

















APPENDIX C

Detailed Capacity Analysis

DRAFT

















HCM Unsignalized Intersection Capacity Analysis
 1: Baker Road N & Lake Street

2020 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	79	3	3	90	0	14	0	9	0	0	0
Future Volume (Veh/h)	0	79	3	3	90	0	14	0	9	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	90	3	3	102	0	16	0	10	0	0	0
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	102			93			200	200	92	210	201	102
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	102			93			200	200	92	210	201	102
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			100			98	100	99	100	100	100
cM capacity (veh/h)	1503			1514			762	699	971	743	697	959
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	93	105	26	0								
Volume Left	0	3	16	0								
Volume Right	3	0	10	0								
cSH	1503	1514	831	1700								
Volume to Capacity	0.00	0.00	0.03	0.00								
Queue Length 95th (m)	0.0	0.0	0.7	0.0								
Control Delay (s)	0.0	0.2	9.5	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	0.2	9.5	0.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			17.2%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
2: Birchpark Drive/7 St & Lake Street
















2020 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	96	6	8	82	0	9	0	32	2	0	0
Future Volume (Veh/h)	0	96	6	8	82	0	9	0	32	2	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	113	7	9	96	0	11	0	38	2	0	0
Pedestrians		2						16			4	
Lane Width (m)		3.5						3.5			3.5	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	100			136			248	250	132	272	254	102
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			136			248	250	132	272	254	102
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			99			98	100	96	100	100	100
cM capacity (veh/h)	1500			1440			685	640	901	641	637	954
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	120	105	49	2								
Volume Left	0	9	11	2								
Volume Right	7	0	38	0								
cSH	1500	1440	842	641								
Volume to Capacity	0.00	0.01	0.06	0.00								
Queue Length 95th (m)	0.0	0.1	1.4	0.1								
Control Delay (s)	0.0	0.7	9.5	10.6								
Lane LOS		A	A	B								
Approach Delay (s)	0.0	0.7	9.5	10.6								
Approach LOS			A	B								
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			21.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

















3: Betts Avenue & Lake Street

2020 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	131	0	1	81	3	0	0	3	0	0	0
Future Volume (Veh/h)	1	131	0	1	81	3	0	0	3	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	1	160	0	1	99	4	0	0	4	0	0	0
Pedestrians		4						6			2	
Lane Width (m)		3.5						3.5			0.0	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		0						1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	105			166			275	275	166	271	273	107
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	105			166			275	275	166	271	273	107
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			100			100	100	100	100	100	100
cM capacity (veh/h)	1499			1417			672	631	879	679	633	949
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total	161	104	4									
Volume Left	1	1	0									
Volume Right	0	4	4									
cSH	1499	1417	879									
Volume to Capacity	0.00	0.00	0.00									
Queue Length 95th (m)	0.0	0.0	0.1									
Control Delay (s)	0.1	0.1	9.1									
Lane LOS	A	A	A									
Approach Delay (s)	0.1	0.1	9.1									
Approach LOS			A									
Intersection Summary												
Average Delay			0.2									
Intersection Capacity Utilization			19.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
4: Park Road N & Lake Street

















2020 AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	162	0	5	112	3	5	0	15	8	2	5
Future Volume (Veh/h)	2	162	0	5	112	3	5	0	15	8	2	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	3	203	0	6	140	4	6	0	19	10	3	6
Pedestrians					1			10			8	
Lane Width (m)					3.5			3.5			3.5	
Walking Speed (m/s)					1.1			1.1			1.1	
Percent Blockage					0			1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	152			213			380	383	214	391	381	150
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	152			213			380	383	214	391	381	150
tC, single (s)	4.6			4.3			7.3	6.5	6.3	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.7			2.4			3.7	4.0	3.4	3.6	4.0	3.3
p0 queue free %	100			100			99	100	98	98	99	99
cM capacity (veh/h)	1174			1246			526	541	791	522	542	895
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	206	150	25	19								
Volume Left	3	6	6	10								
Volume Right	0	4	19	6								
cSH	1174	1246	706	605								
Volume to Capacity	0.00	0.00	0.04	0.03								
Queue Length 95th (m)	0.1	0.1	0.8	0.7								
Control Delay (s)	0.1	0.4	10.3	11.1								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.1	0.4	10.3	11.1								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			20.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

5: Bartlett Avenue & Lake Street

2020 AM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	38	149	104	41	0	78	7	41	0	5	0	
Future Volume (Veh/h)	0	38	149	104	41	0	78	7	41	0	5	0	
Sign Control		Free			Free			Stop			Stop		
Grade		0%			0%			0%			0%		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	
Hourly flow rate (vph)	0	45	177	124	49	0	93	8	49	0	6	0	
Pedestrians		5			1			4			10		
Lane Width (m)		3.5			3.5			3.5			3.5		
Walking Speed (m/s)		1.1			1.1			1.1			1.1		
Percent Blockage		0			0			0			1		
Right turn flare (veh)													
Median type		None				None							
Median storage (veh)													
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	59			226				442	444	138	494	533	64
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	59			226				442	444	138	494	533	64
tC, single (s)	4.1			4.1				7.2	6.6	6.2	7.1	6.7	6.2
tC, 2 stage (s)													
tF (s)	2.2			2.2				3.6	4.1	3.3	3.5	4.2	3.3
p0 queue free %	100			91				80	98	95	100	98	100
cM capacity (veh/h)	1544			1320				461	439	898	415	383	993
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1								
Volume Total	222	173	97	53	6								
Volume Left	0	124	93	0	0								
Volume Right	177	0	0	49	0								
cSH	1544	1320	460	832	383								
Volume to Capacity	0.00	0.09	0.21	0.06	0.02								
Queue Length 95th (m)	0.0	2.4	6.0	1.5	0.4								
Control Delay (s)	0.0	6.0	14.9	9.6	14.5								
Lane LOS		A	B	A	B								
Approach Delay (s)	0.0	6.0	13.0		14.5								
Approach LOS			B		B								
Intersection Summary													
Average Delay			5.6										
Intersection Capacity Utilization			42.3%		ICU Level of Service	A							
Analysis Period (min)			15										

HCM Unsignalized Intersection Capacity Analysis
6: Bartlett Avenue & Queen Elizabeth Way Westbound Ramp

2020 AM Peak Hour

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↖		↑↗			↘↙
Traffic Volume (veh/h)	154	21	101	368	0	117
Future Volume (Veh/h)	154	21	101	368	0	117
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	164	22	107	391	0	124
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	175					
pX, platoon unblocked						
vC, conflicting volume	364	249			107	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	364	249			107	
tC, single (s)	6.9	7.1			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	73	97			100	
cM capacity (veh/h)	598	727			1482	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	109	77	71	427	62	62
Volume Left	109	55	0	0	0	0
Volume Right	0	22	0	391	0	0
cSH	598	630	1700	1700	1700	1700
Volume to Capacity	0.18	0.12	0.04	0.25	0.04	0.04
Queue Length 95th (m)	5.0	3.1	0.0	0.0	0.0	0.0
Control Delay (s)	12.4	11.5	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	12.0		0.0		0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			26.4%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
7: Bartlett Avenue & South Service Road

2020 AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	4	2	101	0	132	1	348	153	53	216	2
Future Volume (vph)	1	4	2	101	0	132	1	348	153	53	216	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	95.0		0.0	160.0		0.0	15.0		0.0	100.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	100.0			100.0			7.6			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor							0.98				1.00	
Fr _t		0.950			0.850				0.850		0.999	
Fl _t Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	892	1339	0	1684	1521	0	1785	3433	1551	1750	3401	0
Fl _t Permitted	0.668			0.754			0.607			0.532		
Satd. Flow (perm)	628	1339	0	1336	1521	0	1120	3433	1551	980	3401	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			606				163			1
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		98.5			543.1			120.4			174.5	
Travel Time (s)		7.1			39.1			8.7			12.6	
Confl. Peds. (#/hr)							8					8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	100%	25%	50%	6%	0%	5%	0%	4%	3%	2%	4%	100%
Adj. Flow (vph)	1	4	2	107	0	140	1	370	163	56	230	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	6	0	107	140	0	1	370	163	56	232	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)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm		NA
Protected Phases		4		3	4		1	2				2
Permitted Phases	4			4			2		2	2		
Detector Phase	4	4		3	4		1	2	2	2		2
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	10.0	10.0	10.0		10.0
Minimum Split (s)	39.2	39.2		9.0	39.2		9.0	26.5	26.5	26.5		26.5
Total Split (s)	42.2	42.2		18.0	42.2		18.0	46.5	46.5	46.5		46.5
Total Split (%)	33.8%	33.8%		14.4%	33.8%		14.4%	37.3%	37.3%	37.3%		37.3%
Maximum Green (s)	35.0	35.0		15.0	35.0		15.0	40.0	40.0	40.0		40.0
Yellow Time (s)	4.1	4.1		3.0	4.1		3.0	4.1	4.1	4.1		4.1
All-Red Time (s)	3.1	3.1		0.0	3.1		0.0	2.4	2.4	2.4		2.4
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	7.2	7.2		3.0	7.2		3.0	6.5	6.5	6.5		6.5
Lead/Lag	Lag	Lag		Lead	Lag		Lead	Lag	Lag	Lag		Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes		Yes

Lanes, Volumes, Timings
7: Bartlett Avenue & South Service Road

2020 AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	None		None	None		None	Max	Max	Max	Max	
Walk Time (s)	12.0	12.0			12.0			8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	20.0	20.0			20.0			12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0			0			0	0	0	0	
Act Effect Green (s)	8.0	8.0		20.8	8.0		45.8	41.3	41.3	41.3	41.3	
Actuated g/C Ratio	0.10	0.10		0.27	0.10		0.60	0.54	0.54	0.54	0.54	
v/c Ratio	0.02	0.04		0.27	0.20		0.00	0.20	0.18	0.11	0.13	
Control Delay	34.0	29.5		21.4	0.6		6.0	10.2	2.6	10.9	9.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	34.0	29.5		21.4	0.6		6.0	10.2	2.6	10.9	9.8	
LOS	C	C		C	A		A	B	A	B	A	
Approach Delay		30.1			9.6			7.9			10.0	
Approach LOS		C			A			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 124.7

Actuated Cycle Length: 76.2

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.27

Intersection Signal Delay: 9.0

Intersection Capacity Utilization 48.7%

Analysis Period (min) 15












Intersection LOS: A
ICU Level of Service A

Splits and Phases: 7: Bartlett Avenue & South Service Road

Ø1	Ø2	Ø3	Ø4
18 s	46.5 s	18 s	42.2 s

HCM Unsignalized Intersection Capacity Analysis
 8: South Service Road & Queen Elizabeth Way Eastbound Ramp

2020 AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	144	69	137	4	93	102
Future Volume (Veh/h)	144	69	137	4	93	102
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	162	78	154	4	104	115
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	158				558	156
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	158				558	156
tC, single (s)	4.1				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.4
p0 queue free %	89				75	87
cM capacity (veh/h)	1422				422	877
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	162	78	158	104	115	
Volume Left	162	0	0	104	0	
Volume Right	0	0	4	0	115	
cSH	1422	1700	1700	422	877	
Volume to Capacity	0.11	0.05	0.09	0.25	0.13	
Queue Length 95th (m)	2.9	0.0	0.0	7.3	3.4	
Control Delay (s)	7.9	0.0	0.0	16.3	9.7	
Lane LOS	A			C	A	
Approach Delay (s)	5.3		0.0	12.9		
Approach LOS				B		
Intersection Summary						
Average Delay			6.6			
Intersection Capacity Utilization			30.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Baker Road N & Lake Street

Movement	NB
Directions Served	LTR
Maximum Queue (m)	10.1
Average Queue (m)	4.0
95th Queue (m)	11.2
Link Distance (m)	95.3
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: Birchpark Drive/7 St & Lake Street

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	5.5	13.7	7.4
Average Queue (m)	0.3	6.5	0.8
95th Queue (m)	2.9	13.5	4.9
Link Distance (m)	136.5	49.2	40.1
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Betts Avenue & Lake Street

Movement	NB
Directions Served	LTR
Maximum Queue (m)	8.3
Average Queue (m)	0.6
95th Queue (m)	4.3
Link Distance (m)	57.5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Park Road N & Lake Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	3.4	4.4	19.4	14.8
Average Queue (m)	0.1	0.1	5.0	4.4
95th Queue (m)	2.6	2.0	14.8	13.0
Link Distance (m)	260.3	165.1	90.8	64.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Bartlett Avenue & Lake Street

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	LT	TR	LTR
Maximum Queue (m)	4.1	12.9	20.3	17.9	13.1
Average Queue (m)	0.3	1.5	10.6	7.7	1.6
95th Queue (m)	2.7	7.7	17.3	15.8	7.7
Link Distance (m)	165.1	102.4	153.4	153.4	131.2
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Bartlett Avenue & Queen Elizabeth Way Westbound Ramp

Movement	WB	WB	NB
Directions Served	L	LR	TR
Maximum Queue (m)	24.9	16.4	1.4
Average Queue (m)	11.1	3.3	0.0
95th Queue (m)	18.9	11.5	1.0
Link Distance (m)	176.4	176.4	153.1
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Bartlett Avenue & South Service Road

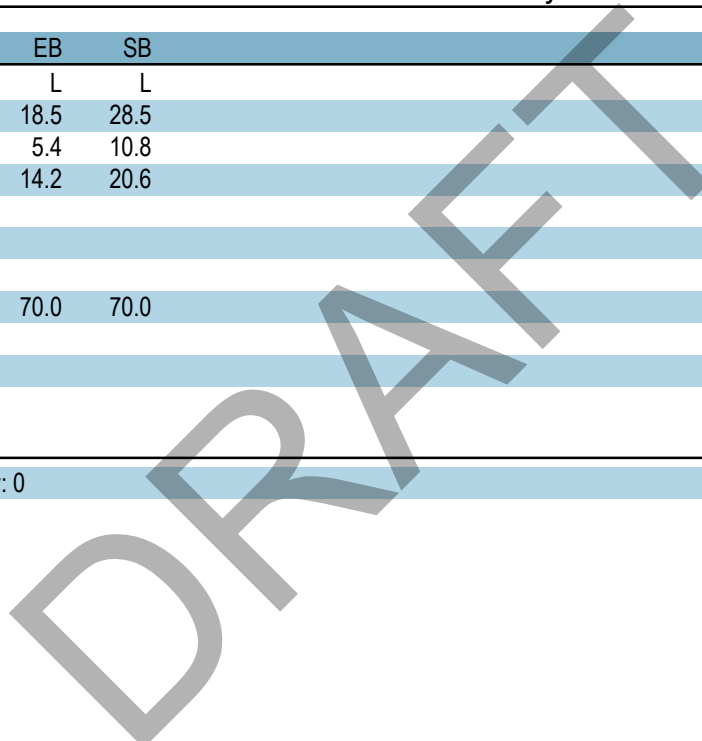
Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	2.6	10.9	34.4	27.9	1.2	26.5	43.5	4.7	15.8	19.2	20.3
Average Queue (m)	0.1	1.0	17.2	14.4	0.0	4.3	15.1	0.3	5.8	6.5	5.7
95th Queue (m)	2.0	5.9	30.7	24.5	1.0	15.1	32.9	3.7	13.8	15.1	14.9
Link Distance (m)		84.1		520.5		109.2	109.2	109.2		153.1	153.1
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (m)	95.0		160.0		15.0				100.0		
Storage Blk Time (%)							1				
Queuing Penalty (veh)							0				

Intersection: 8: South Service Road & Queen Elizabeth Way Eastbound Ramp

Movement	EB	SB
Directions Served	L	L
Maximum Queue (m)	18.5	28.5
Average Queue (m)	5.4	10.8
95th Queue (m)	14.2	20.6
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	70.0	70.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

















Network Summary

Network wide Queuing Penalty: 0



















HCM Unsignalized Intersection Capacity Analysis
 1: Baker Road N & Lake Street

2020 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	143	23	8	112	0	20	0	9	1	0	0
Future Volume (Veh/h)	1	143	23	8	112	0	20	0	9	1	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	1	152	24	9	119	0	21	0	10	1	0	0
Pedestrians								18			3	
Lane Width (m)								3.5			3.5	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								2			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	122			194			321	324	182	316	336	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	122			194			321	324	182	316	336	122
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			99			97	100	99	100	100	100
cM capacity (veh/h)	1474			1369			613	582	825	619	573	932
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	177	128	31	1								
Volume Left	1	9	21	1								
Volume Right	24	0	10	0								
cSH	1474	1369	669	619								
Volume to Capacity	0.00	0.01	0.05	0.00								
Queue Length 95th (m)	0.0	0.2	1.1	0.0								
Control Delay (s)	0.0	0.6	10.6	10.8								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.0	0.6	10.6	10.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.3									
Intersection Capacity Utilization			21.7%		ICU Level of Service				A			
Analysis Period (min)			15									
















HCM Unsignalized Intersection Capacity Analysis
2: Birchpark Drive/7 St & Lake Street

2020 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	126	6	28	129	1	6	0	23	0	0	0
Future Volume (Veh/h)	0	126	6	28	129	1	6	0	23	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	0	131	6	29	134	1	6	0	24	0	0	0
Pedestrians								19			2	
Lane Width (m)								3.5			3.5	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								2			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	137			156			346	348	153	352	350	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	137			156			346	348	153	352	350	136
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			98			99	100	97	100	100	100
cM capacity (veh/h)	1457			1388			584	556	860	571	555	916
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	137	164	30	0								
Volume Left	0	29	6	0								
Volume Right	6	1	24	0								
cSH	1457	1388	786	1700								
Volume to Capacity	0.00	0.02	0.04	0.00								
Queue Length 95th (m)	0.0	0.5	0.9	0.0								
Control Delay (s)	0.0	1.5	9.8	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	1.5	9.8	0.0								
Approach LOS			A	A								
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization			32.1%		ICU Level of Service				A			
Analysis Period (min)			15									

















HCM Unsignalized Intersection Capacity Analysis
3: Betts Avenue & Lake Street

2020 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	161	3	4	145	4	2	0	3	0	0	0
Future Volume (Veh/h)	3	161	3	4	145	4	2	0	3	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	3	171	3	4	154	4	2	0	3	0	0	0
Pedestrians					2			13				2
Lane Width (m)					3.5			3.5			0.0	
Walking Speed (m/s)					1.1			1.1			1.1	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	160			187			356	360	188	350	359	158
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	160			187			356	360	188	350	359	158
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			100			100	100	100	100	100	100
cM capacity (veh/h)	1432			1383			589	561	848	598	561	893
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total	177	162	5									
Volume Left	3	4	2									
Volume Right	3	4	3									
cSH	1432	1383	721									
Volume to Capacity	0.00	0.00	0.01									
Queue Length 95th (m)	0.0	0.1	0.2									
Control Delay (s)	0.1	0.2	10.0									
Lane LOS	A	A	B									
Approach Delay (s)	0.1	0.2	10.0									
Approach LOS			B									
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			21.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 4: Park Road N & Lake Street

















2020 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	164	4	16	163	10	2	0	5	12	0	4
Future Volume (Veh/h)	2	164	4	16	163	10	2	0	5	12	0	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	2	184	4	18	183	11	2	0	6	13	0	4
Pedestrians					2			4			1	
Lane Width (m)					3.5			3.5			3.5	
Walking Speed (m/s)					1.1			1.1			1.1	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	195			192			422	425	192	424	422	190
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	195			192			422	425	192	424	422	190
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	98	100	100
cM capacity (veh/h)	1389			1353			533	514	850	531	517	857
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	190	212	8	17								
Volume Left	2	18	2	13								
Volume Right	4	11	6	4								
cSH	1389	1353	740	583								
Volume to Capacity	0.00	0.01	0.01	0.03								
Queue Length 95th (m)	0.0	0.3	0.2	0.7								
Control Delay (s)	0.1	0.8	9.9	11.4								
Lane LOS	A	A	A	B								
Approach Delay (s)	0.1	0.8	9.9	11.4								
Approach LOS			A	B								
Intersection Summary												
Average Delay			1.1									
Intersection Capacity Utilization			29.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

5: Bartlett Avenue & Lake Street

2020 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	64	114	68	42	0	140	10	112	0	6	5
Future Volume (Veh/h)	2	64	114	68	42	0	140	10	112	0	6	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	70	125	75	46	0	154	11	123	0	7	5
Pedestrians								3			7	
Lane Width (m)								3.5			3.5	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	53			198			344	342	136	468	405	53
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	53			198			344	342	136	468	405	53
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			95			73	98	87	100	99	100
cM capacity (veh/h)	1556			1377			572	546	913	410	503	1014
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	197	121	160	128	12							
Volume Left	2	75	154	0	0							
Volume Right	125	0	0	123	5							
cSH	1556	1377	571	888	637							
Volume to Capacity	0.00	0.05	0.28	0.14	0.02							
Queue Length 95th (m)	0.0	1.3	8.7	3.8	0.4							
Control Delay (s)	0.1	5.0	13.7	9.7	10.8							
Lane LOS	A	A	B	A	B							
Approach Delay (s)	0.1	5.0	12.0		10.8							
Approach LOS			B		B							
Intersection Summary												
Average Delay			6.8									
Intersection Capacity Utilization			42.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 6: Bartlett Avenue & Queen Elizabeth Way Westbound Ramp

2020 PM Peak Hour

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↖		↖↗			↖↗
Traffic Volume (veh/h)	162	40	208	264	0	121
Future Volume (Veh/h)	162	40	208	264	0	121
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	167	41	214	272	0	125
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	175					
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	412	243			214	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	383	212			182	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	72	95			100	
cM capacity (veh/h)	588	791			1375	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	111	97	143	343	62	62
Volume Left	111	56	0	0	0	0
Volume Right	0	41	0	272	0	0
cSH	588	660	1700	1700	1700	1700
Volume to Capacity	0.19	0.15	0.08	0.20	0.04	0.04
Queue Length 95th (m)	5.3	3.9	0.0	0.0	0.0	0.0
Control Delay (s)	12.5	11.4	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	12.0		0.0		0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			26.8%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
7: Bartlett Avenue & South Service Road

2020 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	6	1	247	2	166	0	302	205	52	226	2
Future Volume (vph)	1	6	1	247	2	166	0	302	205	52	226	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	95.0		0.0	160.0		0.0	15.0		0.0	100.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	100.0			100.0			7.6			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor											1.00	
Fr _t		0.981			0.852				0.850		0.999	
Fl _t Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1785	1843	0	1750	1570	0	1879	3500	1551	1716	3462	0
Fl _t Permitted	0.576			0.752						0.549		
Satd. Flow (perm)	1082	1843	0	1385	1570	0	1879	3500	1551	992	3462	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			184				228		1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		98.5			543.1			120.4			174.5	
Travel Time (s)		7.1			39.1			8.7			12.6	
Confl. Peds. (#/hr)							10					10
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	2%	3%	4%	3%	0%
Adj. Flow (vph)	1	7	1	274	2	184	0	336	228	58	251	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1	8	0	274	186	0	0	336	228	58	253	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)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	4		1	2			2	
Permitted Phases	4			4			2		2	2		
Detector Phase	4	4		3	4		1	2	2	2	2	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	39.2	39.2		9.0	39.2		9.0	26.5	26.5	26.5	26.5	
Total Split (s)	42.2	42.2		18.0	42.2		18.0	46.5	46.5	46.5	46.5	
Total Split (%)	33.8%	33.8%		14.4%	33.8%		14.4%	37.3%	37.3%	37.3%	37.3%	
Maximum Green (s)	35.0	35.0		15.0	35.0		15.0	40.0	40.0	40.0	40.0	
Yellow Time (s)	4.1	4.1		3.0	4.1		3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	3.1	3.1		0.0	3.1		0.0	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		3.0	7.2		3.0	6.5	6.5	6.5	6.5	
Lead/Lag	Lag	Lag		Lead	Lag		Lead	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	

Lanes, Volumes, Timings
7: Bartlett Avenue & South Service Road

2020 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	None		None	None		None	Max	Max	Max	Max	
Walk Time (s)	12.0	12.0			12.0			8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	20.0	20.0			20.0			12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0			0			0	0	0	0	
Act Effect Green (s)	8.5	8.5		25.9	8.5			40.1	40.1	40.1	40.1	
Actuated g/C Ratio	0.11	0.11		0.33	0.11			0.51	0.51	0.51	0.51	
v/c Ratio	0.01	0.04		0.53	0.56			0.19	0.25	0.11	0.14	
Control Delay	32.0	30.7		22.7	12.8			11.2	2.5	11.6	10.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	32.0	30.7		22.7	12.8			11.2	2.5	11.6	10.8	
LOS	C	C		C	B			B	A	B	B	
Approach Delay		30.9			18.7			7.7			11.0	
Approach LOS		C			B			A			B	

Intersection Summary

Area Type: Other

Cycle Length: 124.7

Actuated Cycle Length: 78.5

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 12.4

Intersection LOS: B

Intersection Capacity Utilization 56.8%

ICU Level of Service B












Analysis Period (min) 15

Splits and Phases: 7: Bartlett Avenue & South Service Road



HCM Unsignalized Intersection Capacity Analysis
 8: South Service Road & Queen Elizabeth Way Eastbound Ramp

2020 PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	193	65	136	15	204	282
Future Volume (Veh/h)	193	65	136	15	204	282
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	214	72	151	17	227	313
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	168				660	160
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	168				660	160
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	85				36	65
cM capacity (veh/h)	1398				357	886
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	214	72	168	227	313	
Volume Left	214	0	0	227	0	
Volume Right	0	0	17	0	313	
cSH	1398	1700	1700	357	886	
Volume to Capacity	0.15	0.04	0.10	0.64	0.35	
Queue Length 95th (m)	4.1	0.0	0.0	31.6	12.2	
Control Delay (s)	8.0	0.0	0.0	31.0	11.3	
Lane LOS	A			D	B	
Approach Delay (s)	6.0		0.0	19.6		
Approach LOS				C		
Intersection Summary						
Average Delay			12.4			
Intersection Capacity Utilization			40.1%	ICU Level of Service	A	
Analysis Period (min)			15			

Intersection: 1: Baker Road N & Lake Street

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	6.0	13.7	5.7
Average Queue (m)	0.2	5.8	0.2
95th Queue (m)	2.7	13.5	2.6
Link Distance (m)	387.5	95.3	38.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Birchpark Drive/7 St & Lake Street

Movement	WB	NB
Directions Served	LTR	LTR
Maximum Queue (m)	12.8	17.6
Average Queue (m)	0.8	6.3
95th Queue (m)	5.6	14.9
Link Distance (m)	136.5	49.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Betts Avenue & Lake Street

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	2.8	3.0	8.4
Average Queue (m)	0.1	0.1	1.8
95th Queue (m)	1.5	2.0	7.3
Link Distance (m)	136.5	260.3	57.5
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Park Road N & Lake Street

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	7.4	11.4	9.1	11.3
Average Queue (m)	0.2	0.6	1.3	3.8
95th Queue (m)	4.7	4.7	6.3	11.2
Link Distance (m)	260.3	165.1	90.8	64.4
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Bartlett Avenue & Lake Street

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	LT	TR	LTR
Maximum Queue (m)	2.2	10.2	22.0	17.0	10.2
Average Queue (m)	0.1	1.3	11.7	9.7	2.6
95th Queue (m)	1.7	6.6	18.3	14.6	9.2
Link Distance (m)	165.1	102.4	153.4	153.4	131.2
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Bartlett Avenue & Queen Elizabeth Way Westbound Ramp

Movement	WB	WB	NB	NB
Directions Served	L	LR	T	TR
Maximum Queue (m)	23.1	14.9	1.5	3.7
Average Queue (m)	11.6	3.9	0.1	0.1
95th Queue (m)	18.7	11.8	1.4	2.1
Link Distance (m)	176.4	176.4	153.1	153.1
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Bartlett Avenue & South Service Road

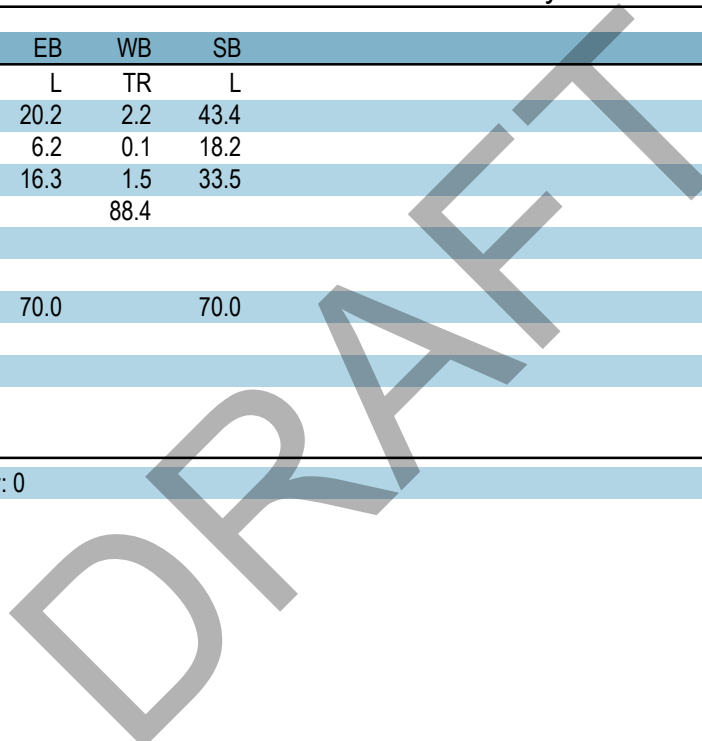
Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	T	T	R	L	T	TR
Maximum Queue (m)	7.1	10.1	58.7	29.0	19.3	32.0	12.6	24.5	24.6	21.4
Average Queue (m)	0.3	1.4	30.9	14.6	6.1	13.8	0.6	6.7	8.3	6.8
95th Queue (m)	2.6	6.6	49.3	24.5	14.8	27.9	7.0	17.2	19.3	16.2
Link Distance (m)		84.1		520.5	109.2	109.2	109.2		153.1	153.1
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)	95.0		160.0					100.0		
Storage Blk Time (%)					1					
Queuing Penalty (veh)					0					

Intersection: 8: South Service Road & Queen Elizabeth Way Eastbound Ramp

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (m)	20.2	2.2	43.4
Average Queue (m)	6.2	0.1	18.2
95th Queue (m)	16.3	1.5	33.5
Link Distance (m)		88.4	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	70.0		70.0
Storage Blk Time (%)			
Queuing Penalty (veh)			

















Network Summary

Network wide Queuing Penalty: 0



















HCM Unsignalized Intersection Capacity Analysis
 1: Baker Road N & Lake Street

2020 Saturday Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	144	22	8	120	0	16	0	15	0	0	0
Future Volume (Veh/h)	1	144	22	8	120	0	16	0	15	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	1	158	24	9	132	0	18	0	16	0	0	0
Pedestrians					2			9			4	
Lane Width (m)					3.5			3.5			3.5	
Walking Speed (m/s)					1.1			1.1			1.1	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	136			191			331	335	181	344	347	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	136			191			331	335	181	344	347	136
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			99			97	100	98	100	100	100
cM capacity (veh/h)	1455			1384			612	578	858	591	569	915
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	183	141	34	0								
Volume Left	1	9	18	0								
Volume Right	24	0	16	0								
cSH	1455	1384	708	1700								
Volume to Capacity	0.00	0.01	0.05	0.00								
Queue Length 95th (m)	0.0	0.1	1.1	0.0								
Control Delay (s)	0.0	0.5	10.3	0.0								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.0	0.5	10.3	0.0								
Approach LOS			B	A								
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			22.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
2: Birchpark Drive/7 St & Lake Street
















2020 Saturday Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	155	7	28	122	0	7	1	18	0	0	1
Future Volume (Veh/h)	0	155	7	28	122	0	7	1	18	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	185	8	33	145	0	8	1	21	0	0	1
Pedestrians								10			7	
Lane Width (m)								3.5			3.5	
Walking Speed (m/s)								1.1			1.1	
Percent Blockage								1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	152			203			411	417	199	428	421	152
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	152			203			411	417	199	428	421	152
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			98			98	100	97	100	100	100
cM capacity (veh/h)	1432			1369			533	509	840	507	507	894
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	193	178	30	1								
Volume Left	0	33	8	0								
Volume Right	8	0	21	1								
cSH	1432	1369	715	894								
Volume to Capacity	0.00	0.02	0.04	0.00								
Queue Length 95th (m)	0.0	0.6	1.0	0.0								
Control Delay (s)	0.0	1.6	10.3	9.0								
Lane LOS		A	B	A								
Approach Delay (s)	0.0	1.6	10.3	9.0								
Approach LOS			B	A								
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			37.0%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

















3: Betts Avenue & Lake Street

2020 Saturday Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	163	3	4	149	6	0	5	1	0	0	0
Future Volume (Veh/h)	9	163	3	4	149	6	0	5	1	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	10	179	3	4	164	7	0	5	1	0	0	0
Pedestrians		8						4			5	
Lane Width (m)		3.5						3.5			0.0	
Walking Speed (m/s)		1.1						1.1			1.1	
Percent Blockage		1						0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	176			186			388	388	184	384	386	180
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	176			186			388	388	184	384	386	180
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 %	99			100			100	99	100	100	100	100
cM capacity (veh/h)	1412			1396			563	542	860	567	544	861
Direction, Lane #	EB 1	WB 1	NB 1									
Volume Total	192	175	6									
Volume Left	10	4	0									
Volume Right	3	7	1									
cSH	1412	1396	578									
Volume to Capacity	0.01	0.00	0.01									
Queue Length 95th (m)	0.2	0.1	0.2									
Control Delay (s)	0.5	0.2	11.3									
Lane LOS	A	A	B									
Approach Delay (s)	0.5	0.2	11.3									
Approach LOS			B									
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			25.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
4: Park Road N & Lake Street

















2020 Saturday Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	158	1	7	150	13	3	0	5	14	2	11
Future Volume (Veh/h)	0	158	1	7	150	13	3	0	5	14	2	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	180	1	8	170	15	3	0	6	16	2	13
Pedestrians		3			2			5			1	
Lane Width (m)		3.5			3.5			3.5			3.5	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	186			186			396	388	188	383	380	182
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	186			186			396	388	188	383	380	182
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			99			99	100	99	97	100	98
cM capacity (veh/h)	1399			1394			549	544	854	568	549	863
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	181	193	9	31								
Volume Left	0	8	3	16								
Volume Right	1	15	6	13								
cSH	1399	1394	721	662								
Volume to Capacity	0.00	0.01	0.01	0.05								
Queue Length 95th (m)	0.0	0.1	0.3	1.1								
Control Delay (s)	0.0	0.4	10.1	10.7								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.4	10.1	10.7								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.2									
Intersection Capacity Utilization			25.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

5: Bartlett Avenue & Lake Street

2020 Saturday Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (veh/h)	7	74	114	76	43	2	1	113	9	93	1	11
Future Volume (Veh/h)	7	74	114	76	43	2	1	113	9	93	1	11
Sign Control		Free			Free				Stop			Stop
Grade		0%			0%				0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	8	81	125	84	47	2	0	124	10	102	1	12
Pedestrians		4							1			2
Lane Width (m)		3.5							3.5			3.5
Walking Speed (m/s)		1.1							1.1			1.1
Percent Blockage		0							0			0
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked							0.00					
vC, conflicting volume	51			207			0	386	380	144	484	441
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	51			207			0	386	380	144	484	441
tC, single (s)	4.1			4.1			0.0	7.1	6.5	6.2	7.1	6.5
tC, 2 stage (s)												
tF (s)	2.2			2.2			0.0	3.5	4.0	3.3	3.5	4.0
p0 queue free %	99			94			0	77	98	89	100	97
cM capacity (veh/h)	1565			1375			0	531	518	902	410	478
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1							
Volume Total	214	133	129	107	13							
Volume Left	8	84	124	0	1							
Volume Right	125	2	0	102	0							
cSH	1565	1375	531	872	472							
Volume to Capacity	0.01	0.06	0.24	0.12	0.03							
Queue Length 95th (m)	0.1	1.5	7.2	3.2	0.6							
Control Delay (s)	0.3	5.1	13.9	9.7	12.8							
Lane LOS	A	A	B	A	B							
Approach Delay (s)	0.3	5.1	12.0		12.8							
Approach LOS			B		B							
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			41.4%		ICU Level of Service				A			
Analysis Period (min)			15									

Movement	SBR
Lane Configurations	
Traffic Volume (veh/h)	0
Future Volume (Veh/h)	0
Sign Control	
Grade	
Peak Hour Factor	0.91
Hourly flow rate (vph)	0
Pedestrians	
Lane Width (m)	
Walking Speed (m/s)	
Percent Blockage	
Right turn flare (veh)	
Median type	
Median storage (veh)	
Upstream signal (m)	
pX, platoon unblocked	
vC, conflicting volume	54
vC1, stage 1 conf vol	
vC2, stage 2 conf vol	
vCu, unblocked vol	54
tC, single (s)	6.2
tC, 2 stage (s)	
tF (s)	3.3
p0 queue free %	100
cM capacity (veh/h)	1013
Direction, Lane #	

DRAFT

HCM Unsignalized Intersection Capacity Analysis
6: Bartlett Avenue & Queen Elizabeth Way Westbound Ramp

2020 Saturday Peak Hour

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙↖		↑↗			↘↙
Traffic Volume (veh/h)	125	25	175	254	0	134
Future Volume (Veh/h)	125	25	175	254	0	134
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	126	25	177	257	0	135
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	175					
pX, platoon unblocked						
vC, conflicting volume	373	217			177	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	373	217			177	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	79	97			100	
cM capacity (veh/h)	604	794			1396	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	84	67	118	316	68	68
Volume Left	84	42	0	0	0	0
Volume Right	0	25	0	257	0	0
cSH	604	663	1700	1700	1700	1700
Volume to Capacity	0.14	0.10	0.07	0.19	0.04	0.04
Queue Length 95th (m)	3.7	2.6	0.0	0.0	0.0	0.0
Control Delay (s)	11.9	11.0	0.0	0.0	0.0	0.0
Lane LOS	B	B				
Approach Delay (s)	11.5		0.0		0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			24.0%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
7: Bartlett Avenue & South Service Road

2020 Saturday Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	12	3	202	1	120	1	285	144	42	206	2
Future Volume (vph)	0	12	3	202	1	120	1	285	144	42	206	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	95.0		0.0	160.0		0.0	15.0		0.0	100.0		0.0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (m)	100.0			100.0			7.6			20.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Ped Bike Factor							0.98				1.00	
Fr _t		0.972			0.851				0.850		0.999	
Fl _t Protected				0.950			0.950			0.950		
Satd. Flow (prot)	1879	1826	0	1767	1538	0	1785	3535	1581	1785	3565	0
Fl _t Permitted				0.747			0.608			0.560		
Satd. Flow (perm)	1879	1826	0	1390	1538	0	1124	3535	1581	1052	3565	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			133				160		1	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		98.5			543.1			120.4			174.5	
Travel Time (s)		7.1			39.1			8.7			12.6	
Confl. Peds. (#/hr)							7					7
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	1%	0%	4%	0%	1%	1%	0%	0%	0%
Adj. Flow (vph)	0	13	3	224	1	133	1	317	160	47	229	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	16	0	224	134	0	1	317	160	47	231	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)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		pm+pt	NA		pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	4		1	2			2	
Permitted Phases	4			4			2		2	2		
Detector Phase	4	4		3	4		1	2	2	2	2	
Switch Phase												
Minimum Initial (s)	8.0	8.0		6.0	8.0		6.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	39.2	39.2		9.0	39.2		9.0	26.5	26.5	26.5	26.5	
Total Split (s)	42.2	42.2		18.0	42.2		18.0	46.5	46.5	46.5	46.5	
Total Split (%)	33.8%	33.8%		14.4%	33.8%		14.4%	37.3%	37.3%	37.3%	37.3%	
Maximum Green (s)	35.0	35.0		15.0	35.0		15.0	40.0	40.0	40.0	40.0	
Yellow Time (s)	4.1	4.1		3.0	4.1		3.0	4.1	4.1	4.1	4.1	
All-Red Time (s)	3.1	3.1		0.0	3.1		0.0	2.4	2.4	2.4	2.4	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	7.2	7.2		3.0	7.2		3.0	6.5	6.5	6.5	6.5	
Lead/Lag	Lag	Lag		Lead	Lag		Lead	Lag	Lag	Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes	Yes	Yes	Yes	

Lanes, Volumes, Timings
7: Bartlett Avenue & South Service Road

2020 Saturday Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5	2.5	2.5	2.5	
Recall Mode	None	None		None	None		None	Max	Max	Max	Max	
Walk Time (s)	12.0	12.0			12.0			8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	20.0	20.0			20.0			12.0	12.0	12.0	12.0	
Pedestrian Calls (#/hr)	0	0			0			0	0	0	0	
Act Effect Green (s)		8.4		24.5	8.4		44.8	40.2	40.2	40.2	40.2	
Actuated g/C Ratio		0.11		0.31	0.11		0.57	0.51	0.51	0.51	0.51	
v/c Ratio		0.08		0.46	0.48		0.00	0.18	0.18	0.09	0.13	
Control Delay		31.6		23.0	13.3		8.0	11.7	3.0	12.5	11.4	
Queue Delay		0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay		31.6		23.0	13.3		8.0	11.7	3.0	12.5	11.4	
LOS		C		C	B		A	B	A	B	B	
Approach Delay		31.6			19.3			8.8				11.6
Approach LOS		C			B			A				B

Intersection Summary

Area Type: Other

Cycle Length: 124.7

Actuated Cycle Length: 78.9

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 13.1

Intersection LOS: B

Intersection Capacity Utilization 54.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 7: Bartlett Avenue & South Service Road

Ø1	Ø2	Ø3	Ø4
18 s	46.5 s	18 s	42.2 s

HCM Unsignalized Intersection Capacity Analysis
 8: South Service Road & Queen Elizabeth Way Eastbound Ramp

2020 Saturday Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↷		↶	↷
Traffic Volume (veh/h)	141	66	82	5	147	193
Future Volume (Veh/h)	141	66	82	5	147	193
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	147	69	85	5	153	201
Pedestrians		2				
Lane Width (m)		3.5				
Walking Speed (m/s)		1.1				
Percent Blockage		0				
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	90				450	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90				450	90
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				70	79
cM capacity (veh/h)	1512				511	969
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	147	69	90	153	201	
Volume Left	147	0	0	153	0	
Volume Right	0	0	5	0	201	
cSH	1512	1700	1700	511	969	
Volume to Capacity	0.10	0.04	0.05	0.30	0.21	
Queue Length 95th (m)	2.5	0.0	0.0	9.5	5.9	
Control Delay (s)	7.6	0.0	0.0	15.0	9.7	
Lane LOS	A			C	A	
Approach Delay (s)	5.2		0.0	12.0		
Approach LOS				B		
Intersection Summary						
Average Delay			8.1			
Intersection Capacity Utilization			29.6%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection: 1: Baker Road N & Lake Street

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	1.5	5.9	10.2
Average Queue (m)	0.1	0.3	5.3
95th Queue (m)	1.2	2.9	12.4
Link Distance (m)	127.2	387.5	95.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Birchpark Drive/7 St & Lake Street

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	11.3	12.7	5.8
Average Queue (m)	0.9	5.8	0.4
95th Queue (m)	5.7	12.9	3.3
Link Distance (m)	136.5	49.2	40.1
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Betts Avenue & Lake Street

Movement	EB	WB	NB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	6.4	5.4	8.4
Average Queue (m)	0.5	0.2	1.7
95th Queue (m)	4.0	2.8	7.3
Link Distance (m)	136.5	260.3	57.5
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Park Road N & Lake Street

Movement	WB	NB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (m)	6.1	9.2	10.3
Average Queue (m)	0.3	2.2	5.4
95th Queue (m)	2.7	8.4	12.7
Link Distance (m)	165.1	90.8	64.4
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Bartlett Avenue & Lake Street

Movement	EB	WB	NB	NB	SB
Directions Served	LTR	LTR	ULT	TR	LTR
Maximum Queue (m)	2.7	9.3	19.8	18.1	10.3
Average Queue (m)	0.1	2.4	11.0	8.9	3.2
95th Queue (m)	1.8	8.8	16.7	14.6	10.3
Link Distance (m)	165.1	102.4	153.4	153.4	131.2
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Bartlett Avenue & Queen Elizabeth Way Westbound Ramp

Movement	WB	WB	NB
Directions Served	L	LR	TR
Maximum Queue (m)	20.0	11.7	2.8
Average Queue (m)	10.0	2.4	0.1
95th Queue (m)	16.1	9.1	2.2
Link Distance (m)	176.4	176.4	153.1
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Bartlett Avenue & South Service Road

Movement	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	TR	L	TR	L	T	T	R	L	T	TR
Maximum Queue (m)	13.3	47.4	25.7	1.4	19.9	34.0	6.2	14.7	19.0	18.8
Average Queue (m)	3.3	26.5	12.6	0.0	5.4	12.5	0.4	5.8	6.2	5.9
95th Queue (m)	10.9	41.8	20.9	1.1	14.8	27.9	4.4	13.4	15.4	14.2
Link Distance (m)	84.1		520.5		109.2	109.2	109.2		153.1	153.1
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (m)		160.0		15.0				100.0		
Storage Blk Time (%)						1				
Queuing Penalty (veh)						0				

Intersection: 8: South Service Road & Queen Elizabeth Way Eastbound Ramp

Movement	EB	SB
Directions Served	L	L
Maximum Queue (m)	14.7	28.6
Average Queue (m)	3.1	12.3
95th Queue (m)	10.8	21.9
Link Distance (m)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	70.0	70.0
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

