

17 April 2020  
Project: 190327

Ashley Mason  
Mason Homes Limited  
70 Innovator Avenue  
Unit #1  
Stouffville, ON L4A 0Y2

Dear Ms. Mason:

**RE: TRANSPORTATION IMPACT STUDY ADDENDUM, PENRYN MASON HOMES –  
PORT HOPE RESIDENTIAL DEVELOPMENT – PHASES 4, 5/9, GOLF COURSE,  
AND COUNTRY INN**

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The original Transportation Impact Study for the subject subdivision phases was completed in July 2017 (July 2017 TIS). This was followed by an Addendum dated 12 August 2019 (August 2019 Addendum) that addressed relatively minor changes in the unit count for the Phases 4 and 5/9 lands and included updated traffic forecasts for the 2022 horizon year that reflected the new unit counts and full build-out. The purpose of the current Addendum is to address the following comments on the subject residential development application (Official Plan Amendment; Zoning By-law Amendment; Draft Plan of Subdivision) that were made by the Municipality of Port Hope's Works and Engineering Department (WED):

- ▶ *“Street A is a local residential road that will also provide access to the Golf Course site. Opportunities to reconfigure Lots 169, 170 and 171 to eliminate entrances directly to Street A should be examined. The TIS should comment on the impact of redirecting all golf course traffic currently accessing from Victoria Street south onto a local residential street.”*

## Context

**Figure 1** (attached) shows the site plan for the Phase 4 and 5/9 lands and highlights the proposed section of Street A that would be used to provide access to the Port Hope Golf and Country Club site via the future Strachan Street/Street A intersection. This route would replace the current access to the golf course that is provided by a private driveway connecting to the existing stub end of Strachan Street west of Victoria Street.

The site plan shows that three single family home lots would have frontage along Street A. The first part of the WED comments pertains to these three lots and whether they should have

direct driveway access to Street A. The residential development along the east side of this same section of Street A is not of concern since vehicle access to those lots would be via a rear laneway. The second part of the WED comments pertains to the potential traffic impact on Street A, and its intersection with Strachan Street, of the golf course and other potential commercial development on the golf course site.

Port Hope Golf and Country Club is an existing 18-hole golf course. It is understood that at some time in the future additional commercial development may occur on these lands in the form of a “*Country Inn*”. For the purposes of this Addendum, it has been assumed that the commercial development would be a 200-room hotel.

## Methodology

In the July 2017 TIS, the traffic forecasts and analysis focused on the existing public road intersections that are external to the subject subdivision. With relatively low traffic forecasts for Strachan Street within the subdivision, forecasts and analysis were not undertaken for each internal intersection. As stated in July 2017 TIS, “... *all internal intersections would function at a very good level of service due to the relatively low peak hour volumes on the Strachan Street extension and dispersal of site traffic to six local road intersections.*”

For this Addendum, detailed weekday AM and PM peak hour traffic forecasts and operational analyses have been prepared for the Strachan Street/Street A intersection to assist in addressing the WED comments. These time periods typically represent the highest traffic volumes on a road network in an urban area. The methodology is as follows:

- ▶ The AM and PM peak hour eastbound and westbound link traffic volumes for the section of Strachan Street just west of Victoria Street were taken from the updated forecasts shown in the August 2019 Addendum;
- ▶ The number of residential units north of Strachan Street in Phase 4 and south of Strachan Street in Phases 5 and 9 was used to estimate the percentages of Strachan Street residential traffic that would originate from or be destined to these areas (i.e. 30% to/from the lands north of Strachan Street and 70% to/from the lands south of Strachan Street);
- ▶ The number and location of the local streets intersecting with Strachan Street was reviewed and it was estimated that 75% of the residential trips to/from the lands north of Strachan Street would use the north leg of Street A for access and 40% of the trips to/from the lands south of Strachan Street would use the south leg of Street A for access;
- ▶ Based on the assumptions above, turning movement volumes were estimated for the Strachan Street/Street A intersection to reflect residential traffic patterns;
- ▶ The number of AM and PM peak hour trips that would typically be generated by an 18-hole golf course and a 200-room hotel was estimated. These trips were assigned to the Strachan Street/Street A intersection assuming that they would be 100% to/from the east (i.e. originating from or destined to Victoria Street);



- ▶ The residential, golf course, and hotel trips were combined to form total traffic forecasts at the Strachan Street/Street A intersection for the AM and PM peak hours; and
- ▶ The resultant traffic forecasts were analyzed for two traffic control scenarios at the Strachan Street/Street A intersection – one with stop control on the Street A approaches and one with all-way stop control.

## Golf Course and Hotel Trip Generation

The AM and PM peak hour trip generation for the existing golf course and potential hotel was estimated based on information contained in the current edition of the Trip Generation Manual (10<sup>th</sup> Edition) published by the Institute of Transportation Engineers (ITE). **Table 1** provides a summary of the trip generation.

**TABLE 1: TRIP GENERATION**

Land Use	Units	Vehicle Trips							
		AM Peak Hour				PM Peak Hour			
		Rate/Unit	Total	In	Out	Rate/Unit	Total	In	Out
Golf Course	18-hole	1.76	32	25	7	2.91	53	28	25
Hotel	200-room	0.47	94	56	38	0.60	120	62	58
<b>Total</b>			<b>126</b>	<b>81</b>	<b>45</b>	<b>-</b>	<b>173</b>	<b>90</b>	<b>83</b>

As noted in the Methodology section, it was assumed that all inbound and outbound trips for these uses would be to/from the east (i.e. oriented to Victoria Street). Therefore, at the Strachan Street/Street A intersection, the inbound trips would add to the westbound left turn movement and the outbound trips would add to the northbound right turn movement.

## Traffic Forecasts

**Figure 2** (attached) shows the AM and PM peak hour total traffic forecasts at the Strachan Street/ Street A intersection for the same 2022 horizon year previously considered in the July 2017 TIS and August 2019 Addendum. These forecasts represent full development of the Phase 4 and 5/9 lands and the trips estimated for the existing golf course and potential hotel.

## Driveways on Street A

The resultant traffic volumes on Street A are in the order of 220 vehicles (two-way trips) in the AM peak hour and 280 vehicles (two-way trips) in the PM peak hour. These are higher than typical volume thresholds for a road with a Local classification (up to approximately 100 vehicles two-way in a peak hour) but well within the typical volume thresholds for a road with a Collector classification (up to approximately 800 vehicles two-way in a peak hour). It is not unusual for residential roads with traffic volumes similar to the forecasts to have residential frontage with driveways (e.g. Rapley Boulevard in Port Hope at approximately 200 vehicles two-way in the PM peak hour).



In consideration of the three lots along the west side of the subject section of Street A cited in the WED comments, which are from north to south numbers 171, 170, and 169, only lot 170 would require a driveway directly on Street A since it is landlocked otherwise. Lots 171 and 169 are corner properties that have longer respective frontages on Street C to the north and Street B to the south than their frontages on Street A. The orientation of the latter lots provides an opportunity for alternative driveway locations. Therefore, while reducing the number of driveways on Street A from three to one is not seen to be absolutely necessary from a traffic operations perspective, it is preferable to reduce the number of potential conflict points between private accesses and public roads where possible.

## Impact Analysis

The 2022 AM and PM peak hour total traffic forecasts for the Strachan Street/Street A intersection were analyzed using Synchro software. The analysis assumptions included:

- ▶ Single lane approaches on all four legs of the intersection;
- ▶ Synchro software default values; and
- ▶ Two operational analyses – one with stop control on Street A approaches and one with all-way stop control to represent the two most likely traffic control scenarios.

**Table 2** provides a summary of the analysis results. The highest possible level of service (LOS) rating is LOS A, which represents average total delay equal or less than 10 seconds per vehicle. When the average delay exceeds 50 seconds for unsignalized intersections, the lowest level of service is achieved (LOS F) and improvements should be considered. Capacity is evaluated in terms of demand flow to capacity with an at-capacity condition represented by a volume to capacity (v/c) ratio of 1.00 (i.e. volume demand equals capacity). The detailed Synchro software output for the analysis is attached for reference.

**TABLE 2: TOTAL TRAFFIC OPERATIONS – STRACHAN STREET/STREET A**

Approach/Movement		AM Peak Hour				PM Peak Hour			
		LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4,5</sup>	LOS <sup>1</sup>	Delay <sup>2</sup>	V/C <sup>3</sup>	Q <sup>4</sup>
<b>Stop Control on Street A Approaches</b>									
EB	Left/Through/Right	A	1	0.00	0.1	A	1	0.00	0.1
WB		A	6	0.08	2.0	A	5	0.10	2.7
NB		A	9	0.12	3.2	A	10	0.15	4.1
SB		B	13	0.10	36	C	16	0.10	2.6
<b>Stop Control on All Approaches</b>									
EB	Left/Through/Right	A	8	0.10	NC	A	8	0.07	NC
WB		A	9	0.18		A	10	0.35	
NB		A	8	0.12		A	8	0.16	
SB		A	8	0.06		A	8	0.05	
<sup>1</sup> Level-of-Service; <sup>2</sup> Average vehicle delay, seconds; <sup>3</sup> Volume-to-Capacity ratio; <sup>4</sup> 95 <sup>th</sup> percentile queue, metres; <sup>5</sup> NC - not calculated in Synchro, with LOS A minimal queuing can be anticipated									



The analysis shows that the Strachan Street/Street A intersection would operate at very good levels of service (mostly at LOS A), well within capacity (mostly less than 20% of capacity), and with minimal queuing (less than one car length on any approach) with either stop-control scenario. Stop control only on the Street A approaches would be sufficient in terms of traffic operations and would provide a more efficient operation for the higher volume Strachan Street approaches. If other considerations override operational efficiency, such as a desire to provide controlled north-south pedestrian crossings of Strachan Street at Street A, the analysis shows that all-way stop control would be satisfactory as well.

## Conclusions

The conclusions of the Addendum are as follows:

- ▶ The Strachan Street traffic forecasts for full development of Phases 4 and 5/9, the existing golf course, and the potential hotel can be characterized as relatively low traffic volumes for a Collector road;
- ▶ The traffic forecasts for the section of Street A that would provide the access route for the golf course and the potential hotel would be higher than typical volume thresholds for a road with a Local classification and lower than typical volume thresholds for a road with a Collector classification. As related to the three lots along the west side of the subject section of Street A, direct driveway access on Street A could be provided if necessary but it would also be preferable to minimize the number of conflict points if possible; and
- ▶ Traffic operations at the Strachan Street/Street A intersection for full development conditions as described would be represented by very good levels of service (low average vehicular delay), volume demands well within capacity, and minimal queuing with either stop control on only the Street A approaches or with all-way stop control. Therefore, the operational impact of having all existing golf course and potential hotel-generated traffic use Street A for access would be minimal on this intersection.

## Recommendations

The recommendation of the Addendum is as follows:

- ▶ In the design of the homes to be situated on lots 171 and 169, alternative driveway locations should be considered that would result in minimizing the number of direct driveways on Street A.



If you have any questions or comments, please contact the undersigned.

Yours truly,

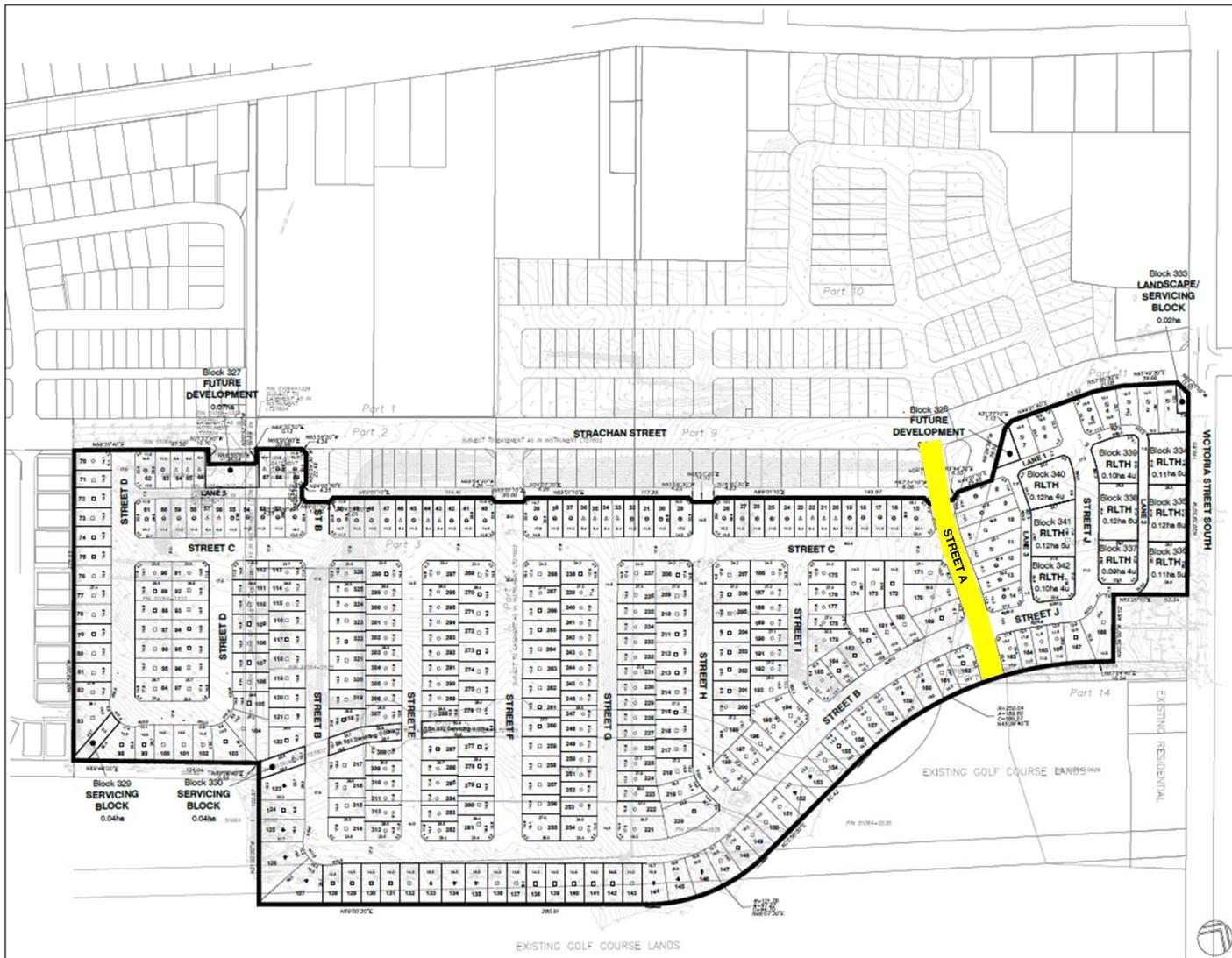
**PARADIGM TRANSPORTATION SOLUTIONS LIMITED**



**Garry Pappin**  
LEL  
Senior Project Manager

Attach.





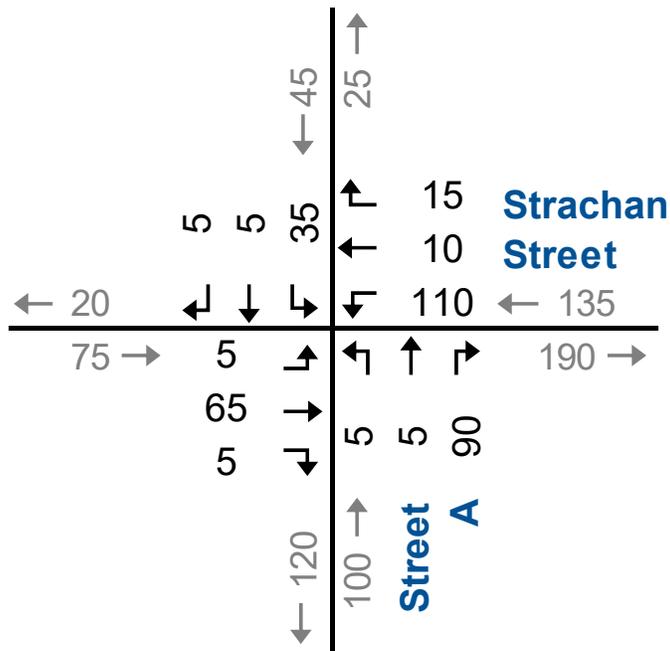
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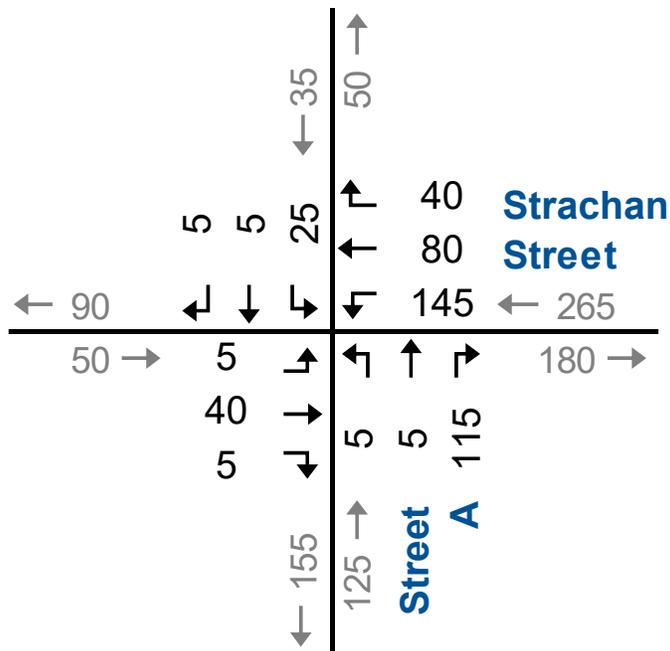
## Golf Course and Country Inn Access Route



### AM Peak Hour



### PM Peak Hour



NTS



## Total Traffic Forecasts Phases 4, 5/9, Golf Course, and Country Inn

# HCM Unsignalized Intersection Capacity Analysis

## 3: Street A & Strachan Street

AM Peak Hour Total Traffic - TWSC  
190327



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	65	5	110	10	15	5	5	90	35	5	5
Future Volume (Veh/h)	5	65	5	110	10	15	5	5	90	35	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	71	5	120	11	16	5	5	98	38	5	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	27			76			350	350	74	443	345	19
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	27			76			350	350	74	443	345	19
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			92			99	99	90	91	99	100
cM capacity (veh/h)	1587			1523			560	527	988	440	531	1059
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	81	147	108	48								
Volume Left	5	120	5	38								
Volume Right	5	16	98	5								
cSH	1587	1523	919	478								
Volume to Capacity	0.00	0.08	0.12	0.10								
Queue Length 95th (m)	0.1	2.0	3.2	2.7								
Control Delay (s)	0.5	6.3	9.4	13.4								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.5	6.3	9.4	13.4								
Approach LOS			A	B								
<b>Intersection Summary</b>												
Average Delay			6.8									
Intersection Capacity Utilization			30.0%		ICU Level of Service				A			
Analysis Period (min)			15									

# HCM Unsignalized Intersection Capacity Analysis

## 3: Street A & Strachan Street

PM Peak Hour Total Traffic - TWSC  
190327



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	5	40	5	145	80	40	5	5	115	25	5	5
Future Volume (Veh/h)	5	40	5	145	80	40	5	5	115	25	5	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	43	5	158	87	43	5	5	125	27	5	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	130			48			488	502	46	608	482	108
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	130			48			488	502	46	608	482	108
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			90			99	99	88	92	99	99
cM capacity (veh/h)	1455			1559			445	422	1024	327	433	945
<b>Direction, Lane #</b>	<b>EB 1</b>	<b>WB 1</b>	<b>NB 1</b>	<b>SB 1</b>								
Volume Total	53	288	135	37								
Volume Left	5	158	5	27								
Volume Right	5	43	125	5								
cSH	1455	1559	930	372								
Volume to Capacity	0.00	0.10	0.15	0.10								
Queue Length 95th (m)	0.1	2.7	4.1	2.6								
Control Delay (s)	0.7	4.5	9.5	15.7								
Lane LOS	A	A	A	C								
Approach Delay (s)	0.7	4.5	9.5	15.7								
Approach LOS			A	C								
<b>Intersection Summary</b>												
Average Delay			6.3									
Intersection Capacity Utilization			36.6%	ICU Level of Service		A						
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis  
3: Street A & Strachan Street

AM Peak Hour Total Traffic - AWSC  
190327

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	65	5	110	10	15	5	5	90	35	5	5
Future Volume (vph)	5	65	5	110	10	15	5	5	90	35	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	71	5	120	11	16	5	5	98	38	5	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	81	147	108	48								
Volume Left (vph)	5	120	5	38								
Volume Right (vph)	5	16	98	5								
Hadj (s)	0.01	0.13	-0.50	0.13								
Departure Headway (s)	4.4	4.5	4.0	4.7								
Degree Utilization, x	0.10	0.18	0.12	0.06								
Capacity (veh/h)	777	767	848	718								
Control Delay (s)	7.9	8.5	7.5	8.0								
Approach Delay (s)	7.9	8.5	7.5	8.0								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			8.0									
Level of Service			A									
Intersection Capacity Utilization			30.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis  
3: Street A & Strachan Street

PM Peak Hour Total Traffic - AWSC  
190327

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	40	5	145	80	40	5	5	115	25	5	5
Future Volume (vph)	5	40	5	145	80	40	5	5	115	25	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	43	5	158	87	43	5	5	125	27	5	5
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	53	288	135	37								
Volume Left (vph)	5	158	5	27								
Volume Right (vph)	5	43	125	5								
Hadj (s)	0.00	0.05	-0.51	0.10								
Departure Headway (s)	4.6	4.4	4.2	5.0								
Degree Utilization, x	0.07	0.35	0.16	0.05								
Capacity (veh/h)	735	782	788	663								
Control Delay (s)	8.0	9.8	8.0	8.2								
Approach Delay (s)	8.0	9.8	8.0	8.2								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			9.0									
Level of Service			A									
Intersection Capacity Utilization			36.6%	ICU Level of Service	A							
Analysis Period (min)			15									