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October 29, 2014  
16-14071-001

Ms. Alicia Cantwell  
Engineering and Development Services  
City Hall, 169 Front Street  
Belleville, ON K8N 2Y8

Dear Ms. Cantwell:

**Re: MMM Response to City of Belleville Comments  
Addendum Letter for Potters Creek Subdivision – Phases 3 to 5  
Northeast Quadrant of Dundas Street West and Avonlough Road  
City of Belleville**

MMM Group Limited (MMM) is pleased to provide this letter to address the comments received from the City dated October 23, 2014 regarding the MMM Traffic Impact Study and Traffic Plan, dated October 16, 2014 for the site located in the northeast quadrant of Dundas Street West and Avonlough Road in the City of Belleville. The City's transportation-related comments are listed in ***bold italics*** in the boxes and our response to each of the comments follows thereafter.

**1. Traffic Plan**

The following was requested on July 2010 to be included as part of this report, "A Traffic Plan needs to be prepared for the subdivision, to illustrate stop signs locations, auxiliary lane locations and pedestrian crossing locations. In addition, a pavement marking and sign plan must be prepared for Street 'J' to illustrate where auxiliary lanes are needed and where parking will be provided, including at the approach to Dundas Street West and along the frontage of Stream. The same type of plan may also be required for Street 'A'. Once the configuration of Street 'J' with Avonlough Road has been finalized, the pavement markings required at that location will also need to be determined. The stop sign locations are also required to help determine where sidewalks should be located, in order to take advantage of the stop control provided by the stop signs. This is addition to the Traffic Impact Study previously requested in the City comments dated March 11, 2010." The report does not provide lane configuration and design for the Dundas Street West / Sienna Avenue intersection as well as pedestrian crossing requirements and signal requirements as requested in past review comments. In Section 6.0, Traffic Plan, the report clearly states that Sienna Avenue from Dundas Street to Ridgeway, the roadway design and pavement markings have been designed by others. We would like to see the design for this section of Sienna Avenue included in this report and not done separately.

Based on the latest email received from the City dated October 23, 2014, the City agreed that the Odan/Detech Group Inc. will provide a separate drawing to satisfy the City’s needs. The correspondences are attached along with this letter for your reference.

From traffic capacity perspective, we do not have any recommendations to change the existing pedestrian crossing and signal infrastructures at Dundas/Sienna intersection. As requested by the City, the queue results for the northbound left turn (NB-L) at Property Stream Access and southbound left turn (SB-L) at Dundas/Sienna for total future 2021 traffic conditions are shown in **Table 1**. Detailed queue analysis sheets are attached along with this letter for your reference.

**TABLE 1  
 TOTAL FUTURE 2021 QUEUE RESULTS**

Movements	95 <sup>th</sup> (50 <sup>th</sup> ) Percentile Queue Length	
	Weekday A.M. Peak Hour	Weekday P.M. Peak Hour
NB-L at Stream Property Access	Less than One Vehicle	Less than One Vehicle
SB-L at Dundas/Sienna Avenue	33 m (18 m)	34 m (18 m)

*Note: The total stop-bar-to-stop-bar spacing between the two intersections above is approximately 105 m.*

Please note that the above results were based on an updated total future 2021 traffic volumes which considered the 48 “Mixed-use/Live Work” units, as per Comment 2. It is our understanding that the drawings to be prepared by Odan/Detech Group Inc. at Dundas/Sienna Ave would satisfy these minimum requirements.

**2. Trip Generation**

In section 4.1, Trip Generation, the report states that no pass-by trips were considered in the trip generation. Since Sienna Avenue will connect to Moira Street as part of Phase 5, it will replace Avonlough Road as the major north south connection between Moira Street and Dundas Street West. Therefore pass-by trips need to be considered and included.

Chapter 5 of the ITE Trip Generation Handbook indicates that “pass-by trips” are vehicles that already exist on the adjacent roadways that pass by the subject site, and whose main origin and destination relate to a purpose or land use other than those proposed for the subject site. These trips are usually related to retail-oriented developments and it often “attract a portion of their trips from traffic passing the site on the way from an origin to an ultimate destination”.

Since the commercial component in our subject site development generates very few trips, we took a conservative approach by not considering pass-by trips (i.e. worst-case scenario with more trips on the road).

In the case that the City interpreted pass-by trips as new “cut-through” traffic, our response is as follows:

Given the surrounding road network, nearby residential area distributions and our review of existing traffic data (i.e. low volumes), it is unlikely that considerable traffic from the other areas will change the existing travel patterns and use the Sienna Avenue as a shortcut to access Dundas Street during a.m. and p.m. peak period.

The 48 “Mixed-use/Live Work” units discussed in section 4.1, Trip Generation should be included in the trip generation calculations.

We have included these 48 “Mixed-use/Live Work” units as Residential Condominium/Townhouse (ITE Land Use Code 230) in our analysis. The new trip generation is discussed in following response.

Based on the number of units provided in Table 4.1, Phase 3 to 5 Developments Site-Generated Peak Hour Trips, it appears that Duplex Dwellings, Semi-Detached Dwellings and Medium Density Residential Dwellings were included in the Single-Family Detached Housing category.

In our report, Duplex Dwellings and Semi-Detached Dwellings were included in the Single-Family Detached Housing (ITE Land Use Code 210) which has the highest trip generation rates among the different residential use types. Therefore, this approach is conservative in our professional opinion. Medium Density Residential Dwellings were included in Residential Condominium/Townhouse (ITE Land Use Code 230). Again, this is considered as a reasonable assumption based on our understanding of Medium Density Residential Dwellings and our project experiences. The detailed land use assumptions are shown in **Table 2**.

**TABLE 2**  
**LAND USE ASSUMPTIONS FOR DIFFERENT TYPES OF DWELLINGS**

Phase	Type of Land Use	ITE Land Use Code (LUC #)	Assumptions	Number of Units
3	Townhomes	230	N/A	98
3	Duplex Dwellings	N/A	Single-Family Detached Housing (ITE LUC # 210)	12
3	Semi-Detached Dwellings	N/A	Single-Family Detached Housing (ITE LUC # 210)	10
3	Single Detached Lot	210	N/A	41
4	Duplex Dwellings	N/A	Single-Family Detached Housing (ITE LUC # 210)	22
4	Medium Density Residential	N/A	Residential Condo/Townhouses (ITE LUC # 230)	72
5	Townhomes	230	N/A	30
5	Semi-Detached Dwellings	N/A	Single-Family Detached Housing (ITE LUC # 210)	12
5	Single Detached Lot	210	N/A	256
5	Semi-Detached Dwellings	N/A	Single-Family Detached Housing (ITE LUC # 210)	12
5	Mixed Use/Live Work	N/A	Residential Condo/Townhouses (ITE LUC # 230)	48

As requested by the City, we included 48 Mixed Use/Live Work units into our analysis. The resultant new trip generation table is shown in **Table 3 (a revised version of Table 4.1 in the Original TIS)**.

**TABLE 3  
 PHASES 3 TO 5 DEVELOPMENTS SITE-GENERATED PEAK HOUR TRIPS**

PHASE	PROPOSED USE (ITE LAND USE CODE)	SCOPE	WEEKDAY A.M. PEAK HOUR		WEEKDAY P.M. PEAK HOUR	
			Inbound Trips	Outbound Trips	Inbound Trips	Outbound Trips
Phase 3	Residential Condo/Townhouse (230)	98 units	7	36	34	17
	Single-Family Detached Housing (210)	63 units	12	35	40	23
	<b>Site Trips</b>		<b>19</b>	<b>71</b>	<b>74</b>	<b>40</b>
Phases 4 & 5	Residential Condo/Townhouse (230)	150 units	11	55	52	26
	Single-Family Detached Housing (210)	290 units	54	163	183	107
	Shopping Centre (820)	22,604 ft <sup>2</sup>	13	8	40	44
	<b>Site Trips</b>		<b>78</b>	<b>226</b>	<b>275</b>	<b>177</b>
<b>TOTAL (Difference from the Original TIS – Table 4.1)</b>			<b>97 (+3)</b>	<b>297 (+18)</b>	<b>349 (+16)</b>	<b>217 (+8)</b>

As a result of the inclusion of the 48 mixed use/live work units, the future total 2021 traffic conditions for p.m. peak period (worst-case scenario) at critical intersections are shown in **Table 4**. Detailed intersection capacity analysis sheets are attached along with this letter for your reference. Comparing to the scenario without 48 units (as shown in **Table 5**), it can be seen that the v/c ratios have increased by 0.01 and delays increased by 2s at maximum for all the movements and overall intersection. Though the worst movement is the shared northbound left-right movement, which has a LOS 'E', it only has a delay of 37s and a v/c ratio of 0.64 which are still well within capacity.

Based on the discussions above, it is our opinion that our conclusions and findings in our report still stand.

**TABLE 4  
 INTERSECTION CAPACITY ANALYSIS  
 TOTAL FUTURE 2021 TRAFFIC CONDITIONS (PM PEAK)  
 WITH 48 MIXED USE/LIVE WORK UNITS**

Intersections	Control Type	Weekday P.M. Peak Hour	
		(LOS) Delay in Seconds	Critical Movements (v/c)
Avondale Rd & Dundas Street W	Signalized	(C) 32	EB-LTR (0.98)
Sidney Street & Moira Street W	Signalized	(D) 42	EB-L (0.91) WB-TR (0.95) NB-T (0.95) SB-L (0.89)
Sidney Street & Bridge Street W	Signalized	(C) 27	EB-L (0.87)
Sienna Avenue & Moira Street W	Unsignalized	(E) 37	NB-LR (0.64)
Marshall Rd & Moira Street W	Unsignalized	(D) 32	NB-LR

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay under HCM 2000.  
 2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with a LOS of 'E' or 'F' for an unsignalized intersection.  
 3. During p.m. peak period, eastbound defacto left turn lane is identified at the Sidney/Bridge intersection. Therefore, it is recoded with 1 through/left shared lane as a left turn lane

**TABLE 5  
 INTERSECTION CAPACITY ANALYSIS  
 TOTAL FUTURE 2021 TRAFFIC CONDITIONS (PM PEAK) - ORIGINAL**

Intersections	Control Type	Weekday P.M. Peak Hour	
		(LOS) Delay in Seconds	Critical Movements (v/c)
Avondale Rd & Dundas Street W	Signalized	(C) 31	EB-LTR (0.98)
Sidney Street & Moira Street W	Signalized	(D) 42	EB-L (0.90) WB-TR (0.95) NB-T (0.95) SB-L (0.89)
Sidney Street & Bridge Street W	Signalized	(C) 27	EB-L (0.86)
Sienna Avenue & Moira Street W	Unsignalized	(D) 35	NB-LR
Marshall Rd & Moira Street W	Unsignalized	(D) 32	NB-LR

- Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay under HCM 2000.  
 2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with a LOS of 'E' or 'F' for an unsignalized intersection.  
 3. During p.m. peak period, eastbound defacto left turn lane is identified at the Sidney/Bridge intersection. Therefore, it is recoded with 1 through/left shared lane as a left turn lane.

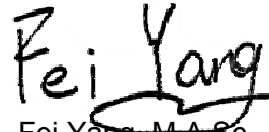
We trust that the above adequately addresses the transportation-related issues raised by the City of Belleville in their review of the proposal for the Potters Creek Subdivisions Phases 3 to 5. Please let us know if the City requires updating the report or an addendum letter is sufficient. However, should you have any questions or comments, please do not hesitate to contact us at 905-882-4211 ext. 6306 or ext. 6478.

Yours very truly,

**MMM GROUP LIMITED**



Nixon Chan, M.A.Sc., P.Eng., PTOE, PMP  
Project Manager & Associate  
Transportation Planning



Fei Yang, M.A.Sc.  
Designer  
Transportation Planning

cc:  
Adrian Bax, Potters Creek Development Inc.  
Robert Babic, The Odan/Detech Group Inc.

## Fei Yang

---

**From:** Cantwell, Alicia <acantwell@city.belleville.on.ca>  
**Sent:** October-24-14 9:01 AM  
**To:** Fei Yang  
**Subject:** RE: Potter's Creek Phase 3 - Approvals Comments - Traffic Impact Study and Traffic Plan

Hello Fei,

Yes that is what I mean.

Alicia

---

**From:** Fei Yang [mailto:YangF@mmm.ca]  
**Sent:** Friday, October 24, 2014 9:00 AM  
**To:** Cantwell, Alicia  
**Subject:** RE: Potter's Creek Phase 3 - Approvals Comments - Traffic Impact Study and Traffic Plan

Hello Alicia,

Good morning. Thanks for providing comments and we will prepare our responses accordingly. I have a question re the latest comment you sent to Robert as per below. For "the left turn lane length and the left turn lane length for traffic turning westbound into Stream off of Sienna", do you mean the northbound left turn at the Stream Property access and southbound left turn at Dundas/Sienna Avenue?

Thank you.

**Fei Yang, MASC.**

Transportation Planning Designer  
Transportation Planning

**MMM Group Limited**

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**From:** Robert Babic [mailto:rob@odandetech.com]  
**Sent:** October-23-14 3:59 PM  
**To:** Fei Yang  
**Subject:** FW: Potter's Creek Phase 3 - Approvals Comments - Traffic Impact Study and Traffic Plan

Hi Fei,

I just received this from Alicia with regards to her first comment on the TIS report...

**Robert Babic**

**The Odan/Detech Group Inc.** | Civil Consultants  
5230 South Service Rd., Unit 107 | Burlington | L7L 5K2  
T: (905) 632-3811 ext: 139 | F: (905) 632-3363 | E: [rob@odandetech.com](mailto:rob@odandetech.com)



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**From:** Cantwell, Alicia [<mailto:acantwell@city.belleville.on.ca>]  
**Sent:** Thursday, October 23, 2014 3:40 PM  
**To:** [rob@odandetech.com](mailto:rob@odandetech.com)  
**Subject:** RE: Potter's Creek Phase 3 - Approvals Comments - Traffic Impact Study and Traffic Plan

Robert,

The lane configuration can be included as a separate figure. Make sure that the report addresses the left turn lane length and the left turn lane length for traffic turning westbound into Stream off of Sienna. Also, as discussed in previous comments the pedestrian crossing at the Sienna Avenue and Dundas Street West intersection should be shown as proposed or suggest by the traffic report. The intersection drawing can be submitted separately from the report, but should take into account the requirements of the report.

Alicia

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**From:** Robert Babic [<mailto:rob@odandetech.com>]  
**Sent:** Thursday, October 23, 2014 3:26 PM  
**To:** Cantwell, Alicia  
**Subject:** RE: Potter's Creek Phase 3 - Approvals Comments - Traffic Impact Study and Traffic Plan

Hi Alicia,

Just with regards to your first comment, can the lane configuration of Sienna be included as its own figure showing just Sienna or should it be shown on the global Potters site plan such as on Figure 1.2? Also the intersection drawing that I have asked you about recently, is that to be included in the report as well or can that be submitted separately?

Robert Babic  
The Odan/Detech Group Inc. | Civil Consultants  
5230 South Service Rd., Unit 107 | Burlington | L7L 5K2  
T: (905) 632-3811 ext: 139 | F: (905) 632-3363 | E: [rob@odandetech.com](mailto:rob@odandetech.com)

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**From:** Cantwell, Alicia [<mailto:acantwell@city.belleville.on.ca>]  
**Sent:** Thursday, October 23, 2014 9:53 AM  
**To:** [jkrpan@odandetech.com](mailto:jkrpan@odandetech.com)  
**Cc:** [rob@odandetech.com](mailto:rob@odandetech.com)  
**Subject:** Potter's Creek Phase 3 - Approvals Comments - Traffic Impact Study and Traffic Plan

John,

Attached are our comments regarding the recently submitted Traffic Impact Study and Traffic Plan. Should you have any questions please contact me at your convenience.

Alicia





**Alicia Cantwell, P.Eng.**  
Approvals - Intermediate Developme...  
Engineering & Development Services

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Queues  
2: Avonlough Rd & Dundas Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	88	782	21	13	1034	90	12	17	15	102	100
v/c Ratio	0.33	0.34	0.02	0.03	0.43	0.08	0.04	0.05	0.04	0.34	0.23
Control Delay	12.4	8.8	1.4	4.8	5.5	0.7	29.8	29.8	0.5	36.0	8.1
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	12.4	8.8	1.4	4.8	5.5	0.7	29.8	29.8	0.5	36.0	8.1
Queue Length 50th (m)	7.4	35.1	0.0	0.5	24.2	0.0	1.9	2.7	0.0	17.5	0.2
Queue Length 95th (m)	17.9	45.3	1.8	m0.9	30.0	m1.1	6.6	8.4	0.6	33.4	13.3
Internal Link Dist (m)		241.9			516.5			45.1			90.1
Turn Bay Length (m)	55.0		55.0	90.0		65.0	20.0		30.0	30.0	
Base Capacity (vph)	266	2310	1045	397	2382	1065	315	364	402	299	444
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	0.33	0.34	0.02	0.03	0.43	0.08	0.04	0.05	0.04	0.34	0.23

Intersection Summary

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

HCM Unsignalized Intersection Capacity Analysis  
27: Avonlough Rd & Future Stream Property Access

29/10/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	5	49	141	54	153	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	49	141	54	153	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)					114	
pX, platoon unblocked						
vC, conflicting volume	498	162	170			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	498	162	170			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	94	90			
cM capacity (veh/h)	479	883	1407			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	5	49	141	54	170
Volume Left	5	0	141	0	0
Volume Right	0	49	0	0	17
cSH	479	883	1407	1700	1700
Volume to Capacity	0.01	0.06	0.10	0.03	0.10
Queue Length 95th (m)	0.3	1.4	2.7	0.0	0.0
Control Delay (s)	12.6	9.3	7.8	0.0	0.0
Lane LOS	B	A	A		
Approach Delay (s)	9.6		5.7		0.0
Approach LOS	A				

Intersection Summary

Average Delay	3.9			
Intersection Capacity Utilization	30.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Queues  
2: Avonlough Rd & Dundas Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	117	1035	23	37	1006	106	13	6	21	100	156
v/c Ratio	0.37	0.44	0.02	0.11	0.42	0.09	0.05	0.02	0.06	0.35	0.36
Control Delay	11.2	8.4	1.4	4.6	4.7	0.6	32.5	31.5	3.5	38.5	10.7
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	11.2	8.4	1.4	4.6	4.7	0.6	32.5	31.5	3.5	38.5	10.7
Queue Length 50th (m)	9.3	46.3	0.0	1.5	21.7	0.0	2.1	1.0	0.0	17.7	3.3
Queue Length 95th (m)	21.0	58.7	1.8	m2.3	26.2	m1.2	7.4	4.4	2.5	33.7	20.3
Internal Link Dist (m)		241.9			516.5			45.1			90.2
Turn Bay Length (m)	55.0		55.0	90.0		65.0	20.0		30.0	30.0	
Base Capacity (vph)	319	2371	1092	323	2418	1147	242	399	373	286	439
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	0.37	0.44	0.02	0.11	0.42	0.09	0.05	0.02	0.06	0.35	0.36

Intersection Summary

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

HCM Unsignalized Intersection Capacity Analysis  
27: Avonlough Rd & Future Stream Property Access

29/10/2014



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔
Volume (veh/h)	18	147	52	178	109	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	18	147	52	178	109	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None	None		
Median storage (veh)						
Upstream signal (m)				114		
pX, platoon unblocked						
vC, conflicting volume	396	114	119			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	396	114	119			
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	84	96			
cM capacity (veh/h)	587	939	1469			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1
Volume Total	18	147	52	178	119
Volume Left	18	0	52	0	0
Volume Right	0	147	0	0	10
cSH	587	939	1469	1700	1700
Volume to Capacity	0.03	0.16	0.04	0.10	0.07
Queue Length 95th (m)	0.8	4.4	0.9	0.0	0.0
Control Delay (s)	11.3	9.5	7.5	0.0	0.0
Lane LOS	B	A	A		
Approach Delay (s)	9.7		1.7		0.0
Approach LOS	A				

Intersection Summary

Average Delay	3.9			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Lanes, Volumes, Timings

3: Avondale Rd & Dundas Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕↕			↕↕			↕↕			↕↕		
Volume (vph)	41	851	5	2	1033	41	3	3	0	71	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor					1.00							
Frt	0.999				0.994				0.923			
Flt Protected	0.998								0.976			
Satd. Flow (prot)	0	3405	0	0	3431	0	0	1484	0	0	1613	0
Flt Permitted	0.798				0.954				0.922			
Satd. Flow (perm)	0	2723	0	0	3273	0	0	1401	0	0	1440	0
Right Turn on Red	Yes				Yes				Yes			
Satd. Flow (RTOR)	1				6				67			
Link Speed (k/h)	60				60				40			
Link Distance (m)	540.5				572.2				85.9			
Travel Time (s)	32.4				34.3				7.7			
Conf. Peds. (#/hr)	5				5							
Peak Hour 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
Heavy Vehicles (%)	0%	6%	0%	100%	4%	11%	50%	0%	0%	7%	0%	6%
Adj. Flow (vph)	41	851	5	2	1033	41	3	3	0	71	0	95
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	897	0	0	1076	0	0	6	0	0	166	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				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	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15		25		15		25		15	
Number of Detectors	1		2		1		2		1		2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		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	
Detector 1 Position(m)	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	0.6		2.0	0.6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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			
Detector 2 Size(m)	0.6				0.6				0.6			
Detector 2 Type	CI+Ex				CI+Ex				CI+Ex			
Detector 2 Channel												
Detector 2 Extend (s)	0.0				0.0				0.0			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	2		6		6		8		8		4	
Permitted Phases	2		6		6		8		8		4	
Detector Phase	2	2		6	6		8	8		4	4	

Lanes, Volumes, Timings

3: Avondale Rd & Dundas Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	35.0	35.0		15.0	15.0		15.0	15.0		8.0	8.0	
Minimum Split (s)	42.0	42.0		22.0	22.0		21.0	21.0		41.0	41.0	
Total Split (s)	56.0	56.0		56.0	56.0		44.0	44.0		44.0	44.0	
Total Split (%)	56.0%	56.0%		56.0%	56.0%		44.0%	44.0%		44.0%	44.0%	
Maximum Green (s)	49.0	49.0		50.0	50.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0				0.0				0.0			
Total Lost Time (s)	7.0				6.0				6.0			
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Walk Time (s)	13.0	13.0		7.0	7.0		7.0	7.0		15.0	15.0	
Flash Dont Walk (s)	13.0	13.0		8.0	8.0		8.0	8.0		20.0	20.0	
Pedestrian Calls (#/hr)	0		0		0		0		0		0	
Act Effect Green (s)	49.0				50.0				38.0			
Actuated g/C Ratio	0.49				0.50				0.38			
v/c Ratio	0.67				0.66				0.01			
Control Delay	19.9				20.9				19.5			
Queue Delay	0.0				0.0				0.0			
Total Delay	19.9				20.9				19.5			
LOS	B				C				B			
Approach Delay	19.9				20.9				19.5			
Approach LOS	B				C				B			

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	85
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.67
Intersection Signal Delay:	19.9
Intersection Capacity Utilization:	77.3%
Analysis Period (min):	15
Intersection LOS:	B
ICU Level of Service:	D

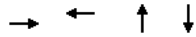
Splits and Phases: 3: Avondale Rd & Dundas Street W



Queues

3: Avondale Rd & Dundas Street W

29/10/2014



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	897	1076	6	166
v/c Ratio	0.67	0.66	0.01	0.28
Control Delay	19.9	20.9	19.5	14.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.9	20.9	19.5	14.0
Queue Length 50th (m)	54.4	82.0	0.8	13.3
Queue Length 95th (m)	70.8	104.9	3.4	28.9
Internal Link Dist (m)	516.5	548.2	61.9	754.0
Turn Bay Length (m)				
Base Capacity (vph)	1334	1639	532	588
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.67	0.66	0.01	0.28

Intersection Summary

HCM Signalized Intersection Capacity Analysis

3: Avondale Rd & Dundas Street W

29/10/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕			↕	
Volume (vph)	41	851	5	2	1033	41	3	3	0	71	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			6.0			6.0			6.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.99			1.00			0.92	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		3405			3432			1483			1613	
Flt Permitted		0.80			0.95			0.92			0.87	
Satd. Flow (perm)		2723			3274			1401			1440	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	41	851	5	2	1033	41	3	3	0	71	0	95
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	0	0	42	0
Lane Group Flow (vph)	0	896	0	0	1073	0	0	6	0	0	124	0
Confl. Peds. (#/hr)		5			5							
Heavy Vehicles (%)	0%	6%	0%	100%	4%	11%	50%	0%	0%	7%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		49.0			50.0			38.0			38.0	
Effective Green, g (s)		49.0			50.0			38.0			38.0	
Actuated g/C Ratio		0.49			0.50			0.38			0.38	
Clearance Time (s)		7.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		1334			1637			532			547	
v/s Ratio Prot												
v/s Ratio Perm		c0.33			0.33			0.00			c0.09	
v/c Ratio		0.67			0.66			0.01			0.23	
Uniform Delay, d1		19.4			18.6			19.3			21.0	
Progression Factor		0.87			1.00			1.00			1.00	
Incremental Delay, d2		2.6			2.1			0.0			1.0	
Delay (s)		19.5			20.7			19.3			22.0	
Level of Service		B			C			B			C	
Approach Delay (s)		19.5			20.7			19.3			22.0	
Approach LOS		B			C			B			C	

Intersection Summary

HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

4: Sidney Street & Moira Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	218	254	77	57	185	132	40	455	47	93	368	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		0.0	30.0		40.0	50.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	0.99		0.99		0.99	1.00		0.97	1.00		0.98
Frt		0.965			0.938				0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1547	1588	0	1624	1497	0	1490	3065	1264	1562	3008	1411
Fit Permitted	0.268			0.561			0.533			0.380		
Satd. Flow (perm)	436	1588	0	951	1497	0	835	3065	1230	623	3008	1378
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			37				131			212
Link Speed (k/h)		50			50				50			50
Link Distance (m)		262.7			615.2			1028.2				384.6
Travel Time (s)		18.9			44.3			74.0				27.7
Confl. Peds. (#/hr)	2		13	13		2	1		3	3		1
Peak Hour 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
Heavy Vehicles (%)	5%	4%	1%	0%	4%	10%	9%	6%	15%	4%	8%	3%
Adj. Flow (vph)	218	254	77	57	185	132	40	455	47	93	368	212
Shared Lane Traffic (%)												
Lane Group Flow (vph)	218	331	0	57	317	0	40	455	47	93	368	212
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	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1		2
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		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
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	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
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	pm+pt	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm

Lanes, Volumes, Timings

4: Sidney Street & Moira Street W

29/10/2014

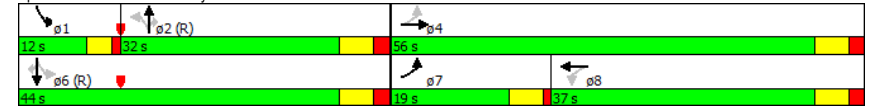


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4				8		2		1	6	
Permitted Phases	4				8		2		2	6		6
Detector Phase	7	4			8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		15.0	15.0	15.0	8.0	15.0	15.0
Minimum Split (s)	13.0	34.0		34.0	34.0		28.0	28.0	28.0	12.0	24.0	24.0
Total Split (s)	19.0	56.0		37.0	37.0		32.0	32.0	32.0	12.0	44.0	44.0
Total Split (%)	19.0%	56.0%		37.0%	37.0%		32.0%	32.0%	32.0%	12.0%	44.0%	44.0%
Maximum Green (s)	14.0	50.0		31.0	31.0		26.0	26.0	26.0	8.0	38.0	38.0
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	4.0
All-Red Time (s)	1.0	2.0		2.0	2.0		2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0		6.0	6.0		6.0	6.0	6.0	4.0	6.0	6.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	5.0	5.0	3.0	5.0	5.0
Recall Mode	Min	Min		Min	Min		C-Max	C-Max	C-Max	Min	C-Max	C-Max
Walk Time (s)		10.0		10.0	10.0		10.0	10.0	10.0		7.0	7.0
Flash Dont Walk (s)		18.0		18.0	18.0		12.0	12.0	12.0		8.0	8.0
Pedestrian Calls (#/hr)		0		0	0		0	0	0		0	0
Act Effct Green (s)	43.4	42.4		23.9	23.9		33.0	33.0	33.0	47.6	45.6	45.6
Actuated g/C Ratio	0.43	0.42		0.24	0.24		0.33	0.33	0.33	0.48	0.46	0.46
v/c Ratio	0.64	0.48		0.25	0.82		0.15	0.45	0.10	0.25	0.27	0.29
Control Delay	27.8	22.1		31.3	48.7		29.8	29.5	1.3	18.6	18.9	4.0
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	22.1		31.3	48.7		29.8	29.5	1.3	18.6	18.9	4.0
LOS	C	C		C	D		C	C	A	B	B	A
Approach Delay		24.3			46.1			27.1			14.2	
Approach LOS		C			D			C			B	

Intersection Summary

Area Type:	CBD
Cycle Length:	100
Actuated Cycle Length:	100
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle:	90
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.82
Intersection Signal Delay:	25.6
Intersection LOS:	C
Intersection Capacity Utilization:	77.7%
ICU Level of Service:	D
Analysis Period (min):	15

Splits and Phases: 4: Sidney Street & Moira Street W



Queues

4: Sidney Street & Moira Street W

29/10/2014



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	218	331	57	317	40	455	47	93	368	212
v/c Ratio	0.64	0.48	0.25	0.82	0.15	0.45	0.10	0.25	0.27	0.29
Control Delay	27.8	22.1	31.3	48.7	29.8	29.5	1.3	18.6	18.9	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.8	22.1	31.3	48.7	29.8	29.5	1.3	18.6	18.9	4.0
Queue Length 50th (m)	27.9	43.5	9.4	54.3	5.6	34.5	0.1	10.4	24.3	0.0
Queue Length 95th (m)	44.1	66.2	19.1	80.3	m13.9	52.8	m1.8	22.7	39.3	14.6
Internal Link Dist (m)		238.7		591.2		1004.2			360.6	
Turn Bay Length (m)	30.0		30.0		30.0		40.0	50.0		40.0
Base Capacity (vph)	344	805	294	489	275	1011	493	377	1372	743
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	0.63	0.41	0.19	0.65	0.15	0.45	0.10	0.25	0.27	0.29

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

4: Sidney Street & Moira Street W

29/10/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔	↔	↔	↔	↔
Volume (vph)	218	254	77	57	185	132	40	455	47	93	368	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		6.0	6.0		6.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1547	1588		1610	1497		1487	3065	1230	1560	3008	1378
Flt Permitted	0.27	1.00		0.56	1.00		0.53	1.00	1.00	0.38	1.00	1.00
Satd. Flow (perm)	436	1588		951	1497		834	3065	1230	624	3008	1378
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	218	254	77	57	185	132	40	455	47	93	368	212
RTOR Reduction (vph)	0	13	0	0	28	0	0	0	31	0	0	115
Lane Group Flow (vph)	218	318	0	57	289	0	40	455	16	93	368	97
Confl. Peds. (#/hr)	2		13	13		2	1		3	3		1
Heavy Vehicles (%)	5%	4%	1%	0%	4%	10%	9%	6%	15%	4%	8%	3%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	42.4	42.4		23.9	23.9		33.0	33.0	33.0	45.6	45.6	45.6
Effective Green, g (s)	42.4	42.4		23.9	23.9		33.0	33.0	33.0	45.6	45.6	45.6
Actuated g/C Ratio	0.42	0.42		0.24	0.24		0.33	0.33	0.33	0.46	0.46	0.46
Clearance Time (s)	5.0	6.0		6.0	6.0		6.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	334	673		227	357		275	1011	405	365	1371	628
v/s Ratio Prot	c0.09	0.20			c0.19			c0.15		0.02	c0.12	
v/s Ratio Perm	0.19			0.06			0.05		0.01	0.09		0.07
v/c Ratio	0.65	0.47		0.25	0.81		0.15	0.45	0.04	0.25	0.27	0.15
Uniform Delay, d1	20.8	20.8		30.8	35.9		23.6	26.4	22.7	16.1	16.9	15.9
Progression Factor	1.06	1.06		1.00	1.00		1.03	0.99	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.5	0.5		0.6	12.7		1.1	1.4	0.2	0.4	0.5	0.5
Delay (s)	26.6	22.6		31.4	48.6		25.2	27.5	22.9	16.5	17.3	16.4
Level of Service	C	C		C	D		C	C	C	B	B	B
Approach Delay (s)		24.2			45.9			26.9			16.9	
Approach LOS		C			D			C			B	

Intersection Summary

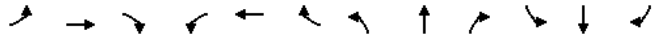
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Lanes, Volumes, Timings

5: Sidney Street & Bridge Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔↔			↔↔			↔↔			↔↔		
Volume (vph)	157	259	69	40	135	99	83	298	43	88	224	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	0.99		0.99		0.99		1.00		1.00		1.00	
Frt	0.979		0.946		0.981		0.963		0.989		0.963	
Flt Protected	0.984		0.993		0.950		0.989		0.989		0.989	
Satd. Flow (prot)	0	3284	0	0	3187	0	1787	1762	0	0	3205	0
Flt Permitted	0.747		0.769		0.454		0.793		0.793		0.793	
Satd. Flow (perm)	0	2491	0	0	2462	0	854	1762	0	0	2563	0
Right Turn on Red	Yes		Yes		Yes		Yes		Yes		Yes	
Satd. Flow (RTOR)	22		99		11		47		47		47	
Link Speed (k/h)	50		50		50		50		50		50	
Link Distance (m)	389.2		166.2		231.3		1028.2		74.0		74.0	
Travel Time (s)	28.0		12.0		16.7		74.0		74.0		74.0	
Conf. Peds. (#/hr)	4		35		35		4		18		18	
Peak Hour 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
Heavy Vehicles (%)	8%	3%	7%	14%	4%	5%	1%	5%	8%	4%	6%	13%
Adj. Flow (vph)	157	259	69	40	135	99	83	298	43	88	224	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	485	0	0	274	0	83	341	0	0	413	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)	0.0		0.0		3.6		3.6		3.6		3.6	
Link Offset(m)	0.0		0.0		0.0		0.0		0.0		0.0	
Crosswalk Width(m)	4.8		4.8		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	
Number of Detectors	1		2		1		2		1		2	
Detector Template	Left	Thru	Left	Thru	Left	Thru	Left	Thru	Left	Thru	Left	Thru
Leading Detector (m)	2.0	10.0	2.0	10.0	2.0	10.0	2.0	10.0	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	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	0.0
Detector 1 Size(m)	2.0	0.6	2.0	0.6	2.0	0.6	2.0	0.6	2.0	0.6	2.0	0.6
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+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	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	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	0.0
Detector 2 Position(m)	9.4		9.4		9.4		9.4		9.4		9.4	
Detector 2 Size(m)	0.6		0.6		0.6		0.6		0.6		0.6	
Detector 2 Type	CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex		CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	4		8		8		5		2		6	
Permitted Phases	4		8		2		6		6		6	
Detector Phase	4	4	8	8	5	2	6	6	6	6	6	6

Lanes, Volumes, Timings

5: Sidney Street & Bridge Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		10.0	20.0		15.0	15.0	
Minimum Split (s)	35.0	35.0		21.0	21.0		15.0	36.0		21.0	21.0	
Total Split (s)	43.0	43.0		43.0	43.0		17.0	57.0		40.0	40.0	
Total Split (%)	43.0%	43.0%		43.0%	43.0%		17.0%	57.0%		40.0%	40.0%	
Maximum Green (s)	38.0	38.0		37.0	37.0		12.0	51.0		34.0	34.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0		0.0		0.0		0.0		0.0		0.0	
Total Lost Time (s)	5.0		6.0		5.0		6.0		6.0		6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		4.0	4.0		5.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Flash Dont Walk (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Pedestrian Calls (#/hr)	0		0		0		0		0		0	
Act Effect Green (s)	26.4		25.4		63.6		62.6		50.5		50.5	
Actuated g/C Ratio	0.26		0.25		0.64		0.63		0.50		0.50	
v/c Ratio	0.72		0.39		0.13		0.31		0.31		0.31	
Control Delay	37.6		19.9		8.8		10.3		19.2		19.2	
Queue Delay	0.0		0.0		0.0		0.0		0.0		0.0	
Total Delay	37.6		19.9		8.8		10.3		19.2		19.2	
LOS	D		B		A		B		B		B	
Approach Delay	37.6		19.9		10.0		19.2		19.2		19.2	
Approach LOS	D		B		A		B		B		B	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	75
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.72
Intersection Signal Delay:	22.5
Intersection Capacity Utilization:	90.9%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	E

Splits and Phases: 5: Sidney Street & Bridge Street W



Queues

5: Sidney Street & Bridge Street W

29/10/2014



Lane Group	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	485	274	83	341	413
v/c Ratio	0.72	0.39	0.13	0.31	0.31
Control Delay	37.6	19.9	8.8	10.3	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	37.6	19.9	8.8	10.3	19.2
Queue Length 50th (m)	45.1	15.0	5.9	28.7	31.6
Queue Length 95th (m)	56.6	24.2	14.3	53.9	48.0
Internal Link Dist (m)	365.2	142.2		207.3	1004.2
Turn Bay Length (m)					
Base Capacity (vph)	960	973	654	1106	1316
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.51	0.28	0.13	0.31	0.31

Intersection Summary

HCM Signalized Intersection Capacity Analysis

5: Sidney Street & Bridge Street W

29/10/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕		↕	↕			↕↕	
Volume (vph)	157	259	69	40	135	99	83	298	43	88	224	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			6.0		5.0	6.0			6.0	
Lane Util. Factor		0.95			0.95		1.00	1.00			0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00			1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00			1.00	
FrT		0.98			0.95		1.00	0.98			0.96	
FlT Protected		0.98			0.99		0.95	1.00			0.99	
Satd. Flow (prot)		3281			3177		1787	1762			3200	
FlT Permitted		0.75			0.77		0.45	1.00			0.79	
Satd. Flow (perm)		2489			2461		855	1762			2564	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	157	259	69	40	135	99	83	298	43	88	224	101
RTOR Reduction (vph)	0	16	0	0	74	0	4	0	0	0	24	0
Lane Group Flow (vph)	0	469	0	0	200	0	83	337	0	0	389	0
Confl. Peds. (#/hr)	4		35	35		4			18	18		
Heavy Vehicles (%)	8%	3%	7%	14%	4%	5%	1%	5%	8%	4%	6%	13%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		26.4			25.4		62.6	62.6			49.5	
Effective Green, g (s)		26.4			25.4		62.6	62.6			49.5	
Actuated g/C Ratio		0.26			0.25		0.63	0.63			0.50	
Clearance Time (s)		5.0			6.0		5.0	6.0			6.0	
Vehicle Extension (s)		5.0			5.0		4.0	4.0			5.0	
Lane Grp Cap (vph)		657			625		610	1103			1269	
v/s Ratio Prot							0.01	c0.19				
v/s Ratio Perm		c0.19			0.08		0.07				0.15	
v/c Ratio		0.71			0.32		0.14	0.31			0.31	
Uniform Delay, d1		33.4			30.3		7.5	8.6			15.0	
Progression Factor		1.00			1.00		1.00	1.00			1.23	
Incremental Delay, d2		4.5			0.6		0.1	0.7			0.6	
Delay (s)		37.9			30.9		7.7	9.4			19.1	
Level of Service		D			C		A	A			B	
Approach Delay (s)		37.9			30.9		9.0				19.1	
Approach LOS		D			C		A				B	

Intersection Summary

HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
12: Avonlough Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (vph)	440	33	60	412	59	101
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	0.991			0.994	0.982	
Flt Protected				0.994	0.982	
Satd. Flow (prot)	1799	0	0	1825	1707	0
Flt Permitted				0.994	0.982	
Satd. Flow (perm)	1799	0	0	1825	1707	0
Link Speed (k/h)	80			80	40	
Link Distance (m)	779.5			725.6	628.8	
Travel Time (s)	35.1			32.7	56.6	
Confl. Peds. (#/hr)		5	5			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	0%	0%	4%	0%	0%
Adj. Flow (vph)	440	33	60	412	59	101
Shared Lane Traffic (%)						
Lane Group Flow (vph)	473	0	0	472	160	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	69.7%
Analysis Period (min)	15
	ICU Level of Service C

HCM Unsignalized Intersection Capacity Analysis  
12: Avonlough Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (veh/h)	440	33	60	412	59	101
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	440	33	60	412	59	101
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			478		994	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			478		994	462
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		77	83
cM capacity (veh/h)			1090		258	602

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	473	472	160
Volume Left	0	60	59
Volume Right	33	0	101
cSH	1700	1090	404
Volume to Capacity	0.28	0.06	0.40
Queue Length 95th (m)	0.0	1.4	14.9
Control Delay (s)	0.0	1.6	19.7
Lane LOS		A	C
Approach Delay (s)	0.0	1.6	19.7
Approach LOS			C

Intersection Summary

Average Delay	3.5
Intersection Capacity Utilization	69.7%
Analysis Period (min)	15
	ICU Level of Service C

Lanes, Volumes, Timings  
13: Marshall Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (vph)	464	85	2	416	67	1
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	0.979				0.998	
Frt Protected					0.953	
Satd. Flow (prot)	1768	0	0	1827	1730	0
Frt Permitted					0.953	
Satd. Flow (perm)	1768	0	0	1827	1730	0
Link Speed (k/h)	80			80	60	
Link Distance (m)	725.6			1183.9	670.5	
Travel Time (s)	32.7			53.3	40.2	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	1%	0%	4%	3%	100%
Adj. Flow (vph)	464	85	2	416	67	1
Shared Lane Traffic (%)						
Lane Group Flow (vph)	549	0	0	418	68	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	40.1%
Analysis Period (min)	15
	ICU Level of Service A

HCM Unsignalized Intersection Capacity Analysis  
13: Marshall Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (veh/h)	464	85	2	416	67	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	464	85	2	416	67	1
Pedestrians					2	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			551		928	508
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			551		928	508
tC, single (s)			4.1		6.4	7.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	4.2
p0 queue free %			100		77	100
cM capacity (veh/h)			1027		295	410

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	549	418	68
Volume Left	0	2	67
Volume Right	85	0	1
cSH	1700	1027	296
Volume to Capacity	0.32	0.00	0.23
Queue Length 95th (m)	0.0	0.0	6.9
Control Delay (s)	0.0	0.1	20.7
Lane LOS		A	C
Approach Delay (s)	0.0	0.1	20.7
Approach LOS			C

Intersection Summary

Average Delay	1.4
Intersection Capacity Utilization	40.1%
Analysis Period (min)	15
	ICU Level of Service A

Lanes, Volumes, Timings

3: Avondale Rd & Dundas Street W

29/10/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕↕			↕↕			↕↕			↕↕		
Volume (vph)	84	1063	4	4	1084	68	6	5	5	54	4	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00											
Frt	0.999			0.991			0.958			0.932		
Flt Protected	0.996						0.982			0.977		
Satd. Flow (prot)	0	3527	0	0	3470	0	0	1787	0	0	1668	0
Flt Permitted	0.637			0.951			0.928			0.868		
Satd. Flow (perm)	0	2256	0	0	3300	0	0	1689	0	0	1482	0
Right Turn on Red	Yes			Yes			Yes			Yes		
Satd. Flow (RTOR)				10			5			55		
Link Speed (k/h)	60			60			40			40		
Link Distance (m)	540.5			572.2			85.9			778.0		
Travel Time (s)	32.4			34.3			7.7			70.0		
Conf. Peds. (#/hr)	9			9								
Peak Hour 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
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	0%	4%	25%	2%
Adj. Flow (vph)	84	1063	4	4	1084	68	6	5	5	54	4	58
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1151	0	0	1156	0	0	16	0	0	116	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			0.0			0.0		
Link Offset(m)	0.0			0.0			0.0			0.0		
Crosswalk Width(m)	4.8			4.8			4.8			4.8		
Two way Left Turn Lane												
Headway Factor	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	
Number of Detectors	1		2		1		2		1		2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		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	
Detector 1 Position(m)	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	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	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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	NA		Perm	NA		Perm	NA	
Protected Phases	2		6		8		8		4		4	
Permitted Phases	2		6		8		8		4		4	
Detector Phase	2	2		6	6		8	8		4	4	

Lanes, Volumes, Timings

3: Avondale Rd & Dundas Street W

29/10/2014

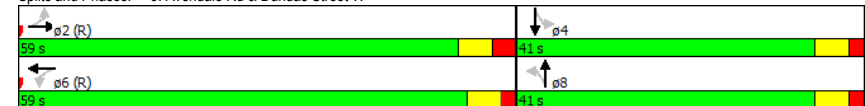


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	35.0	35.0		15.0	15.0		15.0	15.0		8.0	8.0	
Minimum Split (s)	42.0	42.0		22.0	22.0		21.0	21.0		41.0	41.0	
Total Split (s)	59.0	59.0		59.0	59.0		41.0	41.0		41.0	41.0	
Total Split (%)	59.0%	59.0%		59.0%	59.0%		41.0%	41.0%		41.0%	41.0%	
Maximum Green (s)	52.0	52.0		53.0	53.0		35.0	35.0		35.0	35.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0			0.0			0.0		
Total Lost Time (s)	7.0			6.0			6.0			6.0		
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Recall Mode	C-Max	C-Max		C-Max	C-Max		Max	Max		Max	Max	
Walk Time (s)	13.0	13.0		7.0	7.0		7.0	7.0		15.0	15.0	
Flash Dont Walk (s)	13.0	13.0		8.0	8.0		8.0	8.0		20.0	20.0	
Pedestrian Calls (#/hr)	0		0		0		0		0		0	
Act Effect Green (s)	52.0			53.0			35.0			35.0		
Actuated g/C Ratio	0.52			0.53			0.35			0.35		
v/c Ratio	0.98			0.66			0.03			0.21		
Control Delay	46.4			19.1			17.5			13.7		
Queue Delay	0.0			0.0			0.0			0.0		
Total Delay	46.4			19.1			17.5			13.7		
LOS	D			B			B			B		
Approach Delay	46.4			19.1			17.5			13.7		
Approach LOS	D			B			B			B		

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle:	95
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.98
Intersection Signal Delay:	31.7
Intersection Capacity Utilization:	92.6%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	F

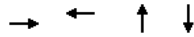
Splits and Phases: 3: Avondale Rd & Dundas Street W



Queues

3: Avondale Rd & Dundas Street W

29/10/2014



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1151	1156	16	116
v/c Ratio	0.98	0.66	0.03	0.21
Control Delay	46.4	19.1	17.5	13.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	46.4	19.1	17.5	13.7
Queue Length 50th (m)	82.7	84.5	1.5	8.4
Queue Length 95th (m)	#162.6	107.7	6.1	21.1
Internal Link Dist (m)	516.5	548.2	61.9	754.0
Turn Bay Length (m)				
Base Capacity (vph)	1173	1753	594	554
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.98	0.66	0.03	0.21

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

3: Avondale Rd & Dundas Street W

29/10/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕			↕	
Volume (vph)	84	1063	4	4	1084	68	6	5	5	54	4	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0			6.0			6.0			6.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Fr t		1.00			0.99			0.96			0.93	
Fl t Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		3530			3470			1786			1669	
Fl t Permitted		0.64			0.95			0.93			0.87	
Satd. Flow (perm)		2258			3301			1690			1483	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	84	1063	4	4	1084	68	6	5	5	54	4	58
RTOR Reduction (vph)	0	0	0	0	5	0	0	3	0	0	36	0
Lane Group Flow (vph)	0	1151	0	0	1151	0	0	13	0	0	80	0
Confl. Peds. (#/hr)		9			9							
Heavy Vehicles (%)	0%	2%	0%	0%	3%	0%	0%	0%	0%	4%	25%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		52.0			53.0			35.0			35.0	
Effective Green, g (s)		52.0			53.0			35.0			35.0	
Actuated g/C Ratio		0.52			0.53			0.35			0.35	
Clearance Time (s)		7.0			6.0			6.0			6.0	
Vehicle Extension (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		1174			1749			591			519	
v/s Ratio Prot												
v/s Ratio Perm		c0.51			0.35			0.01			c0.05	
v/c Ratio		0.98			0.66			0.02			0.15	
Uniform Delay, d1		23.5			17.0			21.3			22.3	
Progression Factor		1.02			1.00			1.00			1.00	
Incremental Delay, d2		21.0			2.0			0.1			0.6	
Delay (s)		45.1			18.9			21.4			23.0	
Level of Service		D			B			C			C	
Approach Delay (s)		45.1			18.9			21.4			23.0	
Approach LOS		D			B			C			C	

Intersection Summary

HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

4: Sidney Street & Moira Street W

29/10/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	328	349	68	61	247	188	45	781	95	178	528	289
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	30.0		0.0	30.0		0.0	30.0		40.0	50.0		40.0
Storage Lanes	1		0	1		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00	1.00		1.00	0.99				0.98	1.00		
Frt		0.976			0.935				0.850			0.850
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1608	1623	0	1593	1565	0	1624	3154	1439	1577	3217	1398
Fit Permitted	0.161			0.518			0.456			0.133		
Satd. Flow (perm)	272	1623	0	864	1565	0	780	3154	1404	221	3217	1398
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			38				131			289
Link Speed (k/h)		50			50				50			50
Link Distance (m)		262.7			615.2				1028.2			384.6
Travel Time (s)		18.9			44.3				74.0			27.7
Confl. Peds. (#/hr)	1		8	8		1			2	2		
Peak Hour 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
Heavy Vehicles (%)	1%	3%	0%	2%	2%	1%	0%	3%	1%	3%	1%	4%
Adj. Flow (vph)	328	349	68	61	247	188	45	781	95	178	528	289
Shared Lane Traffic (%)												
Lane Group Flow (vph)	328	417	0	61	435	0	45	781	95	178	528	289
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	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		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
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	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
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	pm+pt	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm

Lanes, Volumes, Timings

4: Sidney Street & Moira Street W

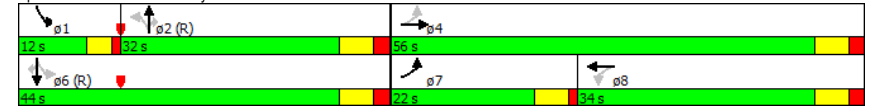
29/10/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Protected Phases	7	4						8			1	6
Permitted Phases	4							2		2	6	6
Detector Phase	7	4						2	2	2	1	6
Switch Phase												
Minimum Initial (s)	8.0	8.0						15.0	15.0	15.0	8.0	15.0
Minimum Split (s)	13.0	34.0						28.0	28.0	28.0	12.0	24.0
Total Split (s)	22.0	56.0						32.0	32.0	32.0	12.0	44.0
Total Split (%)	22.0%	56.0%						34.0%	34.0%	32.0%	12.0%	44.0%
Maximum Green (s)	17.0	50.0						26.0	26.0	26.0	8.0	38.0
Yellow Time (s)	4.0	4.0						4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0						2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0						0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	6.0						6.0	6.0	6.0	4.0	6.0
Lead/Lag	Lead							Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?	Yes							Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0						5.0	5.0	5.0	3.0	5.0
Recall Mode	Min	Min						C-Max	C-Max	C-Max	Min	C-Max
Walk Time (s)		10.0						10.0	10.0	10.0		7.0
Flash Dont Walk (s)		18.0						18.0	18.0	12.0		8.0
Pedestrian Calls (#/hr)		0						0	0	0		0
Act Effct Green (s)	50.4	49.4						27.4	27.4	26.0	40.6	38.6
Actuated g/C Ratio	0.50	0.49						0.27	0.27	0.26	0.41	0.39
v/c Ratio	0.90	0.52						0.26	0.95	0.22	0.87	0.43
Control Delay	50.4	20.1						31.6	65.7	32.8	61.0	24.1
Queue Delay	0.0	0.0						0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	20.1						31.6	65.7	32.8	61.0	24.1
LOS	D	C						C	E	A	E	C
Approach Delay		33.4						61.5		49.7		25.0
Approach LOS		C						E		D		C

Intersection Summary

Area Type: CBD  
 Cycle Length: 100  
 Actuated Cycle Length: 100  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 39.9  
 Intersection LOS: D  
 Intersection Capacity Utilization 99.9%  
 ICU Level of Service F  
 Analysis Period (min) 15

Splits and Phases: 4: Sidney Street & Moira Street W





Queues

4: Sidney Street & Moira Street W

29/10/2014



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	328	417	61	435	45	781	95	178	528	289
v/c Ratio	0.90	0.52	0.26	0.95	0.22	0.95	0.21	0.87	0.43	0.40
Control Delay	50.4	20.1	31.6	65.7	32.8	56.1	4.5	61.0	24.1	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	20.1	31.6	65.7	32.8	56.1	4.5	61.0	24.1	4.4
Queue Length 50th (m)	44.7	52.8	9.6	79.9	6.9	79.5	1.2	24.1	41.3	0.0
Queue Length 95th (m)	#96.9	86.9	21.2	#141.9	m14.3	#122.7	m4.9	#62.1	56.5	16.6
Internal Link Dist (m)		238.7		591.2		1004.2			360.6	
Turn Bay Length (m)	30.0		30.0		30.0		40.0	50.0		40.0
Base Capacity (vph)	363	818	241	465	202	820	461	205	1241	716
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	0.90	0.51	0.25	0.94	0.22	0.95	0.21	0.87	0.43	0.40

Intersection Summary

- # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

4: Sidney Street & Moira Street W

29/10/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔	↔	↔	↔	↔
Volume (vph)	328	349	68	61	247	188	45	781	95	178	528	289
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		6.0	6.0		6.0	6.0	6.0	4.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Flpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.98	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
Frt	1.00	0.98		1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1608	1622		1585	1566		1624	3154	1404	1577	3217	1398
Flt Permitted	0.16	1.00		0.52	1.00		0.46	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	273	1622		865	1566		780	3154	1404	221	3217	1398
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	328	349	68	61	247	188	45	781	95	178	528	289
RTOR Reduction (vph)	0	7	0	0	28	0	0	0	70	0	0	177
Lane Group Flow (vph)	328	410	0	61	407	0	45	781	25	178	528	112
Confl. Peds. (#/hr)	1		8			1			2		2	
Heavy Vehicles (%)	1%	3%	0%	2%	2%	1%	0%	3%	1%	3%	1%	4%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4			8			2		1		6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	49.4	49.4		27.4	27.4		26.0	26.0	26.0	38.6	38.6	38.6
Effective Green, g (s)	49.4	49.4		27.4	27.4		26.0	26.0	26.0	38.6	38.6	38.6
Actuated g/C Ratio	0.49	0.49		0.27	0.27		0.26	0.26	0.26	0.39	0.39	0.39
Clearance Time (s)	5.0	6.0		6.0	6.0		6.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		5.0	5.0	5.0	3.0	5.0	5.0
Lane Grp Cap (vph)	361	801		237	429		202	820	365	201	1241	539
v/s Ratio Prot	c0.15	0.25			0.26			0.25		c0.08		0.16
v/s Ratio Perm	c0.29			0.07			0.06		0.02	c0.26		0.08
v/c Ratio	0.91	0.51		0.26	0.95		0.22	0.95	0.07	0.89	0.43	0.21
Uniform Delay, d1	23.4	17.1		28.4	35.6		29.1	36.4	27.9	24.0	22.6	20.5
Progression Factor	0.99	1.06		1.00	1.00		1.02	0.96	1.54	1.00	1.00	1.00
Incremental Delay, d2	25.6	0.6		0.6	30.5		2.3	20.1	0.3	33.8	1.1	0.9
Delay (s)	48.9	18.6		28.9	66.1		31.8	55.1	43.3	57.8	23.6	21.4
Level of Service	D	B		C	E		C	E	D	E	C	C
Approach Delay (s)		31.9			61.5			52.7			29.1	
Approach LOS		C			E			D			C	

Intersection Summary

HCM 2000 Control Delay	41.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings

5: Sidney Street & Bridge Street W

29/10/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Volume (vph)	301	228	59	61	223	108	98	393	55	63	393	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95
Ped Bike Factor	1.00	0.98			0.99			0.99			1.00	
Frt		0.969			0.959			0.982			0.968	
Flt Protected	0.950				0.992			0.950			0.995	
Satd. Flow (prot)	1719	1746	0	0	3322	0	1671	1817	0	0	3439	0
Flt Permitted	0.494				0.825			0.309			0.844	
Satd. Flow (perm)	891	1746	0	0	2743	0	544	1817	0	0	2908	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			72			9			35	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		389.2			166.2			231.3			1028.2	
Travel Time (s)		28.0			12.0			16.7			74.0	
Conf. Peds. (#/hr)	6		75	75		6		33	33			
Peak Hour 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
Heavy Vehicles (%)	5%	3%	6%	8%	2%	2%	8%	2%	0%	0%	1%	2%
Adj. Flow (vph)	301	228	59	61	223	108	98	393	55	63	393	126
Shared Lane Traffic (%)												
Lane Group Flow (vph)	301	287	0	0	392	0	98	448	0	0	582	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	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		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	
Detector 1 Position(m)	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	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	
Detector 1 Channel												
Detector 1 Extend (s)	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	
Detector 1 Delay (s)	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	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8			5			2	
Permitted Phases		4			8			2			6	
Detector Phase		4	4		8	8		5	2		6	6

Lanes, Volumes, Timings

5: Sidney Street & Bridge Street W

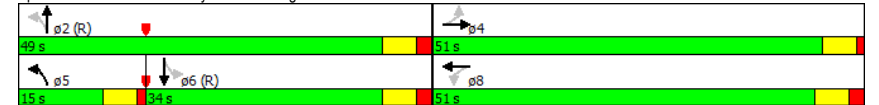
29/10/2014

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	15.0	15.0		15.0	15.0		10.0	20.0		15.0	15.0	
Minimum Split (s)	35.0	35.0		21.0	21.0		15.0	36.0		21.0	21.0	
Total Split (s)	51.0	51.0		51.0	51.0		15.0	49.0		34.0	34.0	
Total Split (%)	51.0%	51.0%		51.0%	51.0%		15.0%	49.0%		34.0%	34.0%	
Maximum Green (s)	46.0	46.0		45.0	45.0		10.0	43.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0		6.0	6.0		5.0	6.0		6.0	6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?							Yes			Yes	Yes	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		4.0	4.0		5.0	5.0	
Recall Mode	None	None		None	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	10.0	10.0						10.0				
Flash Dont Walk (s)	20.0	20.0						20.0				
Pedestrian Calls (#/hr)	0	0						0				
Act Effect Green (s)	39.1	39.1			38.1		50.9	49.9			37.9	
Actuated g/C Ratio	0.39	0.39			0.38		0.51	0.50			0.38	
v/c Ratio	0.86	0.41			0.36		0.25	0.49			0.52	
Control Delay	51.3	21.4			17.7		16.9	20.4			31.8	
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	
Total Delay	51.3	21.4			17.7		16.9	20.4			31.8	
LOS	D	C			B		B	C			C	
Approach Delay		36.7			17.7			19.8			31.8	
Approach LOS		D			B			B			C	

Intersection Summary

Area Type:	Other
Cycle Length:	100
Actuated Cycle Length:	100
Offset:	0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle:	75
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.86
Intersection Signal Delay:	27.4
Intersection Capacity Utilization:	97.7%
Analysis Period (min):	15
Intersection LOS:	C
ICU Level of Service:	F

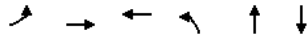
Splits and Phases: 5: Sidney Street & Bridge Street W



Queues

5: Sidney Street & Bridge Street W

29/10/2014



Lane Group	EBL	EBT	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	301	287	392	98	448	582
v/c Ratio	0.86	0.41	0.36	0.25	0.49	0.52
Control Delay	51.3	21.4	17.7	16.9	20.4	31.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	21.4	17.7	16.9	20.4	31.8
Queue Length 50th (m)	52.9	37.2	22.6	10.6	60.3	60.8
Queue Length 95th (m)	#94.0	54.1	31.7	21.8	97.6	80.8
Internal Link Dist (m)		365.2	142.2		207.3	1004.2
Turn Bay Length (m)						
Base Capacity (vph)	409	812	1273	389	910	1122
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.35	0.31	0.25	0.49	0.52

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

5: Sidney Street & Bridge Street W

29/10/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔		↔	↔		↔	↔		↔	↔	↔
Volume (vph)	301	228	59	61	223	108	98	393	55	63	393	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0			6.0		5.0	6.0			6.0	
Lane Util. Factor	1.00	1.00			0.95		1.00	1.00			0.95	
Frpb, ped/bikes	1.00	0.98			1.00		1.00	0.99			1.00	
Flpb, ped/bikes	1.00	1.00			0.99		1.00	1.00			1.00	
Frt	1.00	0.97			0.96		1.00	0.98			0.97	
Fit Protected	0.95	1.00			0.99		0.95	1.00			0.99	
Satd. Flow (prot)	1713	1746			3298		1671	1816			3425	
Fit Permitted	0.49	1.00			0.83		0.31	1.00			0.84	
Satd. Flow (perm)	890	1746			2743		544	1816			2905	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	301	228	59	61	223	108	98	393	55	63	393	126
RTOR Reduction (vph)	0	10	0	0	45	0	5	0	5	0	22	0
Lane Group Flow (vph)	301	277	0	0	347	0	98	443	0	0	560	0
Confl. Peds. (#/hr)	6		75	75			6			33	33	
Heavy Vehicles (%)	5%	3%	6%	8%	2%	2%	8%	2%	0%	0%	1%	2%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.1	39.1			38.1		49.9	49.9			36.9	
Effective Green, g (s)	39.1	39.1			38.1		49.9	49.9			36.9	
Actuated g/C Ratio	0.39	0.39			0.38		0.50	0.50			0.37	
Clearance Time (s)	5.0	5.0			6.0		5.0	6.0			6.0	
Vehicle Extension (s)	5.0	5.0			5.0		4.0	4.0			5.0	
Lane Grp Cap (vph)	347	682			1045		361	906			1071	
v/s Ratio Prot		0.16					0.02	c0.24				
v/s Ratio Perm	c0.34				0.13		0.11				0.19	
v/c Ratio	0.87	0.41			0.33		0.27	0.49			0.52	
Uniform Delay, d1	28.1	22.0			21.9		14.1	16.6			24.7	
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.17	
Incremental Delay, d2	21.3	0.8			0.4		0.6	1.9			1.7	
Delay (s)	49.4	22.9			22.3		14.7	18.5			30.5	
Level of Service	D	C			C		B	B			C	
Approach Delay (s)		36.4			22.3			17.8			30.5	
Approach LOS		D			C			B			C	

Intersection Summary

HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings  
12: Avonlough Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (vph)	586	85	96	440	63	122
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	0.983			0.911		
Flt Protected				0.991	0.983	
Satd. Flow (prot)	1836	0	0	1883	1668	0
Flt Permitted				0.991	0.983	
Satd. Flow (perm)	1836	0	0	1883	1668	0
Link Speed (k/h)	80			80	40	
Link Distance (m)	779.5			725.6	628.8	
Travel Time (s)	35.1			32.7	56.6	
Confl. Peds. (#/hr)		5	5			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	0%	0%	0%	4%	1%
Adj. Flow (vph)	586	85	96	440	63	122
Shared Lane Traffic (%)						
Lane Group Flow (vph)	671	0	0	536	185	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	85.5%
Analysis Period (min)	15
	ICU Level of Service E

HCM Unsignalized Intersection Capacity Analysis  
12: Avonlough Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (veh/h)	586	85	96	440	63	122
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	586	85	96	440	63	122
Pedestrians					5	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			676		1266	634
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			676		1266	634
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			90		62	75
cM capacity (veh/h)			921		165	479

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	671	536	185
Volume Left	0	96	63
Volume Right	85	0	122
cSH	1700	921	291
Volume to Capacity	0.39	0.10	0.64
Queue Length 95th (m)	0.0	2.8	32.2
Control Delay (s)	0.0	2.8	36.8
Lane LOS		A	E
Approach Delay (s)	0.0	2.8	36.8
Approach LOS			E

Intersection Summary

Average Delay	6.0
Intersection Capacity Utilization	85.5%
Analysis Period (min)	15
	ICU Level of Service E

Lanes, Volumes, Timings  
13: Marshall Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (vph)	673	54	2	454	90	7
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	0.990				0.990	
Frt Protected					0.956	
Satd. Flow (prot)	1844	0	0	1900	1798	0
Frt Permitted					0.956	
Satd. Flow (perm)	1844	0	0	1900	1798	0
Link Speed (k/h)	80			80	60	
Link Distance (m)	725.6			1183.9	670.5	
Travel Time (s)	32.7			53.3	40.2	
Confl. Peds. (#/hr)		2	2			
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	0%	0%	0%	0%
Adj. Flow (vph)	673	54	2	454	90	7
Shared Lane Traffic (%)						
Lane Group Flow (vph)	727	0	0	456	97	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	0.0			0.0	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
13: Marshall Rd & Moira Street W

29/10/2014

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↘			↖	↗	
Volume (veh/h)	673	54	2	454	90	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	673	54	2	454	90	7
Pedestrians					2	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			729		1160	702
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			729		1160	702
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		59	98
cM capacity (veh/h)			883		217	441

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	727	456	97
Volume Left	0	2	90
Volume Right	54	0	7
cSH	1700	883	226
Volume to Capacity	0.43	0.00	0.43
Queue Length 95th (m)	0.0	0.1	16.1
Control Delay (s)	0.0	0.1	32.5
Lane LOS		A	D
Approach Delay (s)	0.0	0.1	32.5
Approach LOS			D

Intersection Summary

Average Delay	2.5
Intersection Capacity Utilization 50.8%	ICU Level of Service A
Analysis Period (min)	15