.20	0.61	0.24		0.87	0.19	
Uniform Delay, d1	15.4	21.7	17.2	15.4	25.4	20.0	22.1	18.7		25.4	18.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	0.8	0.1	0.5	2.9	0.2	2.7	0.2		21.1	0.2	
Delay (s)	18.0	22.4	17.3	16.0	28.3	20.2	24.8	18.9		46.6	18.5	
Level of Service	B	C	B	B	C	C	C	B		D	B	
Approach Delay (s)		21.1			25.5			21.4			33.5	
Approach LOS		C			C			C			C	

Intersection Summary

HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	88.7	Sum of lost time (s)	13.6
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2031-RIRO> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	447	770	38	48	716	197	108	139	55	244	68	496
Future Volume (vph)	447	770	38	48	716	197	108	139	55	244	68	496
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3360		1805	3438	1583	1805	1881	1615	1752	1900	1599
Flt Permitted	0.27	1.00		0.34	1.00	1.00	0.71	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	500	3360		637	3438	1583	1350	1881	1615	1226	1900	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	466	802	40	50	746	205	112	145	57	254	71	517
RTOR Reduction (vph)	0	3	0	0	0	123	0	0	42	0	0	265
Lane Group Flow (vph)	466	839	0	50	746	82	113	145	15	254	71	252
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2			6			8				4
Permitted Phases	2			6		6	8		8	4		4
Actuated Green, G (s)	53.0	53.0		35.3	35.3	35.3	23.6	23.6	23.6	23.6	23.6	23.6
Effective Green, g (s)	54.0	54.0		36.3	36.3	36.3	24.6	24.6	24.6	24.6	24.6	24.6
Actuated g/C Ratio	0.60	0.60		0.40	0.40	0.40	0.27	0.27	0.27	0.27	0.27	0.27
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	509	2000		254	1375	633	366	510	438	332	515	433
v/s Ratio Prot	c0.15	0.25			c0.22			0.08			0.04	
v/s Ratio Perm	0.39			0.08		0.05	0.08		0.01	c0.21		0.16
v/c Ratio	0.92	0.42		0.20	0.54	0.13	0.31	0.28	0.04	0.77	0.14	0.58
Uniform Delay, d1	12.0	9.9		17.7	20.8	17.2	26.3	26.1	24.3	30.4	25.0	28.6
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.1	0.2		0.7	0.7	0.2	0.5	0.3	0.0	10.1	0.1	2.0
Delay (s)	33.1	10.1		18.4	21.5	17.4	26.8	26.4	24.4	40.5	25.1	30.6
Level of Service	C	B		B	C	B	C	C	C	D	C	C
Approach Delay (s)		18.3			20.5			26.2			33.1	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.7	Sum of lost time (s)	14.7
Intersection Capacity Utilization	94.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<Future Total 2031-RIRO> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↓	↘
Traffic Volume (veh/h)	0	223	0	125	113	268
Future Volume (Veh/h)	0	223	0	125	113	268
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	242	0	136	123	291
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						100
pX, platoon unblocked						
vC, conflicting volume	404	268	414			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	404	268	414			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	69	100			
cM capacity (veh/h)	602	770	1145			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	242	136	414			
Volume Left	0	0	0			
Volume Right	242	0	291			
cSH	770	1700	1700			
Volume to Capacity	0.31	0.08	0.24			
Queue Length 95th (m)	10.8	0.0	0.0			
Control Delay (s)	11.8	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.8	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.6			
Intersection Capacity Utilization			42.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
 17: Beamish Road & Prospect Boulevard

<Future Total 2031-RIRO> PM  
 09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	22	39	10	241	25
Future Volume (Veh/h)	6	22	39	10	241	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	24	42	11	262	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						224
pX, platoon unblocked						
vC, conflicting volume	618	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	618	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	98	98			83	
cM capacity (veh/h)	299	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	31	53	289			
Volume Left	7	0	262			
Volume Right	24	11	0			
cSH	647	1700	1527			
Volume to Capacity	0.05	0.03	0.17			
Queue Length 95th (m)	1.2	0.0	5.0			
Control Delay (s)	10.8	0.0	7.2			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	7.2			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			6.5			
Intersection Capacity Utilization			34.2%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
20: Beamish Road & Phase 1 driveway

<Future Total 2031-RIRO> PM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	16	17	44	250	59
Future Volume (Veh/h)	57	16	17	44	250	59
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	17	18	48	272	64
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	408	324	346			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	324	346			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	98	99			
cM capacity (veh/h)	581	705	1203			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	79	66	336			
Volume Left	62	18	0			
Volume Right	17	0	64			
cSH	604	1203	1700			
Volume to Capacity	0.13	0.01	0.20			
Queue Length 95th (m)	3.6	0.4	0.0			
Control Delay (s)	11.9	2.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.9	2.3	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			2.3			
Intersection Capacity Utilization			30.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2036-RIRO> AM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	191	7	188	81	481	3	398	290	315	283	9
Future Volume (vph)	13	191	7	188	81	481	3	398	290	315	283	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1456	1794		1656	1743	1495	1347	1792	1524	3303	1755	
Flt Permitted	0.70	1.00		0.40	1.00	1.00	0.55	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1066	1794		703	1743	1495	786	1792	1524	3303	1755	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	15	225	8	221	95	566	4	468	341	371	333	11
RTOR Reduction (vph)	0	2	0	0	0	316	0	0	223	0	1	0
Lane Group Flow (vph)	15	231	0	221	95	250	4	468	118	371	343	0
Heavy Vehicles (%)	24%	5%	15%	9%	9%	8%	34%	6%	6%	6%	8%	0%
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA	
Protected Phases		4		3	8			2		1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	14.1	14.1		25.2	25.2	25.2	27.6	27.6	27.6	12.3	42.9	
Effective Green, g (s)	15.1	15.1		26.2	26.2	26.2	28.6	28.6	28.6	13.3	43.9	
Actuated g/C Ratio	0.18	0.18		0.32	0.32	0.32	0.35	0.35	0.35	0.16	0.53	
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	194	327		327	552	473	271	619	527	531	931	
v/s Ratio Prot		c0.13		c0.07	0.05			c0.26		c0.11	0.20	
v/s Ratio Perm	0.01			0.14		0.17	0.01		0.08			
v/c Ratio	0.08	0.71		0.68	0.17	0.53	0.01	0.76	0.22	0.70	0.37	
Uniform Delay, d1	28.0	31.7		22.5	20.4	23.2	17.8	24.0	19.2	32.8	11.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	6.8		5.4	0.1	1.1	0.0	5.6	0.3	4.0	0.3	
Delay (s)	28.2	38.6		28.0	20.6	24.3	17.8	29.5	19.5	36.8	11.6	
Level of Service	C	D		C	C	C	B	C	B	D	B	
Approach Delay (s)		37.9			24.8			25.3			24.7	
Approach LOS		D			C			C			C	

Intersection Summary

HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	82.7	Sum of lost time (s)	16.6
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2036-RIRO> AM  
09/29/2021






























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	676	152	163	534	31	31	2	50	58	6	37
Future Volume (vph)	20	676	152	163	534	31	31	2	50	58	6	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.5	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1810	1188	1271	1759	1583	1308	1173		1770	1621	
Flt Permitted	0.45	1.00	1.00	0.15	1.00	1.00	0.73	1.00		0.72	1.00	
Satd. Flow (perm)	840	1810	1188	201	1759	1583	1002	1173		1343	1621	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	21	719	162	173	568	33	33	2	53	62	6	39
RTOR Reduction (vph)	0	0	82	0	0	10	0	45	0	0	33	0
Lane Group Flow (vph)	21	719	80	173	568	23	33	10	0	62	12	0
Heavy Vehicles (%)	2%	5%	36%	42%	8%	2%	38%	2%	40%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	33.5	33.5	33.5	49.2	49.2	49.2	10.4	10.4		10.4	10.4	
Effective Green, g (s)	34.5	34.5	34.5	50.2	50.2	50.2	11.4	11.4		11.4	11.4	
Actuated g/C Ratio	0.47	0.47	0.47	0.69	0.69	0.69	0.16	0.16		0.16	0.16	
Clearance Time (s)	6.8	6.8	6.8	4.5	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	395	853	559	316	1206	1085	156	182		209	252	
v/s Ratio Prot		c0.40		c0.09	0.32			0.01				0.01
v/s Ratio Perm	0.03		0.07	0.28		0.01	0.03			c0.05		
v/c Ratio	0.05	0.84	0.14	0.55	0.47	0.02	0.21	0.06		0.30	0.05	
Uniform Delay, d1	10.5	17.0	11.0	9.8	5.3	3.7	27.0	26.3		27.4	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	7.6	0.1	1.9	0.3	0.0	0.7	0.1		0.8	0.1	
Delay (s)	10.5	24.6	11.1	11.7	5.6	3.7	27.7	26.4		28.1	26.4	
Level of Service	B	C	B	B	A	A	C	C		C	C	
Approach Delay (s)		21.8			6.9			26.9			27.4	
Approach LOS		C			A			C			C	

Intersection Summary

HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	15.1
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12
























<Future Total 2036-RIRO> AM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 					
Traffic Volume (vph)	137	586	122	50	568	236	116	9	97	169	23	106	
Future Volume (vph)	137	586	122	50	568	236	116	9	97	169	23	106	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00		
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99		1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.88		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1787	3343	1455	1805	3406	1553	1388	1603		1734	1587		
Flt Permitted	0.33	1.00	1.00	0.40	1.00	1.00	0.66	1.00		0.68	1.00		
Satd. Flow (perm)	614	3343	1455	763	3406	1553	971	1603		1242	1587		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	
Adj. Flow (vph)	154	658	137	56	638	265	130	10	109	190	26	119	
RTOR Reduction (vph)	0	0	76	0	0	165	0	80	0	0	88	0	
Lane Group Flow (vph)	154	658	61	56	638	100	130	39	0	190	57	0	
Confl. Peds. (#/hr)									3	3			
Heavy Vehicles (%)	1%	8%	11%	0%	6%	4%	30%	12%	0%	4%	5%	5%	
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA		
Protected Phases	5	2		1	6			8			4		
Permitted Phases	2		2	6		6	8			4			
Actuated Green, G (s)	34.5	27.5	27.5	27.1	23.1	23.1	15.7	15.7		15.7	15.7		
Effective Green, g (s)	35.5	28.5	28.5	29.1	24.1	24.1	16.7	16.7		16.7	16.7		
Actuated g/C Ratio	0.56	0.45	0.45	0.46	0.38	0.38	0.26	0.26		0.26	0.26		
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8		
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)	514	1493	649	429	1286	586	254	419		325	415		
v/s Ratio Prot	c0.04	0.20		0.01	c0.19			0.02			0.04		
v/s Ratio Perm	0.12		0.04	0.05		0.06	0.13			c0.15			
v/c Ratio	0.30	0.44	0.09	0.13	0.50	0.17	0.51	0.09		0.58	0.14		
Uniform Delay, d1	7.1	12.2	10.2	9.7	15.2	13.2	20.1	17.8		20.5	18.0		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		
Incremental Delay, d2	0.3	0.3	0.1	0.1	0.4	0.2	1.7	0.1		2.7	0.2		
Delay (s)	7.5	12.4	10.3	9.9	15.6	13.4	21.8	17.9		23.2	18.2		
Level of Service	A	B	B	A	B	B	C	B		C	B		
Approach Delay (s)		11.3			14.6			19.9			21.0		
Approach LOS		B			B			B			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			14.8									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.49										
Actuated Cycle Length (s)			63.8									Sum of lost time (s)	13.6
Intersection Capacity Utilization			62.9%									ICU Level of Service	B
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2036-RIRO> AM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	323	398	74	91	549	254	29	50	31	108	90	272	
Future Volume (vph)	323	398	74	91	549	254	29	50	31	108	90	272	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.0	6.0	6.0	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1735	3276		1805	3374	1563	1805	1759	1594	1734	1845	1553	
Flt Permitted	0.37	1.00		0.45	1.00	1.00	0.69	1.00	1.00	0.72	1.00	1.00	
Satd. Flow (perm)	672	3276		855	3374	1563	1312	1759	1594	1314	1845	1553	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	
Adj. Flow (vph)	371	457	85	105	631	292	33	57	36	124	103	313	
RTOR Reduction (vph)	0	13	0	0	0	145	0	0	29	0	0	243	
Lane Group Flow (vph)	371	529	0	105	631	147	33	57	7	124	103	70	
Confl. Peds. (#/hr)	1					1			1	1			
Heavy Vehicles (%)	4%	9%	0%	0%	7%	2%	0%	8%	0%	4%	3%	4%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	45.1	45.1		35.1	35.1	35.1	12.7	12.7	12.7	12.7	12.7	12.7	
Effective Green, g (s)	46.1	46.1		36.1	36.1	36.1	13.7	13.7	13.7	13.7	13.7	13.7	
Actuated g/C Ratio	0.64	0.64		0.50	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19	
Clearance Time (s)	3.0	7.0		7.0	7.0	7.0	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	549	2100		429	1694	784	249	335	303	250	351	295	
v/s Ratio Prot	c0.08	0.16			c0.19			0.03			0.06		
v/s Ratio Perm	0.36			0.12		0.09	0.03		0.00	c0.09		0.05	
v/c Ratio	0.68	0.25		0.24	0.37	0.19	0.13	0.17	0.02	0.50	0.29	0.24	
Uniform Delay, d1	6.1	5.5		10.2	11.0	9.8	24.2	24.3	23.7	26.0	25.0	24.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.3	0.1		0.5	0.2	0.2	0.2	0.2	0.0	1.5	0.5	0.4	
Delay (s)	9.4	5.6		10.7	11.2	10.0	24.4	24.6	23.7	27.6	25.4	25.1	
Level of Service	A	A		B	B	B	C	C	C	C	C	C	
Approach Delay (s)		7.2			10.8			24.3			25.7		
Approach LOS		A			B			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			13.3		HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio			0.44										
Actuated Cycle Length (s)			71.9		Sum of lost time (s)					14.1			
Intersection Capacity Utilization			73.6%		ICU Level of Service					D			
Analysis Period (min)			15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<Future Total 2036-RIRO> AM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↓	↘
Traffic Volume (veh/h)	0	145	0	63	80	221
Future Volume (Veh/h)	0	145	0	63	80	221
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	158	0	68	87	240
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						100
pX, platoon unblocked						
vC, conflicting volume	275	207	327			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	275	207	327			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	100			
cM capacity (veh/h)	715	833	1233			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	158	68	327			
Volume Left	0	0	0			
Volume Right	158	0	240			
cSH	833	1700	1700			
Volume to Capacity	0.19	0.04	0.19			
Queue Length 95th (m)	5.6	0.0	0.0			
Control Delay (s)	10.3	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	10.3	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.0			
Intersection Capacity Utilization			33.4%	ICU Level of Service	A	
Analysis Period (min)			15			



HCM Unsignalized Intersection Capacity Analysis  
18: Beamish Road & Prospect Boulevard

<Future Total 2036-RIRO> AM  
09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	12	25	6	156	25
Future Volume (Veh/h)	6	12	25	6	156	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	13	27	7	170	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						225
pX, platoon unblocked						
vC, conflicting volume	418	50			44	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	418	50			44	
tC, single (s)	7.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.4	3.3			2.2	
p0 queue free %	98	99			89	
cM capacity (veh/h)	388	1001			1551	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	20	34	197			
Volume Left	7	0	170			
Volume Right	13	7	0			
cSH	644	1700	1551			
Volume to Capacity	0.03	0.02	0.11			
Queue Length 95th (m)	0.8	0.0	2.9			
Control Delay (s)	10.8	0.0	6.7			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	6.7			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			6.1			
Intersection Capacity Utilization			29.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
20: Beamish Road & Phase 1 driveway

<Future Total 2036-RIRO> AM  
09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	8	12	25	173	35
Future Volume (Veh/h)	25	8	12	25	173	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	9	13	27	188	38
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						184
pX, platoon unblocked						
vC, conflicting volume	280	227	236			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	280	227	236			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	99	99			
cM capacity (veh/h)	691	799	1320			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	36	40	226			
Volume Left	27	13	0			
Volume Right	9	0	38			
cSH	715	1320	1700			
Volume to Capacity	0.05	0.01	0.13			
Queue Length 95th (m)	1.3	0.2	0.0			
Control Delay (s)	10.3	2.6	0.0			
Lane LOS	B	A				
Approach Delay (s)	10.3	2.6	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			24.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

<Future Total 2036-RIRO> PM

1: Highway 93/Penetanguishene Road & Angela Schmidt Foster Road/Highway 12

09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	13	157	3	303	220	689	4	366	292	731	460	24	
Future Volume (vph)	13	157	3	303	220	689	4	366	292	731	460	24	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	6.2	6.2		2.0	6.2	6.2	6.4	6.4	6.4	2.0	6.4		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.97	1.00		
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1456	1710		1719	1845	1553	1805	1827	1482	3367	1826		
Flt Permitted	0.62	1.00		0.51	1.00	1.00	0.48	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	943	1710		914	1845	1553	909	1827	1482	3367	1826		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	14	164	3	316	229	718	4	381	304	761	479	25	
RTOR Reduction (vph)	0	1	0	0	0	484	0	0	198	0	2	0	
Lane Group Flow (vph)	14	166	0	316	229	234	4	381	106	761	502	0	
Heavy Vehicles (%)	24%	11%	0%	5%	3%	4%	0%	4%	9%	4%	3%	9%	
Turn Type	Perm	NA		pm+pt	NA	Perm	Perm	NA	Perm	Prot	NA		
Protected Phases		4		3	8			2		1	6		
Permitted Phases	4			8		8	2		2				
Actuated Green, G (s)	11.5	11.5		22.5	22.5	22.5	22.0	22.0	22.0	23.3	48.3		
Effective Green, g (s)	12.5	12.5		23.5	23.5	23.5	23.0	23.0	23.0	24.3	49.3		
Actuated g/C Ratio	0.15	0.15		0.28	0.28	0.28	0.27	0.27	0.27	0.28	0.58		
Clearance Time (s)	7.2	7.2		3.0	7.2	7.2	7.4	7.4	7.4	3.0	7.4		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	4.0	4.0	4.0	3.0	4.0		
Lane Grp Cap (vph)	138	250		336	507	427	244	492	399	958	1054		
v/s Ratio Prot		c0.10		c0.10	0.12			c0.21		c0.23	0.27		
v/s Ratio Perm	0.01			0.16		0.15	0.00		0.07				
v/c Ratio	0.10	0.66		0.94	0.45	0.55	0.02	0.77	0.27	0.79	0.48		
Uniform Delay, d1	31.6	34.5		29.1	25.6	26.4	22.9	28.8	24.6	28.2	10.5		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	6.5		33.8	0.6	1.4	0.0	7.9	0.5	4.6	0.5		
Delay (s)	31.9	41.0		62.9	26.3	27.9	22.9	36.7	25.0	32.8	11.0		
Level of Service	C	D		E	C	C	C	D	C	C	B		
Approach Delay (s)		40.3			36.3			31.5			24.1		
Approach LOS		D			D			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			31.0		HCM 2000 Level of Service					C			
HCM 2000 Volume to Capacity ratio			0.77										
Actuated Cycle Length (s)			85.4		Sum of lost time (s)					16.6			
Intersection Capacity Utilization			86.7%		ICU Level of Service					E			
Analysis Period (min)			15										
c Critical Lane Group													

HCM Signalized Intersection Capacity Analysis  
2: Beamish Road/Hanson Road & Highway 12

<Future Total 2036-RIRO> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	839	170	227	1037	103	61	7	86	77	5	51
Future Volume (vph)	62	839	170	227	1037	103	61	7	86	77	5	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1792	1205	1517	1827	1583	1467	1357		1770	1607	
Flt Permitted	0.21	1.00	1.00	0.12	1.00	1.00	0.72	1.00		0.69	1.00	
Satd. Flow (perm)	397	1792	1205	195	1827	1583	1111	1357		1294	1607	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	64	865	175	234	1069	106	63	7	89	79	5	53
RTOR Reduction (vph)	0	0	73	0	0	21	0	77	0	0	46	0
Lane Group Flow (vph)	64	865	102	234	1069	85	63	19	0	79	12	0
Heavy Vehicles (%)	2%	6%	34%	19%	4%	2%	23%	2%	22%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2		1	6			8				4
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	51.4	51.4	51.4	68.7	68.7	68.7	12.0	12.0		12.0	12.0	
Effective Green, g (s)	52.4	52.4	52.4	69.7	69.7	69.7	13.0	13.0		13.0	13.0	
Actuated g/C Ratio	0.56	0.56	0.56	0.74	0.74	0.74	0.14	0.14		0.14	0.14	
Clearance Time (s)	6.8	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	220	995	669	358	1350	1170	153	187		178	221	
v/s Ratio Prot		c0.48		0.11	c0.59			0.01				0.01
v/s Ratio Perm	0.16		0.08	0.38		0.05	0.06			c0.06		
v/c Ratio	0.29	0.87	0.15	0.65	0.79	0.07	0.41	0.10		0.44	0.06	
Uniform Delay, d1	11.1	18.0	10.2	17.7	7.7	3.4	37.2	35.6		37.3	35.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	8.2	0.1	4.2	3.3	0.0	1.8	0.2		1.8	0.1	
Delay (s)	11.8	26.2	10.3	21.9	11.0	3.4	39.0	35.8		39.1	35.4	
Level of Service	B	C	B	C	B	A	D	D		D	D	
Approach Delay (s)		22.8			12.2			37.0			37.5	
Approach LOS		C			B			D			D	

Intersection Summary

HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	94.3	Sum of lost time (s)	13.6
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis  
5: Jones Road & Highway 12

<Future Total 2036-RIRO> PM  
09/29/2021



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↑	↗	↘	↗		↘	↗	
Traffic Volume (vph)	176	781	102	106	977	299	232	31	282	290	38	214
Future Volume (vph)	176	781	102	106	977	299	232	31	282	290	38	214
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	5.8	5.8	2.0	5.8	5.8	5.8	5.8		5.8	5.8	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3312	1550	1805	3471	1532	1770	1608		1785	1623	
Flt Permitted	0.12	1.00	1.00	0.27	1.00	1.00	0.54	1.00		0.47	1.00	
Satd. Flow (perm)	235	3312	1550	510	3471	1532	1009	1608		877	1623	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	178	789	103	107	987	302	234	31	285	293	38	216
RTOR Reduction (vph)	0	0	63	0	0	194	0	163	0	0	134	0
Lane Group Flow (vph)	178	789	40	107	987	108	234	153	0	293	120	0
Confl. Peds. (#/hr)	2		1	1		2			3	3		
Heavy Vehicles (%)	0%	9%	2%	0%	4%	3%	2%	0%	1%	1%	3%	2%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	43.2	34.1	34.1	37.4	31.2	31.2	33.0	33.0		33.0	33.0	
Effective Green, g (s)	44.3	35.1	35.1	39.4	32.2	32.2	34.0	34.0		34.0	34.0	
Actuated g/C Ratio	0.49	0.39	0.39	0.44	0.36	0.36	0.38	0.38		0.38	0.38	
Clearance Time (s)	3.0	6.8	6.8	3.0	6.8	6.8	6.8	6.8		6.8	6.8	
Vehicle Extension (s)	3.0	3.6	3.6	3.0	3.6	3.6	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	292	1293	605	327	1243	548	381	608		331	613	
v/s Ratio Prot	c0.07	0.24		0.03	c0.28			0.10			0.07	
v/s Ratio Perm	0.23		0.03	0.12		0.07	0.23			c0.33		
v/c Ratio	0.61	0.61	0.07	0.33	0.79	0.20	0.61	0.25		0.89	0.20	
Uniform Delay, d1	16.0	21.9	17.1	15.5	25.9	19.9	22.6	19.2		26.1	18.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	0.9	0.1	0.6	3.7	0.2	2.9	0.2		23.3	0.2	
Delay (s)	19.6	22.8	17.2	16.1	29.6	20.1	25.6	19.4		49.5	18.9	
Level of Service	B	C	B	B	C	C	C	B		D	B	
Approach Delay (s)		21.8			26.5			22.0			35.3	
Approach LOS		C			C			C			D	
























Intersection Summary

HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	89.9	Sum of lost time (s)	13.6
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: King Street & Highway 12

<Future Total 2036-RIRO> PM  
09/29/2021

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	463	798	38	48	751	197	108	139	55	244	68	521	
Future Volume (vph)	463	798	38	48	751	197	108	139	55	244	68	521	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	2.0	6.0		6.6	6.6	6.6	6.1	6.1	6.1	6.1	6.1	6.1	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	3361		1805	3438	1583	1805	1881	1615	1752	1900	1599	
Flt Permitted	0.25	1.00		0.33	1.00	1.00	0.71	1.00	1.00	0.66	1.00	1.00	
Satd. Flow (perm)	457	3361		619	3438	1583	1350	1881	1615	1226	1900	1599	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	482	831	40	50	782	205	112	145	57	254	71	543	
RTOR Reduction (vph)	0	3	0	0	0	125	0	0	42	0	0	272	
Lane Group Flow (vph)	482	868	0	50	782	80	113	145	15	254	71	271	
Heavy Vehicles (%)	2%	7%	0%	0%	5%	2%	0%	1%	0%	3%	0%	1%	
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	
Protected Phases	5	2			6			8				4	
Permitted Phases	2			6		6	8		8	4		4	
Actuated Green, G (s)	53.3	53.3		34.6	34.6	34.6	23.6	23.6	23.6	23.6	23.6	23.6	
Effective Green, g (s)	54.3	54.3		35.6	35.6	35.6	24.6	24.6	24.6	24.6	24.6	24.6	
Actuated g/C Ratio	0.60	0.60		0.39	0.39	0.39	0.27	0.27	0.27	0.27	0.27	0.27	
Clearance Time (s)	3.0	7.0		7.6	7.6	7.6	7.1	7.1	7.1	7.1	7.1	7.1	
Vehicle Extension (s)	3.0	4.5		4.5	4.5	4.5	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	504	2005		242	1344	619	364	508	436	331	513	432	
v/s Ratio Prot	c0.17	0.26			c0.23			0.08			0.04		
v/s Ratio Perm	0.40			0.08		0.05	0.08		0.01	c0.21		0.17	
v/c Ratio	0.96	0.43		0.21	0.58	0.13	0.31	0.29	0.04	0.77	0.14	0.63	
Uniform Delay, d1	14.0	10.0		18.3	21.8	17.8	26.4	26.3	24.5	30.6	25.2	29.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	29.0	0.3		0.7	0.9	0.2	0.5	0.3	0.0	10.2	0.1	2.8	
Delay (s)	43.1	10.2		19.1	22.7	17.9	26.9	26.6	24.5	40.8	25.3	32.0	
Level of Service	D	B		B	C	B	C	C	C	D	C	C	
Approach Delay (s)		21.9			21.6			26.3			34.0		
Approach LOS		C			C			C			C		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			25.2									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.71										
Actuated Cycle Length (s)			91.0									Sum of lost time (s)	14.7
Intersection Capacity Utilization			95.2%									ICU Level of Service	F
Analysis Period (min)			15										
c	Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
 10: Beamish Road & Phase 2 driveway

<Future Total 2036-RIRO> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↓	↘
Traffic Volume (veh/h)	0	223	0	125	113	268
Future Volume (Veh/h)	0	223	0	125	113	268
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	242	0	136	123	291
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)					100	
pX, platoon unblocked						
vC, conflicting volume	404	268	414			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	404	268	414			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	69	100			
cM capacity (veh/h)	602	770	1145			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	242	136	414			
Volume Left	0	0	0			
Volume Right	242	0	291			
cSH	770	1700	1700			
Volume to Capacity	0.31	0.08	0.24			
Queue Length 95th (m)	10.8	0.0	0.0			
Control Delay (s)	11.8	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	11.8	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			3.6			
Intersection Capacity Utilization			42.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
17: Beamish Road & Prospect Boulevard

<Future Total 2036-RIRO> PM  
09/29/2021



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	6	22	39	10	241	25
Future Volume (Veh/h)	6	22	39	10	241	25
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	24	42	11	262	27
Pedestrians	10		10			10
Lane Width (m)	3.6		3.6			3.6
Walking Speed (m/s)	1.2		1.2			1.2
Percent Blockage	1		1			1
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						224
pX, platoon unblocked						
vC, conflicting volume	618	68			63	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	618	68			63	
tC, single (s)	7.0	6.2			4.1	
tC, 2 stage (s)						
tF (s)	4.1	3.3			2.2	
p0 queue free %	98	98			83	
cM capacity (veh/h)	299	979			1527	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	31	53	289			
Volume Left	7	0	262			
Volume Right	24	11	0			
cSH	647	1700	1527			
Volume to Capacity	0.05	0.03	0.17			
Queue Length 95th (m)	1.2	0.0	5.0			
Control Delay (s)	10.8	0.0	7.2			
Lane LOS	B		A			
Approach Delay (s)	10.8	0.0	7.2			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			6.5			
Intersection Capacity Utilization		34.2%		ICU Level of Service		A
Analysis Period (min)			15			



HCM Unsignalized Intersection Capacity Analysis  
 20: Beamish Road & Phase 1 driveway

<Future Total 2036-RIRO> PM  
 09/29/2021



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	16	17	44	250	59
Future Volume (Veh/h)	57	16	17	44	250	59
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	17	18	48	272	64
Pedestrians	10			10	10	
Lane Width (m)	3.6			3.6	3.6	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						185
pX, platoon unblocked						
vC, conflicting volume	408	324	346			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	324	346			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	98	99			
cM capacity (veh/h)	581	705	1203			
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>NB 1</b>	<b>SB 1</b>			
Volume Total	79	66	336			
Volume Left	62	18	0			
Volume Right	17	0	64			
cSH	604	1203	1700			
Volume to Capacity	0.13	0.01	0.20			
Queue Length 95th (m)	3.6	0.4	0.0			
Control Delay (s)	11.9	2.3	0.0			
Lane LOS	B	A				
Approach Delay (s)	11.9	2.3	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			2.3			
Intersection Capacity Utilization			30.8%	ICU Level of Service	A	
Analysis Period (min)			15			

# APPENDIX

## J LEFT-TURN LANE WARRANT ASSESSMENTS



# Left-Turn Lane Warrant Analysis

Created by Jonathan Derek Law  
Based on MTO's Geometric Design Guidelines for Ontario Highways

Enter Values in dark grey cells

Do not edit formulas in grey cells

P Cars Heavy

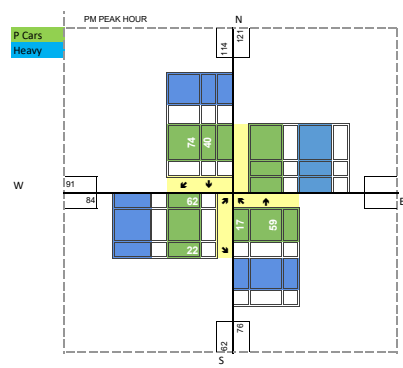
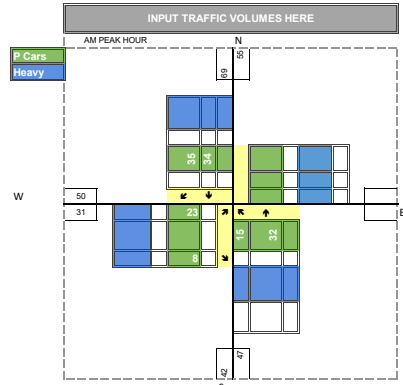
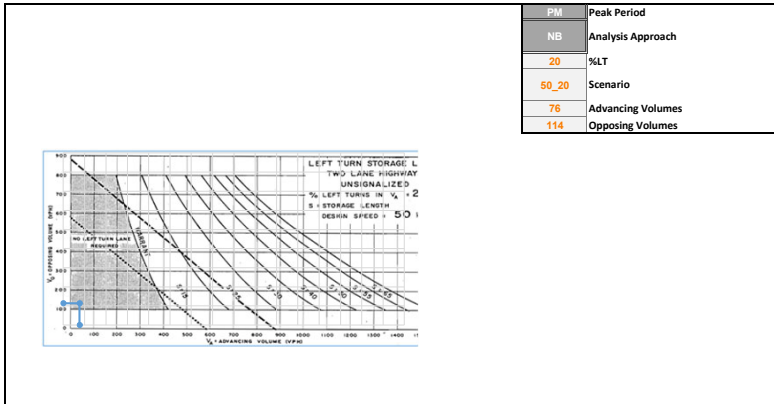
## Step # Instruction

- 1 Input peak hour traffic volumes in boxes to the right
- 2 Adjust truck equivalent if necessary
- 3 Input design speed
- 4 Select peak period
- 5 Select analysis approach
- 6 Print to PDF

Approach Direction		Northbound		Southbound		Eastbound		Westbound	
Peak Hours		AM	PM	AM	PM	AM	PM	AM	PM
Advancing Traffic	Cars	47	76	69	114	31	84	0	0
	Trucks	0	0	0	0	0	0	0	0
	Truck Equivalent	2	2	2	2	2	2	2	2
Total		47	76	69	114	31	84	0	0
Opposing Traffic	Cars	69	114	47	76	0	0	31	84
	Trucks	0	0	0	0	0	0	0	0
	Truck Equivalent	2	2	2	2	2	2	2	2
Total		69	114	47	76	0	0	31	84
Left Turning Traffic	Cars	15	17	0	0	23	62	0	0
	Trucks	0	0	0	0	0	0	0	0
	Truck Equivalent	2	2	2	2	2	2	2	2
Total		15	17	0	0	23	62	0	0
Left Turn Warrant		Design speed = 50							
(Va) Advancing Traffic =		47	76	69	114	31	84	0	0
(Vo) Opposing Traffic =		69	114	47	76	0	0	31	84
LT Traffic =		15	17	0	0	23	62	0	0
%LT Traffic =		32%	22%	0%	0%	74%	74%	#DIV/0!	#DIV/0!
Rounded to nearest 5%		6.0%	4.0%	0.0%	0.0%	15.0%	15.0%	#DIV/0!	#DIV/0!
% Trucks in LT Traffic		0%	0%	#DIV/0!	#DIV/0!	0%	0%	#DIV/0!	#DIV/0!

Note: # of trucks will change along with background growth

PM	Peak Period
NB	Analysis Approach
20	%LT
50_20	Scenario
76	Advancing Volumes
114	Opposing Volumes



Design Spe % LT's		
50	5%	15
60	10%	25
70	15%	30
80	20%	40
90	25%	50
100	30%	55
110	35%	65
40%		70
		80
		90
		95

Scenario	%LT	Vadv	Vopp
NB_AM	3000%	47	69
NB_PM	2000%	76	114
SB_AM	0%	69	47
SB_PM	0%	114	76
EB_AM	4000%	31	0
EB_PM	4000%	84	0
WB_AM	#DIV/0!	0	31
WB_PM	#DIV/0!	0	84

0	114
76	114
76	0

# Left-Turn Lane Warrant Analysis

Enter Values in dark grey cells

Do not edit formulas in grey cells

P Cars Heavy

## Step # Instruction

- 1 Input peak hour traffic volumes in boxes to the right
- 2 Adjust truck equivalent if necessary
- 3 Input design speed
- 4 Select peak period
- 5 Select analysis approach
- 6 Print to PDF

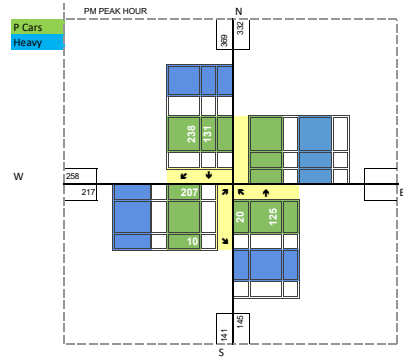
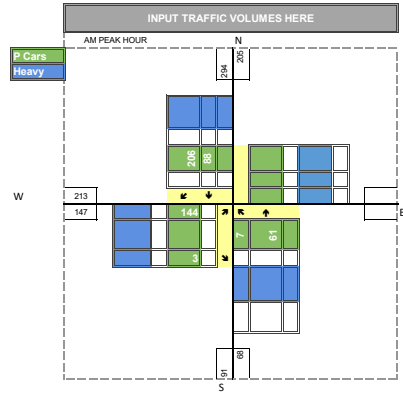
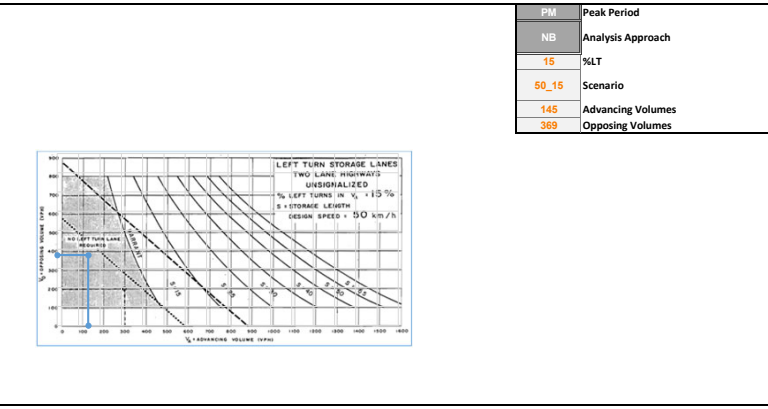
Approach Direction		Northbound		Southbound		Eastbound		Westbound	
Peak Hours		AM	PM	AM	PM	AM	PM	AM	PM
Advancing Traffic	Cars	68	145	294	369	147	217	0	0
	Trucks	0	0	0	0	0	0	0	0
	Truck Equivalent	2	2	2	2	2	2	2	2
Total		68	145	294	369	147	217	0	0
Opposing Traffic	Cars	294	369	68	145	0	0	147	217
	Trucks	0	0	0	0	0	0	0	0
	Truck Equivalent	2	2	2	2	2	2	2	2
Total		294	369	68	145	0	0	147	217
Left Turning Traffic	Cars	7	20	0	0	144	207	0	0
	Trucks	0	0	0	0	0	0	0	0
	Truck Equivalent	2	2	2	2	2	2	2	2
Total		7	20	0	0	144	207	0	0

Left Turn Warrant	Design speed =	50							
(Va) Advancing Traffic =		68	145	294	369	147	217	0	0
(Vo) Opposing Traffic =		294	369	68	145	0	0	147	217
	LT Traffic =	7	20	0	0	144	207	0	0
	%LT Traffic =	10%	14%	0%	0%	98%	95%	#DIV/0!	#DIV/0!
	Rounded to nearest 5%	2.0%	3.0%	0.0%	0.0%	20.0%	19.0%	#DIV/0!	#DIV/0!
	% Trucks in LT Traffic	0%	0%	#DIV/0!	#DIV/0!	0%	0%	#DIV/0!	#DIV/0!

Note: # of trucks will change along with background growth

Note: Minimum LT% = 5%, Maximum LT% = 40%

PM	Peak Period
NB	Analysis Approach
15	%LT
60_15	Scenario
145	Advancing Volumes
369	Opposing Volumes



Design Spe % LT's		
50	5%	15
60	10%	25
70	15%	30
80	20%	40
90	25%	50
100	30%	55
110	35%	65
120	40%	70
130		80
140		90
150		95

Analysis Ap Peak Period		
NB	AM	
SB	PM	
EB		
WB		

Scenario	%LT	Vadv	Vopp
NB_AM	1000%	68	294
NB_PM	1500%	145	369
SB_AM	0%	294	68
SB_PM	0%	369	145
EB_AM	4000%	147	0
EB_PM	4000%	217	0
WB_AM	#DIV/0!	0	147
WB_PM	#DIV/0!	0	217

0	369
145	369
145	0