City of Hamilton

Mohawk Road EA Study

Traffic Operations Report

B000941

30/01/2019

B000941

SUBMITTED BY CIMA CANADA INC.
400–3027 Harvester Road
Burlington, ON L7N 3G7
T: 289-288-0287 F: 289-288-0285
cima.ca

CONTACT
Phil Weber
Phil.Weber@cima.ca
T: 905-695-1005, 6732

City of Hamilton

Mohawk Road EA Study

Traffic Operations Analysis

Project no. B000941

PREPARED BY: ______________________________

Gordon Scobie, P.Eng.
Project Engineer

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Giovani Bottesini, P.Eng., M.Eng.
Project Engineer

VERIFIED BY: ______________________________

Phil Weber, P.Eng., M.Eng.
Director, Traffic Engineering

CIMA+
3027 Harvester Rd.
Burlington, Ontario L7N 3G7

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Appendices

1. Introduction

CIMA+ was retained by the City of Hamilton (the City) to conduct an Environmental Assessment (EA) to optimize and improve roadway elements for the 2031 horizon year along Mohawk Road, between McNiven Road/Lime Kiln Road and Filman Road. The purpose of this memorandum is to summarize the traffic operational analysis that was conducted as part of the formal EA process.

The traffic operational analysis that was conducted includes:

- Review of existing conditions;
- Traffic volume forecasting; and
- Review of projected conditions, including a Do-Nothing scenario (2-lane cross section) and two scenarios with 3-lane cross sections (centre two-way left-turn lane, plus two westbound (WB) lanes and one eastbound (EB) lane).

Figure 1 depicts the study area limits (highlighted in red) and the local area context.

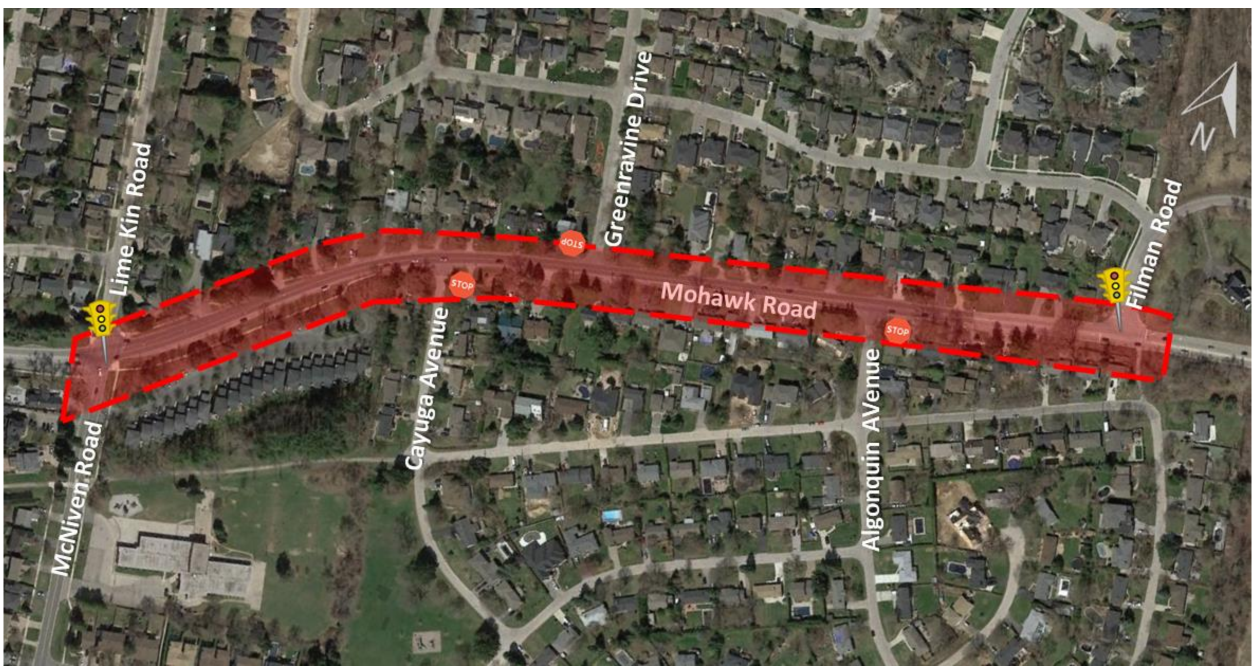


Figure 1: Mohawk Road EA Study Area

2. Existing Conditions

Mohawk Road is a major east-west arterial road which extends from Highway 403 in the east to Lowden Avenue in the west, where it becomes Rousseaux Street. For analysis purposes, the study area is comprised of an approximate 800 m segment of Mohawk Road between McNiven Road/Lime Kiln Road and Filman Road. Within the study area, there are two existing signalized intersections and three intersections with STOP control on the minor approaches only (as depicted on **Figure 1**). The lane use surrounding the study area, and along Mohawk Road, is predominantly low-density residential.

Mohawk Road is classified as an arterial road within the study area. The posted speed limit is 50 km/h and there is a single travel lane in both the eastbound and westbound directions. At the signalized McNiven Road/Lime Kiln Road intersection, auxilary left-turn lanes are provided for all directions and an auxiliary right-turn lane is provided for the eastbound right-turn movement only. At the signalized Filman Road intersection, auxiliary turn lanes are provied for the eastbound left-turn and southbound right-turn movements only. The unsignalized study area intersections are 'T' intersections with Mohawk Road and consist of a single-lane approach in all directions, with the exception of the Algonquin Avenue intersection where an auxiliary westbound left-turn lane is provided.

2.1 Existing Traffic Volumes

Recent vehicle turning movement count (TMC) data was provided by the City for each study area intersection. The dates when TMC data was collected is summarized in the following **Table 1** and the weekday peak hour volumes for each intersection are illustrated on **Figure 2**. Detailed TMC data is provided as **Appendix A**.

Table 1: TMC Data Collection Dates and Peak Hours

Intersection	Count Date	AM Peak Hour	PM Peak Hour
Mohawk Road & McNiven Road/Lime Kiln Road	Thursday, April 26, 2018	8:45 – 9:45	17:00 – 18:00
Mohawk Road & Green Ravine Drive	Thursday, June 21, 2018	7:45 – 9:45	16:45 – 17:45
Mohawk Road & Algonquin Avenue	Monday, June 4, 2018	8:00 – 9:00	16:00 – 17:00
Mohawk Road & Filman Road	Monday, April 25, 2018	8:00 – 9:00	16:45 – 17:45

As shown in **Table 1,** AM and PM peak hours vary for different intersections within the study area. For analysis and volume balancing purposes, data that was collected between 8:00 and 9:00, and between 16:45 to 17:45 was selected to represent AM and PM peak hours, respectively. It should be noted that CIMA+ completed AM and PM peak hour counts at the Mohawk/Cayuga intersection, on Thursday, July 19, 2018 to confirm the assumed peak hours.

Figure 2 depicts the existing observed peak hour intersection volumes.

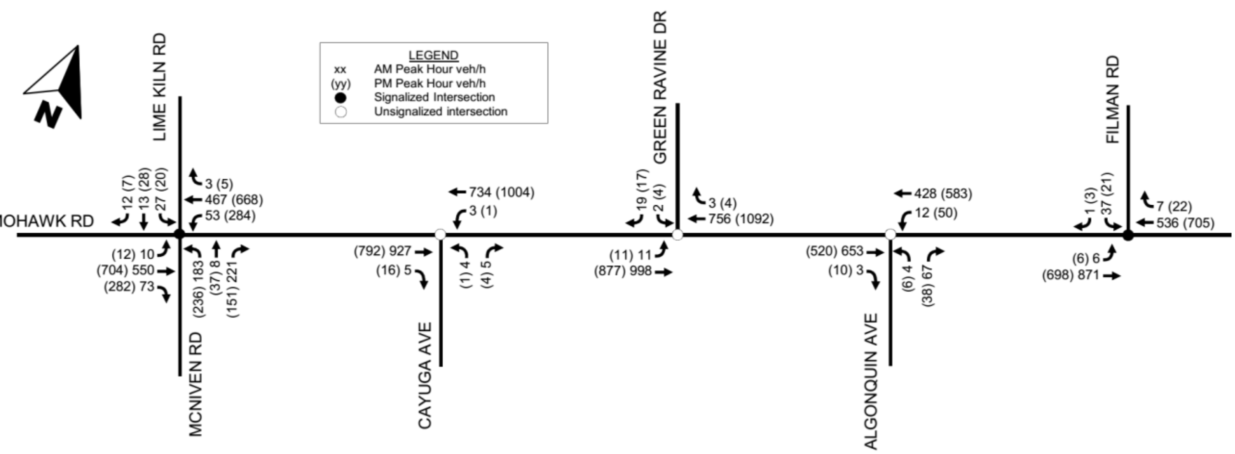


Figure 2: Existing Intersection Volumes – Observed TMC Data

Despite using a common peak hour when extracting TMC data, notable imbalances were revealed between study area intersections. Traffic volumes were conservatively balanced by proportionally increasing approach volumes at select study area intersections, such that total network volumes are consistent with higher observed volumes.

Figure 3 depicts the resultant balanced existing intersection volumes used for analysis purposes.

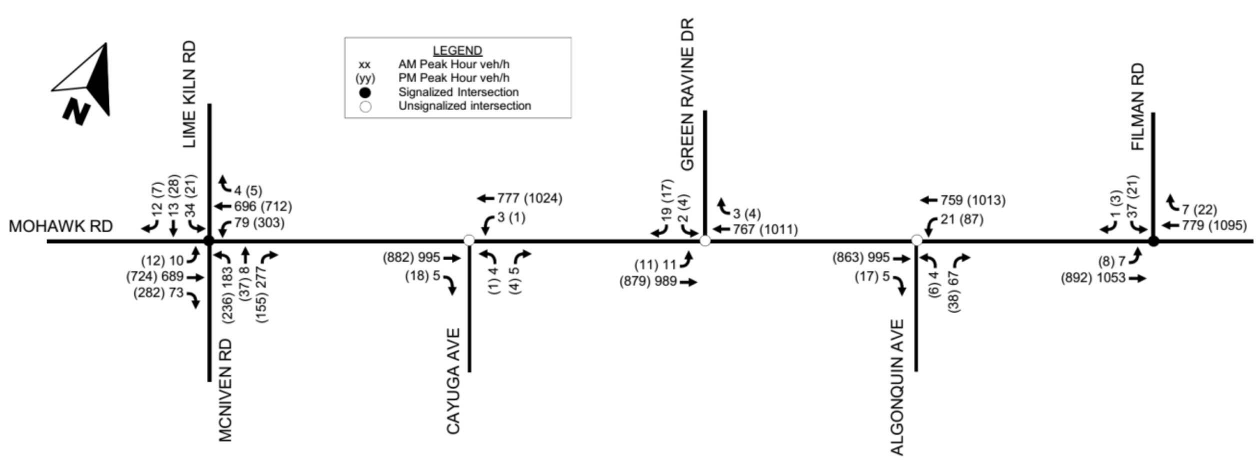


Figure 3: Existing Intersection Volumes - Balanced

2.2 Existing Intersection Operations

Intersection capacity analysis was conducted using the traffic analysis software Synchro (v9) and the following procedures described in the Highway Capacity Manual (HCM). The subsequent analysis primarily focuses on performance measures such as Level-of-Service (LOS), a volume-to-capacity (v/c) ratio, and 95th percentile queues.

LOS is a qualitative measure of operational performance and is based on control delay. The following **Table 2** summarizes the LOS criteria for signalized intersections.

Table 2: LOS Criteria for Signalized and Unsignalized Intersections

LOS	Control Delay (seconds/vehicle)
A	0 – 10
B	> 10 – 20
C	> 20 – 35
D	> 35 – 55
E	> 55 – 80
F	> 80

The v/c ratio is the ratio between traffic volume (in terms of vehicles per hour) and the theoretical capacity of an intersection movement. A v/c ratio greater than 1.0 indicates that a movement is processing more vehicles in an hour than theoretically possible.

The 95th Percentile Queue is the queue length that has only a 5 percent probability of being exceeded during the analysis period. It is industry practice and accepted methodology to use the 95th percentile queue length for design and operational analysis purposes.

Existing intersection operations were reviewed, using Synchro/SimTraffic software, using the balanced volumes described in the previous section as well as considering existing signal timing plans provided by the City. **Table 3** summarizes existing peak hour operations at the study area intersections. Detailed Synchro/Sim Traffic data output is provided as **Appendix B**.

Table 3: AM(PM) Peak Hour Intersection Performance - Existing

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Mohawk Road at McNiven Road/Lime Kiln Road										
EB	L	31	0.04	8	A	18	0.05	12	B	7
	T	-	0.67	16	B	100	0.84	29	C	212
	R	36	0.06	8	A	41	0.30	15	B	88
WB	L	48	0.23	9	A	22	1.02	78	E	152
	T/R	-	0.63	11	B	97	0.65	13	B	291
NB	L	29	0.73	44	D	53	0.84	53	D	88
	T/R	-	0.22	32	C	63	0.22	30	C	187
SB	L	20	0.33	33	C	19	0.11	30	C	13
	T/R	-	0.05	31	C	12	0.08	29	C	16
Overall		-	0.69	19	B	-	1.00	31	C	-
Mohawk Road at Cayuga Avenue										
EB	T/R		0.61	0	-	-	0.61	0	-	11
WB	L/T		0.01	0	A	18	0.00	0	A	133
NB	L/R	-	0.11	53	F	6	0.09	64	F	20
Overall		-	0.63	1	B	-	0.65	1	C	-
Mohawk Road at Green Ravine Drive										
EB	L/T		0.02	1	A	20	0.02	1	A	69
WB	T/R		0.48	0	-	3	0.61	0	-	177
SB	L/R	-	0.08	18	C	13	0.08	20	C	28
Overall		-	0.71	1	C	-	0.65	1	C	-
Mohawk Road at Algonquin Avenue										
EB	T/R		0.64	0	-	-	0.54	0	-	-
WB	L	-	0.04	11	B	13	0.12	11	B	37
	T		0.49	0	-	-	0.63	0	-	80
NB	L/R	-	0.36	31	D	24	14.0	Error	F	19
Overall		-	0.64	2	B	-	0.66	216	C	-
Mohawk Road at Filman Road										
EB	L	28	0.02	2	A	8	0.03	2	A	9
	T	-	0.78	9	A	118	0.66	6	A	80
WB	T	-	0.33	3	A	76	0.45	3	A	96
	T/R	-	-	-	-	43	-	-	-	75
SB	L	-	0.44	34	C	15	0.25	34	C	10
	R	20	0.00	32	C	2	0.00	33	C	4
Overall		-	0.76	7	A	-	0.64	5	A	-

As shown in **Table 3**, the majority of movements at study area intersections are currently operating with delays equivalent to LOS C or lower during both AM and PM peak hours. Individual movements noted to be currently operating with long delays and/or high v/c ratios, exceeding the City's thresholds include:

Mohawk Road at McNiven Road/Lime Kin Road

- The westbound left-turn operating with a v/c of 1.02 and delays of 78 seconds during the PM peak hour

This is due a high volume of westbound left-turning vehicles. Given this movement currently has a protected green phase, dual auxiliary left-turn lanes will be required to achieve a more reasonable LOS.

Mohawk Road at Cayuga Avenue

- The northbound approach operating with a v/c of 0.11 and delays of 53 seconds during the AM peak hour
- The northbound approach operating with a v/c of 0.09 and delays of 64 seconds during the PM peak hour

The low v/c and high delay is attributed to the lack of acceptable gaps for drivers on Cayuga Avenue attempting to turn onto Mohawk Road. Delays to the northbound approach can be mitigated with intersection signal control; however given that turning movements at this location are low, intersection signal control warrants will not be triggered based on volume.

Mohawk Road at Algonquin Avenue

- The northbound approach operating with a v/c of 0.36 and delays of 31 seconds during the AM peak hour
- The northbound approach operating with a v/c of 14.0 and incalculable delays seconds during the PM peak hour

The low v/c and high delay is attributed to the lack of sufficiently-long gaps for drivers on Algonquin Avenue attempting to turn onto Mohawk Road. Delays to the northbound approach can be mitigated with intersection signal control; however given that turning movements at this location are low, intersection signal control warrants will not be triggered based on volume. The high v/c ratio of 14.0 and incalculable delays are a result of the capacity analysis software's limitation. When the Algonquin Avenue intersection is coded in isolation, or with a greater distance from Filman Road, the resulting v/c ratio is 0.33; however, delays are still notably high for reasons mentioned above.

3. Future Do-Nothing Conditions

3.1 Traffic Volume Projections

For the purpose of this assessment, a 1% annual growth rate (as provided by the City) was applied to existing 2018 volumes to obtain projected future volumes for the 2031 planning horizon year. Since the area surrounding the study area in built-out, only the east and westbound volumes along Mohawk Road and the northbound right-turn movement at the McNiven Road/Lime Kiln Road intersection were grown. The resulting projected 2031 future traffic volumes are depicted as **Figure 4**.

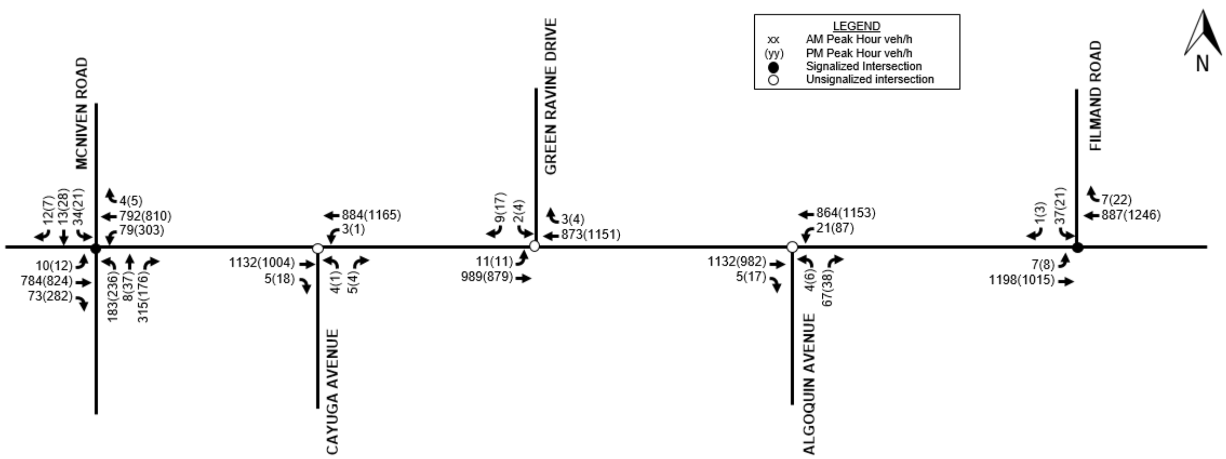


Figure 4: Projected 2031 Intersection Volumes

3.2 Intersection Operations

Based on the projected 2031 volumes depicted on **Figure 4**, and considering optimized signal timing plans (120-second cycle) and existing intersection geometry, the following **Table 4** summarizes projected peak hour operations at study area intersections, as a 'Do Nothing' scenario. Detailed Synchro/Sim Traffic data output is provided as **Appendix C**.

Table 4: AM(PM) Peak Hour Intersection Performance – Projected Do Nothing

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Mohawk Road at McNiven Road/Lime Kiln Road										
EB	L	31	0.04	8	A	4	0.05	14	B	6
	T	-	0.74	18	B	182	0.95	47	D	203
	R	36	0.06	8	A	43	0.32	17	B	57
WB	L	48	0.32	12	B	50	0.96	78	E	65
	T/R	-	0.69	12	B	136	0.68	13	B	268
NB	L	29	0.66	38	D	43	0.85	62	E	42
	T/R	-	0.36	31	C	134	0.23	37	D	156
SB	L	20	0.44	33	C	28	0.14	36	D	13
	T/R	-	0.05	29	C	35	0.08	36	D	11
Overall		-	0.73	19	B	-	0.93	37	D	-
Mohawk Road at Cayuga Avenue										
EB	T/R	-	0.70	0	-	0	0.69	0	-	104
WB	L/T	-	0.01	0	A	9	0.00	0	A	109
NB	L/R	-	0.22	117	F	10	0.28	232	F	4
Overall		-	0.70	1	C	-	0.72	1	C	-
Mohawk Road at Green Ravine Drive										
EB	L/T	-	0.02	1	A	36	0.03	1	A	66
WB	T/R	-	0.54	-	-	0	0.69	0	-	54
SB	L/R	-	0.05	22	C	9	0.09	23	C	23
Overall		-	0.71	1	C	-	0.71	1	C	-
Mohawk Road at Algonquin Avenue										
EB	T/R	-	0.73	0	-	34	0.62	0	-	0
WB	L	-	0.04	12	B	13	0.14	11	B	28
	T	-	0.55	0	-	0	0.71	0	-	44
NB	L/R	-	0.49	48	E	41	473	Err	F	43
Overall		-	0.71	2	C	-	0.71	192	C	-
Mohawk Road at Filman Road										
EB	L	28	0.02	2	A	15	0.03	2	A	7
	T	-	0.85	10	B	109	0.72	6	A	91
WB	T	-	0.36	2	A	65	0.48	3	A	108
	T/R	-	-	-	-	36	-	-	-	74
SB	L	-	0.28	31	C	13	0.16	31	C	12
	R	20	0.00	30	C	0	0.00	31	C	0
Overall		-	0.80	7	A	-	0.67	5	A	-

As shown in **Table 4**, with an increase in background traffic volumes, the westbound left-turn and eastbound through movements at the Mohawk/McNiven/Lime Kiln intersection is projected to approach capacity, and with some 95th percentile queues exceeding available storage by approximately 2 to 3 car lengths.

The northbound approach at the Cayuga intersection is projected to operate with long delays and LOS F. Similar to existing conditions, the high v/c ratio at the northbound approach at the Algonquin Avenue intersection results of the capacity analysis software's limitation. When coded in isolation, or with a greater distance from Filman Road, the resulting v/c ratio is 0.37. With an increase in background traffic volumes along Mohawk Road, drivers attempting to turn onto Mohawk Road from Cayuga Avenue and Algonquin Avenue will experience significantly more delay, resulting in a failing LOS for northbound approaches.

4. Future 3-Lane Cross Section Alternatives

4.1 Two-Way Left-Turn Lane

Based on the projected 2031 volumes depicted in **Figure 4**, and considering optimized signal timing plans (120-second cycle) and the addition of a two-way left-turn lane along Mohawk Road, the following **Table 5** summarizes projected peak hour operations at the study area intersections. Detailed Synchro/Sim Traffic data output is provided as **Appendix C**.

Table 5: AM(PM) Peak Hour Intersection Performance – Two-Way Left-Turn Lane

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Mohawk Road at McNiven Road/Lime Kiln Road										
EB	L	31	0.04	9	A	5	0.05	15	B	6
	T	-	0.77	20	B	171	0.95	47	D	202
	R	36	0.06	8	A	15	0.32	18	B	57
WB	L	70	0.29	11	B	12	0.96	77	E	92
	T/R	-	0.71	13	B	129	0.68	13	B	183
NB	L	29	0.73	43	D	52	0.85	62	E	46
	T/R	-	0.40	33	C	42	0.23	37	D	160
SB	L	20	0.45	35	C	6	0.14	36	D	12
	T/R	-	0.05	31	C	15	0.08	36	D	14
Overall		-	0.76	21	C	-	0.93	37	D	-
Mohawk Road at Cayuga Avenue										
EB	T/R	-	0.70	0	-	0	0.69	0	-	0
WB	L	20	0.01	13	B	14	0.00	14	B	4
	T	-	0.54	0	-	0	0.79	0	-	16
NB	L/R	-	0.05	25	D	0	0.03	26	D	4
Overall		-	-	1	C	-	0.71	1	C	-
Mohawk Road at Green Ravine Drive										
EB	L	20	0.02	11	B	15	0.03	16	C	8
	T	-	0.61	11	-	0	0.53	0	-	0
WB	T/R	-	0.54	0	-	0	0.69	0	-	0
SB	L/R	-	0.04	18	C	9	0.09	22	C	18
Overall		-	-	1	B	-	0.71	1	C	-
Mohawk Road at Algonquin Avenue										
EB	T/R	-	0.73	0	-	14	0.62	0	-	0
WB	L	29	0.04	12	B	19	0.14	11	B	22
	T	-	0.55	0	-	0	0.71	0	-	0
NB	L/R	-	0.36	31	D	44	0.26	32	D	33
Overall		-	-	2	C	-	0.71	1	C	-

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Mohawk Road at Filman Road										
EB	L	28	0.02	2	A	11	0.03	2	A	7
	T	-	0.89	15	B	120	0.72	6	A	79
WB	T	-	0.37	3	A	51	0.48	3	A	104
	T/R	-	-	-	-	15	-	-	-	75
SB	L	-	0.44	34	C	11	0.16	31	C	11
	R	20	0.00	32	C	0	0.00	31	C	0
Overall		-	0.86	10	B	-	0.67	5	A	-

Compared to the 'Do Nothing' scenario, the McNiven Road/Lime Kiln Road intersection is not projected to present operational differences. This is due to the fact that the lane configuration at this intersection is not expected to change. The Cayuga and Algonquin intersections are projected to operate with delays equivalent to LOS D or lower for all movements. The lane configuration at the Filman Road intersection, similar to McNiven, is not expected to change, and therefore the resulting traffic operations are also similar to that intersection.

The two-way left turn lane provides a safety benefit by removing left-turning vehicles (at intersections and private driveways) from the main stream of traffic, however this benefit may be minor due to the low left-turning volumes at the minor intersections.

4.2 Two Westbound Lanes and One Eastbound Lane

Based on the projected 2031 volumes depicted in **Figure 4**, and considering optimized signal timing plans (120-second cycle) and the addition of a second westbound lane along Mohawk Road, the following summarizes projected peak hour operations at study area intersections. Detailed Synchro/Sim Traffic data output is provided as **Appendix C**.

Table 6: AM(PM) Peak Hour Intersection Performance – 2 WB Lanes & 1 EB Lane

Direction	Mov.	Storage Length (m)	AM Peak Hour				PM Peak Hour			
			v/c	Delay (s)	LOS	Queue (m)	v/c	Delay (s)	LOS	Queue (m)
Mohawk Road at McNiven Road/Lime Kiln Road										
EB	L	31	0.04	8	A	14	0.05	15	B	15
	T	-	0.74	18	B	154	0.95	47	D	203
	R	36	0.06	8	A	41	0.32	18	B	57
WB	L	-	0.32	12	B	28	0.96	77	E	125
	T/R	-	0.69	12	B	132	0.68	13	B	144
NB	L	29	0.66	38	D	43	0.85	62	E	43
	T/R	-	0.36	31	C	94	0.23	37	D	147
SB	L	20	0.44	33	C	21	0.14	36	D	17
	T/R	-	0.05	29	C	35	0.08	36	D	9
Overall		-	0.73	19	B	-	0.93	37	D	-
Mohawk Road at Cayuga Avenue										
EB	T/R	-	0.70	0	-	0	0.69	0	-	0
WB	T/L	-	0.01	1	A	8	0.00	1	A	0
	T	-	0.36	0	-	0	0.53	0	-	0
NB	L/R	-	0.11	55	F	9	0.08	56	F	3
Overall		-	0.70	1	C	-	0.64	1	B	-
Mohawk Road at Green Ravine Drive										
EB	L/T	-	0.02	1	A	29	0.02	1	A	39
WB	T	-	0.36	0	-	0	0.46	0	-	0
	T/R	-	0.18	0	-	0	0.23	0	-	0
SB	L/R	-	0.17	74	F	15	0.34	90	F	15
Overall		-	0.71	1	C	-	0.65	2	C	-
Mohawk Road at Algonquin Avenue										
EB	T/R	-	0.73	0	-	56	0.62	0	-	2
WB	L	20	0.04	12	B	14	0.14	11	B	24
	T	-	0.28	0	-	-	0.36	0	-	0
	T	-	0.28	0	-	-	0.36	0	-	0
NB	L/R	-	0.49	48	E	57	0.30	38	E	20
Overall		-	0.71	2	C	-	0.71	2	C	-
Mohawk Road at Filman Road										
EB	L	30	0.02	1	A	21	0.03	2	A	10
	T	-	0.85	10	B	104	0.72	6	A	86
WB	T	-	0.36	2	A	41	0.48	3	A	60
	T/R	-	-	-	-	34	-	-	-	47
SB	L	-	0.28	31	C	12	0.16	31	C	12
	R	20	0.00	30	C	4	0.00	31	C	3
Overall		-	0.80	7	A	-	0.67	5	A	-

Compared to the ‘Do Nothing’ scenario, the McNiven Road/Lime Kiln Road intersection is not projected to present operational differences. This is due to the fact that the lane configuration at this intersection is not expected to change. The Cayuga, Algonquin and Green Ravine turning movements from the minor roadways are reported to operate at LOS F or LOS E, however the long delays are a result of the software’s limitation. When Cayuga Avenue is coded with greater distance from McNiven Road/Lime Kiln Road, it results in a LOS D and control delay decreases from 56 seconds to 31 seconds. Similarly, when Green Ravine was coded with greater distance from McNiven Road/Lime Kin Road, it results in a LOS D and control delay decreases from 90 seconds to 29.6 seconds.

The lane configuration at the Filman Road intersection, similar to McNiven, is not expected to change, therefore the operational results are also similar to the ‘Do-nothing’ scenario; compared to the two-way left turn lane scenario, there is a reduction in the westbound 95th percentile queue, however neither scenario shows queues extending onto the Highway 403 ramp. One possible explanation for the reduced queues is that drivers no longer need to merge into one lane past the intersection. The anticipation of merging may increase the number of lane changing manoeuvres on approach to the intersection, particularly considering the proximity of the Highway 403 off-ramp. With a continuous lane, fewer drivers would need to change lanes close to Filman Road.

This alternative, however, presents some disadvantages with respect to traffic safety compared with the two-way left-turn lane. Westbound speeds would likely increase due to the addition of a second lane, and eastbound drivers going around service trucks (e.g. waste collection) could encroach on the opposing traffic lane. This would be mitigated with the presence of a two-way left-turn lane.

5. Conclusions and Recommendations

The operational analysis of the proposed conversion from a two-lane to a three-lane cross section along Mohawk Road between McNiven Road/Lime Kiln Road and Filman Road showed no negative impacts at the signalized intersections (McNiven/Lime Kiln and Filman), and potential reduction in delays for motorists on the minor roads at the unsignalized intersections.

The alternative with the additional two-way left turn lane is recommended for implementation, since it is consistent with the City of Hamilton Transportation Master Plan, and is expected to have greater safety benefits compared to existing conditions and to a two WB lanes and one EB lane lane configuration.

Some potential issues that require attention by the 2031 horizon year (although these are also observed for the 'Do Nothing' scenario) include:

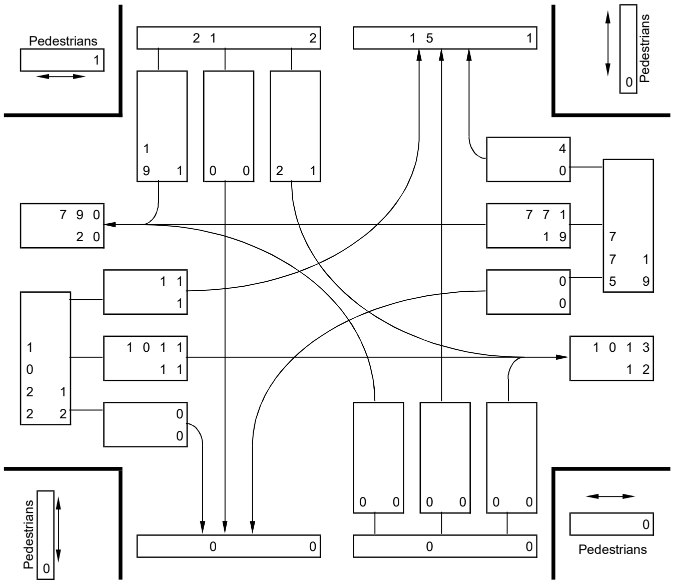
- Increase signal cycle at the intersection of Mohawk Road and McNiven Road/Lime Kiln Road to 120 seconds and optimize splits; and
- Consider extending storage lengths for the following movements at the intersection of Mohawk Road and McNiven Road/Lime Kiln Road:
  - Eastbound right-turn: 60 metres;
  - Westbound lef-turn: 70 metres; and
  - Northbound left-turn: 45 metres.

A

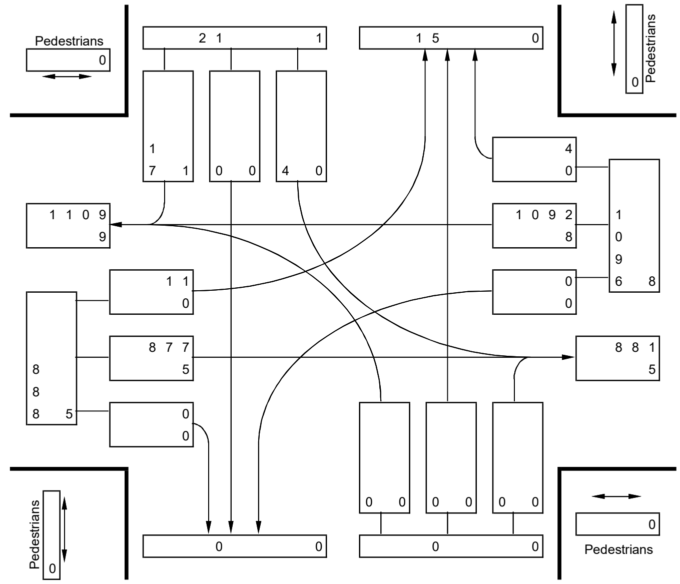
Turning Movement Counts

City of Hamilton **TURNING MOVEMENT FLOW CHART** Loc. Code: 102

Intersection:	**Mohawk Rd**	**at**	**Green Ravine Dr**	Total Vehicles: 11,492	Date: Thursday
Direction:	(East/West)		(North/South)	M.V.E./Year: 7.385	Jun 21, 2018
Road Condition: Dry		Weather: Clear		AWDT Factor: 1.89	Period: 7 hours
Comments:					

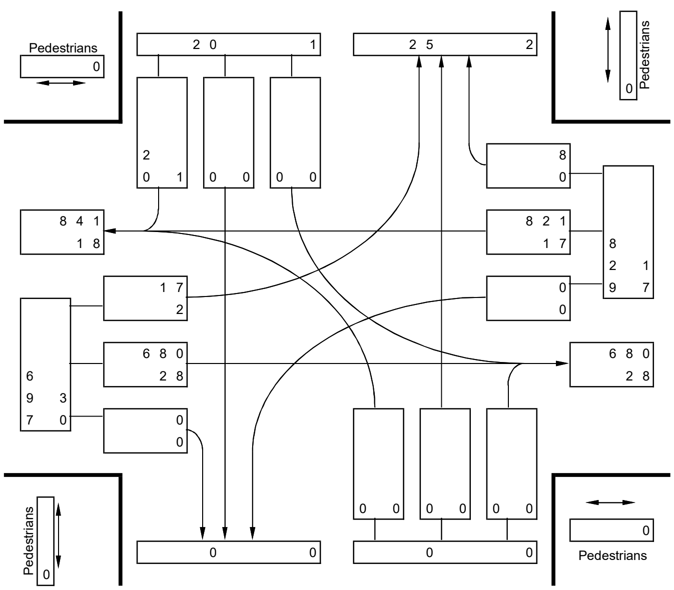


A.M. PEAK HOUR = 7:45 AM - 8:45 AM

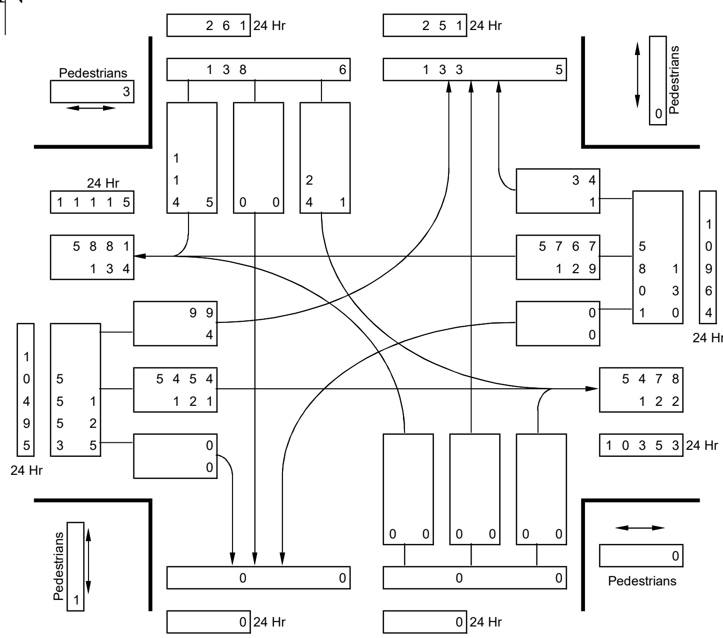


P.M. PEAK HOUR = 4:45 PM - 5:45 PM

N



NORMAL HOUR = 2:30 PM - 3:30 PM



7 Hr & 24 Hr TOTAL VOLUMES

B

Synchro Outputs for Existing Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	995	5	3	777	4	5
Future Volume (Veh/h)	995	5	3	777	4	5
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)	1036	5	3	809	4	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	251					
pX, platoon unblocked			0.70		0.70	0.70
vC, conflicting volume			1041		1854	1038
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			844		2006	840
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		91	98
cM capacity (veh/h)			560		46	257

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1041	812	9
Volume Left	0	3	4
Volume Right	5	0	5
cSH	1700	560	85
Volume to Capacity	0.61	0.01	0.11
Queue Length 95th (m)	0.0	0.1	2.8
Control Delay (s)	0.0	0.2	52.6
Lane LOS		A	F
Approach Delay (s)	0.0	0.2	52.6
Approach LOS			F

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	995	5	21	759	4	67
Future Volume (Veh/h)	995	5	21	759	4	67
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1082	5	23	825	4	73
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				181		
pX, platoon unblocked					0.82	
vC, conflicting volume			1087		1956	1084
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1087		2054	1084
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			96		92	72
cM capacity (veh/h)			620		49	262

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1087	23	825	77
Volume Left	0	23	0	4
Volume Right	5	0	0	73
cSH	1700	620	1700	214
Volume to Capacity	0.64	0.04	0.49	0.36
Queue Length 95th (m)	0.0	0.9	0.0	12.4
Control Delay (s)	0.0	11.0	0.0	31.0
Lane LOS		B		D
Approach Delay (s)	0.0	0.3		31.0
Approach LOS				D

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	989	767	3	2	19
Future Volume (Veh/h)	11	989	767	3	2	19
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	1041	807	3	2	20
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		361	378			
pX, platoon unblocked	0.82				0.78	0.82
vC, conflicting volume	810				1874	808
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	660				1465	658
tC, single (s)	4.2				6.9	6.2
tC, 2 stage (s)						
tF (s)	2.3				4.0	3.3
p0 queue free %	98				98	95
cM capacity (veh/h)	736				85	384

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1053	810	22
Volume Left	12	0	2
Volume Right	0	3	20
cSH	736	1700	291
Volume to Capacity	0.02	0.48	0.08
Queue Length 95th (m)	0.4	0.0	1.9
Control Delay (s)	0.5	0.0	18.4
Lane LOS	A		C
Approach Delay (s)	0.5	0.0	18.4
Approach LOS			C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	689	73	79	696	4	183	8	277	34	13	12
Future Volume (vph)	10	689	73	79	696	4	183	8	277	34	13	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1504	1845	1509	1656	1756		1719	1575		1805	1632	
Flt Permitted	0.33	1.00	1.00	0.23	1.00		0.74	1.00		0.29	1.00	
Satd. Flow (perm)	522	1845	1509	402	1756		1338	1575		547	1632	
Peak-hour factor, PHF	0.94	0.94	0.96	1.00	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	733	76	79	740	4	195	9	295	36	14	13
RTOR Reduction (vph)	0	0	25	0	0	0	0	236	0	0	10	0
Lane Group Flow (vph)	11	733	51	79	744	0	195	68	0	36	17	0
Heavy Vehicles (%)	20%	3%	7%	9%	8%	33%	5%	38%	2%	0%	8%	8%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	55.8	55.8	55.8	63.8	63.8		18.9	18.9		18.9	18.9	
Effective Green, g (s)	55.8	55.8	55.8	63.8	63.8		18.9	18.9		18.9	18.9	
Actuated g/C Ratio	0.59	0.59	0.59	0.68	0.68		0.20	0.20		0.20	0.20	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	308	1090	891	338	1186		267	315		109	326	
v/s Ratio Prot		c0.40		0.01	c0.42			0.04			0.01	
v/s Ratio Perm	0.02		0.03	0.15			c0.15			0.07		
v/c Ratio	0.04	0.67	0.06	0.23	0.63		0.73	0.22		0.33	0.05	
Uniform Delay, d1	8.1	13.1	8.2	8.6	8.6		35.4	31.6		32.3	30.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	3.3	0.1	0.1	2.5		8.5	0.1		0.7	0.0	
Delay (s)	8.3	16.4	8.3	8.7	11.1		43.9	31.7		33.0	30.5	
Level of Service	A	B	A	A	B		D	C		C	C	
Approach Delay (s)		15.6			10.9			36.5			31.9	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	94.4	Sum of lost time (s)	14.7
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	1053	779	7	37	1
Future Volume (vph)	7	1053	779	7	37	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8	6.8		6.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1863	3310		1752	1615
Flt Permitted	0.34	1.00	1.00		0.95	1.00
Satd. Flow (perm)	548	1863	3310		1752	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	7	1120	829	7	39	1
RTOR Reduction (vph)	0	0	0	0	0	1
Lane Group Flow (vph)	7	1120	836	0	39	0
Heavy Vehicles (%)	17%	2%	9%	0%	3%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	54.5	54.5	54.5		3.6	3.6
Effective Green, g (s)	54.5	54.5	54.5		3.6	3.6
Actuated g/C Ratio	0.77	0.77	0.77		0.05	0.05
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	421	1432	2544		88	82
v/s Ratio Prot		c0.60	0.25		c0.02	
v/s Ratio Perm	0.01					0.00
v/c Ratio	0.02	0.78	0.33		0.44	0.00
Uniform Delay, d1	1.9	4.8	2.5		32.7	31.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	4.3	0.3		1.3	0.0
Delay (s)	2.0	9.1	2.9		34.0	31.9
Level of Service	A	A	A		C	C
Approach Delay (s)		9.0	2.9		33.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	12.8
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 5: Cayuga Ave & Mohawk Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	43.8	7.5
Average Queue (m)	1.8	1.4
95th Queue (m)	17.8	5.6
Link Distance (m)	98.5	276.2
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Algonquin Ave & Mohawk Road

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (m)	16.6	35.5
Average Queue (m)	3.9	11.9
95th Queue (m)	12.7	23.9
Link Distance (m)		181.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	29.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: Mohawk Road & Green Ravine Dr

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	35.3	4.4	16.5
Average Queue (m)	3.8	0.2	4.6
95th Queue (m)	19.5	3.3	12.7
Link Distance (m)	98.5	177.2	131.4
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	37.0	119.9	69.5	31.2	110.2	60.1	73.2	23.6	16.6
Average Queue (m)	2.7	55.9	10.1	11.1	51.9	29.9	35.4	8.2	3.6
95th Queue (m)	17.9	99.6	41.1	21.9	96.5	52.6	63.0	19.1	11.5
Link Distance (m)		191.5			224.2		136.2		253.5
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	31.0		36.0	48.0		29.0		20.0	
Storage Blk Time (%)	0	17			7	14	12	3	0
Queuing Penalty (veh)	1	14			6	39	23	1	0

Intersection: 14: Mohawk Road & Filman Rd

Movement	EB	EB	B1	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (m)	10.7	84.2	40.1	87.7	76.2	17.5	3.0
Average Queue (m)	1.7	42.7	4.3	31.4	8.5	6.5	0.2
95th Queue (m)	7.6	92.0	25.8	75.9	43.4	14.8	2.2
Link Distance (m)		59.5	88.5	87.2	87.2	64.2	
Upstream Blk Time (%)		4	0	1	0		
Queuing Penalty (veh)		41	0	0	0		
Storage Bay Dist (m)	28.0						20.0
Storage Blk Time (%)		10				0	
Queuing Penalty (veh)		1				0	

Network Summary

Network wide Queuing Penalty: 126

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	882	18	1	1024	1	4
Future Volume (Veh/h)	882	18	1	1024	1	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1014	21	1	1177	1	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	251					
pX, platoon unblocked			0.59		0.59	0.59
vC, conflicting volume			1035		2204	1024
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			708		2698	690
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		93	98
cM capacity (veh/h)			528		14	263

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1035	1178	6
Volume Left	0	1	1
Volume Right	21	0	5
cSH	1700	528	67
Volume to Capacity	0.61	0.00	0.09
Queue Length 95th (m)	0.0	0.0	2.3
Control Delay (s)	0.0	0.1	64.3
Lane LOS		A	F
Approach Delay (s)	0.0	0.1	64.3
Approach LOS			F

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	863	17	87	1013	6	38
Future Volume (Veh/h)	863	17	87	1013	6	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	908	18	92	1066	6	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				181		
pX, platoon unblocked					0.25	
vC, conflicting volume			926		2167	917
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			926		4201	917
tC, single (s)			4.1		6.6	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			88		0	87
cM capacity (veh/h)			746		0	317

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	926	92	1066	46
Volume Left	0	92	0	6
Volume Right	18	0	0	40
cSH	1700	746	1700	3
Volume to Capacity	0.54	0.12	0.63	14.03
Queue Length 95th (m)	0.0	3.4	0.0	Err
Control Delay (s)	0.0	10.5	0.0	Err
Lane LOS		B		F
Approach Delay (s)	0.0	0.8		Err
Approach LOS				F

Intersection Summary			
Average Delay	216.4		
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	879	1011	4	4	17
Future Volume (Veh/h)	11	879	1011	4	4	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	11	897	1032	4	4	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)		361	378			
pX, platoon unblocked	0.27				0.46	0.27
vC, conflicting volume	1036				1953	1034
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				662	0
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	98				98	94
cM capacity (veh/h)	445				192	292

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	908	1036	21
Volume Left	11	0	4
Volume Right	0	4	17
cSH	445	1700	266
Volume to Capacity	0.02	0.61	0.08
Queue Length 95th (m)	0.6	0.0	2.0
Control Delay (s)	0.8	0.0	19.7
Lane LOS	A		C
Approach Delay (s)	0.8	0.0	19.7
Approach LOS			C

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	724	282	303	712	5	236	37	155	21	28	7
Future Volume (vph)	12	724	282	303	712	5	236	37	155	21	28	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.88		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1827	1553	1805	1843		1719	1572		1719	1648	
Flt Permitted	0.32	1.00	1.00	0.13	1.00		0.73	1.00		0.52	1.00	
Satd. Flow (perm)	556	1827	1553	253	1843		1325	1572		940	1648	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	787	307	329	774	5	257	40	168	23	30	8
RTOR Reduction (vph)	0	0	68	0	0	0	0	129	0	0	6	0
Lane Group Flow (vph)	13	787	239	329	779	0	257	79	0	23	32	0
Heavy Vehicles (%)	8%	4%	4%	0%	3%	0%	5%	3%	7%	5%	7%	29%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	50.2	50.2	50.2	63.2	63.2		22.6	22.6		22.6	22.6	
Effective Green, g (s)	50.2	50.2	50.2	63.2	63.2		22.6	22.6		22.6	22.6	
Actuated g/C Ratio	0.51	0.51	0.51	0.65	0.65		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	286	940	799	323	1194		307	364		217	381	
v/s Ratio Prot		0.43		c0.10	0.42			0.05			0.02	
v/s Ratio Perm	0.02		0.15	c0.56			c0.19			0.02		
v/c Ratio	0.05	0.84	0.30	1.02	0.65		0.84	0.22		0.11	0.08	
Uniform Delay, d1	11.7	20.2	13.6	22.8	10.5		35.7	30.3		29.5	29.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	8.8	1.0	54.9	2.8		17.0	0.1		0.1	0.0	
Delay (s)	12.0	29.0	14.5	77.7	13.2		52.7	30.4		29.6	29.4	
Level of Service	B	C	B	E	B		D	C		C	C	
Approach Delay (s)		24.8			32.4			42.7			29.4	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	97.5	Sum of lost time (s)	14.7
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	892	1095	22	21	3
Future Volume (vph)	8	892	1095	22	21	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8	6.8		6.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1810	3368		1805	1615
Flt Permitted	0.24	1.00	1.00		0.95	1.00
Satd. Flow (perm)	384	1810	3368		1805	1615
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	929	1141	23	22	3
RTOR Reduction (vph)	0	0	1	0	0	3
Lane Group Flow (vph)	8	929	1163	0	22	0
Heavy Vehicles (%)	17%	5%	7%	0%	0%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	55.7	55.7	55.7		3.5	3.5
Effective Green, g (s)	55.7	55.7	55.7		3.5	3.5
Actuated g/C Ratio	0.77	0.77	0.77		0.05	0.05
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	297	1400	2605		87	78
v/s Ratio Prot		c0.51	0.35		c0.01	
v/s Ratio Perm	0.02					0.00
v/c Ratio	0.03	0.66	0.45		0.25	0.00
Uniform Delay, d1	1.9	3.8	2.8		33.0	32.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	2.5	0.6		0.6	0.0
Delay (s)	2.1	6.3	3.4		33.5	32.6
Level of Service	A	A	A		C	C
Approach Delay (s)		6.3	3.4		33.4	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	5.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 5: Cayuga Ave & Mohawk Road

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (m)	23.3	102.4	25.6
Average Queue (m)	1.6	58.1	6.3
95th Queue (m)	11.2	132.9	19.6
Link Distance (m)	224.2	98.5	276.2
Upstream Blk Time (%)		5	
Queuing Penalty (veh)		54	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Algonquin Ave & Mohawk Road

Movement	WB	WB	B1	NB
Directions Served	L	T	T	LR
Maximum Queue (m)	81.8	110.8	37.5	23.2
Average Queue (m)	13.5	11.0	1.9	9.9
95th Queue (m)	37.2	65.3	14.5	19.1
Link Distance (m)		89.2	58.7	181.6
Upstream Blk Time (%)		3		
Queuing Penalty (veh)		32		
Storage Bay Dist (m)	29.0			
Storage Blk Time (%)	1	4		
Queuing Penalty (veh)	12	3		

Intersection: 10: Mohawk Road & Green Ravine Dr

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	100.0	179.7	34.1
Average Queue (m)	15.9	53.3	10.4
95th Queue (m)	69.1	156.0	27.8
Link Distance (m)	98.5	177.2	131.4
Upstream Blk Time (%)	0	1	
Queuing Penalty (veh)	4	8	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 11: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	11.8	203.4	82.0	119.9	228.1	73.9	155.4	15.1	18.6
Average Queue (m)	1.6	107.2	41.7	109.3	181.6	65.9	109.4	5.5	6.2
95th Queue (m)	6.8	212.1	88.0	152.4	291.2	88.1	186.5	12.8	15.8
Link Distance (m)		191.5			224.2		136.2		253.5
Upstream Blk Time (%)		6			8		39		
Queuing Penalty (veh)		0			87		0		
Storage Bay Dist (m)	31.0		36.0	48.0		29.0		20.0	
Storage Blk Time (%)		30	1	85	8	71	27	0	1
Queuing Penalty (veh)		89	5	607	24	136	63	0	0

Intersection: 14: Mohawk Road & Filman Rd

Movement	EB	EB	B1	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (m)	17.5	87.6	24.2	99.5	97.6	15.0	7.8
Average Queue (m)	2.0	22.0	1.1	31.9	17.5	2.7	0.7
95th Queue (m)	9.1	71.7	8.5	96.3	74.8	10.2	4.0
Link Distance (m)		58.7	89.2	87.2	87.2	64.2	
Upstream Blk Time (%)		2		7	2		
Queuing Penalty (veh)		21		0	0		
Storage Bay Dist (m)	28.0						20.0
Storage Blk Time (%)		5				0	
Queuing Penalty (veh)		0				0	

Network Summary

Network wide Queuing Penalty: 1146

C

Synchro Outputs for Future Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	784	73	79	792	4	183	8	315	34	13	12
Future Volume (vph)	10	784	73	79	792	4	183	8	315	34	13	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1504	1845	1509	1656	1756		1719	1576		1805	1632	
Flt Permitted	0.27	1.00	1.00	0.16	1.00		0.74	1.00		0.20	1.00	
Satd. Flow (perm)	422	1845	1509	279	1756		1338	1576		375	1632	
Peak-hour factor, PHF	0.94	0.94	0.96	1.00	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	834	76	79	843	4	195	9	335	36	14	13
RTOR Reduction (vph)	0	0	24	0	0	0	0	218	0	0	10	0
Lane Group Flow (vph)	11	834	52	79	847	0	195	126	0	36	17	0
Heavy Vehicles (%)	20%	3%	7%	9%	8%	33%	5%	38%	2%	0%	8%	8%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	55.6	55.6	55.6	63.8	63.8		18.9	18.9		18.9	18.9	
Effective Green, g (s)	57.4	57.4	57.4	62.8	65.6		20.8	20.8		20.8	20.8	
Actuated g/C Ratio	0.61	0.61	0.61	0.67	0.69		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	256	1121	917	246	1220		294	347		82	359	
v/s Ratio Prot		c0.45		0.01	c0.48			0.08			0.01	
v/s Ratio Perm	0.03		0.03	0.20			c0.15			0.10		
v/c Ratio	0.04	0.74	0.06	0.32	0.69		0.66	0.36		0.44	0.05	
Uniform Delay, d1	7.4	13.2	7.5	11.8	8.5		33.6	31.2		31.8	29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	4.5	0.1	0.3	3.3		4.3	0.2		1.4	0.0	
Delay (s)	7.8	17.7	7.6	12.0	11.8		37.9	31.4		33.1	29.0	
Level of Service	A	B	A	B	B		D	C		C	C	
Approach Delay (s)		16.8			11.8			33.8			31.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	94.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1132	5	3	884	4	5
Future Volume (Veh/h)	1132	5	3	884	4	5
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)	1179	5	3	921	4	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	251					
pX, platoon unblocked			0.62		0.62	0.62
vC, conflicting volume			1184		2108	1182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			993		2477	989
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		81	97
cM capacity (veh/h)			439		21	188

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1184	924	9
Volume Left	0	3	4
Volume Right	5	0	5
cSH	1700	439	41
Volume to Capacity	0.70	0.01	0.22
Queue Length 95th (m)	0.0	0.2	5.8
Control Delay (s)	0.0	0.2	116.6
Lane LOS		A	F
Approach Delay (s)	0.0	0.2	116.6
Approach LOS			F

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	989	873	3	2	9
Future Volume (Veh/h)	11	989	873	3	2	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	1041	919	3	2	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		361	378			
pX, platoon unblocked	0.75				0.79	0.75
vC, conflicting volume	922				1986	920
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	733				1413	731
tC, single (s)	4.2				6.9	6.2
tC, 2 stage (s)						
tF (s)	2.3				4.0	3.3
p0 queue free %	98				98	97
cM capacity (veh/h)	634				92	320

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1053	922	11
Volume Left	12	0	2
Volume Right	0	3	9
cSH	634	1700	221
Volume to Capacity	0.02	0.54	0.05
Queue Length 95th (m)	0.5	0.0	1.2
Control Delay (s)	0.6	0.0	22.1
Lane LOS	A		C
Approach Delay (s)	0.6	0.0	22.1
Approach LOS			C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1132	5	21	864	4	67
Future Volume (Veh/h)	1132	5	21	864	4	67
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1230	5	23	939	4	73
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				181		
pX, platoon unblocked					0.77	
vC, conflicting volume			1235		2218	1232
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1235		2427	1232
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			96		85	66
cM capacity (veh/h)			544		27	215

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1235	23	939	77
Volume Left	0	23	0	4
Volume Right	5	0	0	73
cSH	1700	544	1700	157
Volume to Capacity	0.73	0.04	0.55	0.49
Queue Length 95th (m)	0.0	1.1	0.0	18.7
Control Delay (s)	0.0	11.9	0.0	48.2
Lane LOS		B		E
Approach Delay (s)	0.0	0.3		48.2
Approach LOS				E

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	1198	887	7	37	1
Future Volume (vph)	7	1198	887	7	37	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1863	3310		1752	1615
Flt Permitted	0.29	1.00	1.00		0.95	1.00
Satd. Flow (perm)	478	1863	3310		1752	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	7	1274	944	7	39	1
RTOR Reduction (vph)	0	0	0	0	0	1
Lane Group Flow (vph)	7	1274	951	0	39	0
Heavy Vehicles (%)	17%	2%	9%	0%	3%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	54.5	54.5	54.5		3.6	3.6
Effective Green, g (s)	57.3	57.3	57.3		5.6	5.6
Actuated g/C Ratio	0.81	0.81	0.81		0.08	0.08
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	386	1505	2675		138	127
v/s Ratio Prot		c0.68	0.29		c0.02	
v/s Ratio Perm	0.01					0.00
v/c Ratio	0.02	0.85	0.36		0.28	0.00
Uniform Delay, d1	1.3	4.1	1.8		30.8	30.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	6.1	0.4		0.4	0.0
Delay (s)	1.4	10.2	2.2		31.2	30.1
Level of Service	A	B	A		C	C
Approach Delay (s)		10.1	2.2		31.1	
Approach LOS		B	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	6.1	196.1	43.4	55.4	157.3	36.4	140.8	26.8	64.0
Average Queue (m)	0.9	106.1	14.8	23.0	82.5	31.8	74.1	12.9	9.4
95th Queue (m)	4.4	181.5	43.4	50.2	136.3	43.3	133.5	27.8	35.3
Link Distance (m)		191.5			224.2		136.2		253.5
Upstream Blk Time (%)		1					2		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	31.0		36.0	48.0		29.0		20.0	
Storage Blk Time (%)		31	0	0	17	27	22	20	1
Queuing Penalty (veh)		26	0	0	13	88	41	5	0

Intersection: 2: Cayuga Ave & Mohawk Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	27.9	18.5
Average Queue (m)	0.9	2.6
95th Queue (m)	9.2	10.2
Link Distance (m)	98.5	276.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Mohawk Road & Green Ravine Dr

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	52.6	8.9
Average Queue (m)	8.7	2.8
95th Queue (m)	35.7	9.3
Link Distance (m)	98.5	131.4
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Algonquin Ave & Mohawk Road

Movement	EB	WB	B11	NB
Directions Served	TR	L	T	LR
Maximum Queue (m)	68.2	14.2	5.2	53.4
Average Queue (m)	6.1	5.0	0.2	19.8
95th Queue (m)	33.6	12.9	1.7	41.3
Link Distance (m)	177.2		59.5	181.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)		29.0		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Mohawk Road & Filman Rd

Movement	EB	EB	B11	WB	WB	SB
Directions Served	L	T	T	T	TR	L
Maximum Queue (m)	35.1	88.3	110.3	73.3	60.6	14.1
Average Queue (m)	3.3	51.1	23.7	28.2	10.4	5.1
95th Queue (m)	14.7	108.6	83.4	65.4	36.3	12.5
Link Distance (m)		59.5	88.5	87.2	87.2	64.2
Upstream Blk Time (%)		9	1			
Queuing Penalty (veh)		113	14			
Storage Bay Dist (m)	28.0					
Storage Blk Time (%)		12				0
Queuing Penalty (veh)		1				0

Network Summary

Network wide Queuing Penalty: 302

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	824	282	303	810	5	236	37	176	21	28	7
Future Volume (vph)	12	824	282	303	810	5	236	37	176	21	28	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.88		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1827	1553	1805	1843		1719	1566		1719	1648	
Flt Permitted	0.29	1.00	1.00	0.07	1.00		0.73	1.00		0.40	1.00	
Satd. Flow (perm)	515	1827	1553	124	1843		1325	1566		726	1648	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	896	307	329	880	5	257	40	191	23	30	8
RTOR Reduction (vph)	0	0	55	0	0	0	0	147	0	0	6	0
Lane Group Flow (vph)	13	896	252	329	885	0	257	84	0	23	32	0
Heavy Vehicles (%)	8%	4%	4%	0%	3%	0%	5%	3%	7%	5%	7%	29%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	58.4	58.4	58.4	80.3	80.3		24.8	24.8		24.8	24.8	
Effective Green, g (s)	60.2	60.2	60.2	79.3	82.1		26.7	26.7		26.7	26.7	
Actuated g/C Ratio	0.52	0.52	0.52	0.68	0.70		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	265	941	800	341	1295		302	357		165	376	
v/s Ratio Prot		0.49		c0.15	0.48			0.05			0.02	
v/s Ratio Perm	0.03		0.16	c0.51			c0.19			0.03		
v/c Ratio	0.05	0.95	0.32	0.96	0.68		0.85	0.23		0.14	0.08	
Uniform Delay, d1	14.1	26.9	16.4	39.4	9.9		43.1	36.7		35.9	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	19.8	1.0	38.9	2.9		19.3	0.1		0.1	0.0	
Delay (s)	14.4	46.8	17.4	78.3	12.9		62.4	36.8		36.0	35.5	
Level of Service	B	D	B	E	B		E	D		D	D	
Approach Delay (s)		39.0			30.6			50.3			35.7	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	116.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1004	18	1	1165	1	4
Future Volume (Veh/h)	1004	18	1	1165	1	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1154	21	1	1339	1	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	251					
pX, platoon unblocked			0.51		0.51	0.51
vC, conflicting volume			1175		2506	1164
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			866		3461	846
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		74	97
cM capacity (veh/h)			403		4	187

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1175	1340	6
Volume Left	0	1	1
Volume Right	21	0	5
cSH	1700	403	21
Volume to Capacity	0.69	0.00	0.28
Queue Length 95th (m)	0.0	0.1	6.6
Control Delay (s)	0.0	0.2	231.7
Lane LOS		A	F
Approach Delay (s)	0.0	0.2	231.7
Approach LOS			F

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	879	1151	4	4	17
Future Volume (Veh/h)	11	879	1151	4	4	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	11	897	1174	4	4	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)		361	378			
pX, platoon unblocked	0.22				0.43	0.22
vC, conflicting volume	1178				2095	1176
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16				623	7
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	97				98	93
cM capacity (veh/h)	350				190	231

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	908	1178	21
Volume Left	11	0	4
Volume Right	0	4	17
cSH	350	1700	222
Volume to Capacity	0.03	0.69	0.09
Queue Length 95th (m)	0.8	0.0	2.5
Control Delay (s)	1.2	0.0	22.9
Lane LOS	A		C
Approach Delay (s)	1.2	0.0	22.9
Approach LOS			C

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	982	17	87	1153	6	38
Future Volume (Veh/h)	982	17	87	1153	6	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1034	18	92	1214	6	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				181		
pX, platoon unblocked					0.20	
vC, conflicting volume			1052		2441	1043
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1052		6216	1043
tC, single (s)			4.1		6.6	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			86		0	85
cM capacity (veh/h)			669		0	268

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1052	92	1214	46
Volume Left	0	92	0	6
Volume Right	18	0	0	40
cSH	1700	669	1700	0
Volume to Capacity	0.62	0.14	0.71	472.84
Queue Length 95th (m)	0.0	3.8	0.0	Err
Control Delay (s)	0.0	11.2	0.0	Err
Lane LOS		B		F
Approach Delay (s)	0.0	0.8		Err
Approach LOS				F

Intersection Summary			
Average Delay	191.8		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	1015	1246	22	21	3
Future Volume (vph)	8	1015	1246	22	21	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1810	3369		1805	1615
Flt Permitted	0.19	1.00	1.00		0.95	1.00
Satd. Flow (perm)	312	1810	3369		1805	1615
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	1057	1298	23	22	3
RTOR Reduction (vph)	0	0	1	0	0	3
Lane Group Flow (vph)	8	1057	1320	0	22	0
Heavy Vehicles (%)	17%	5%	7%	0%	0%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	55.7	55.7	55.7		3.5	3.5
Effective Green, g (s)	58.5	58.5	58.5		5.5	5.5
Actuated g/C Ratio	0.81	0.81	0.81		0.08	0.08
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	253	1470	2737		137	123
v/s Ratio Prot		c0.58	0.39		c0.01	
v/s Ratio Perm	0.03					0.00
v/c Ratio	0.03	0.72	0.48		0.16	0.00
Uniform Delay, d1	1.3	3.0	2.1		31.1	30.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	3.1	0.6		0.2	0.0
Delay (s)	1.5	6.1	2.7		31.3	30.7
Level of Service	A	A	A		C	C
Approach Delay (s)		6.1	2.7		31.2	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	4.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	6.3	207.4	43.5	55.5	227.2	36.3	152.1	13.4	12.6
Average Queue (m)	1.5	197.7	35.5	52.8	166.4	34.6	82.6	4.7	4.4
95th Queue (m)	5.6	202.7	56.8	65.2	268.1	41.7	156.4	13.1	11.3
Link Distance (m)		191.5			224.2		136.2		253.5
Upstream Blk Time (%)		49			4		19		
Queuing Penalty (veh)		0			45		0		
Storage Bay Dist (m)	31.0		36.0	48.0		29.0		20.0	
Storage Blk Time (%)		45	1	40	10	40	15		
Queuing Penalty (veh)		131	7	322	30	86	36		

Intersection: 2: Cayuga Ave & Mohawk Road

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (m)	225.1	100.3	6.2
Average Queue (m)	16.3	39.1	0.8
95th Queue (m)	103.6	109.0	4.0
Link Distance (m)	224.2	98.5	276.2
Upstream Blk Time (%)	0	1	
Queuing Penalty (veh)	2	11	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Mohawk Road & Green Ravine Dr

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	99.1	101.5	23.4
Average Queue (m)	16.7	12.7	10.0
95th Queue (m)	66.1	53.8	22.8
Link Distance (m)	98.5	177.2	131.4
Upstream Blk Time (%)	3		
Queuing Penalty (veh)	33		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Algonquin Ave & Mohawk Road

Movement	WB	WB	B11	B11	NB
Directions Served	L	T	T		LR
Maximum Queue (m)	36.2	110.8	94.8	84.0	58.8
Average Queue (m)	13.7	6.0	38.8	12.9	18.7
95th Queue (m)	28.0	43.9	100.6	55.9	42.7
Link Distance (m)		89.2	58.7	58.7	181.6
Upstream Blk Time (%)		1	8	2	
Queuing Penalty (veh)		16	50	11	
Storage Bay Dist (m)	29.0				
Storage Blk Time (%)	5				
Queuing Penalty (veh)	63				

Intersection: 5: Mohawk Road & Filman Rd

Movement	EB	EB	B11	WB	WB	SB
Directions Served	L	T	T	T	TR	L
Maximum Queue (m)	9.2	86.0	59.2	100.5	91.8	14.2
Average Queue (m)	1.7	35.1	3.3	49.9	29.3	4.6
95th Queue (m)	7.1	90.9	21.8	107.1	73.9	11.8
Link Distance (m)		58.7	89.2	87.2	87.2	64.2
Upstream Blk Time (%)		3		3	0	
Queuing Penalty (veh)		34		0	0	
Storage Bay Dist (m)	28.0					
Storage Blk Time (%)		7				0
Queuing Penalty (veh)		1				0

Network Summary

Network wide Queuing Penalty: 878

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	784	73	79	792	4	183	8	315	34	13	12
Future Volume (vph)	10	784	73	79	792	4	183	8	315	34	13	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1504	1845	1509	1656	1756		1719	1576		1805	1632	
Flt Permitted	0.26	1.00	1.00	0.17	1.00		0.74	1.00		0.21	1.00	
Satd. Flow (perm)	419	1845	1509	293	1756		1338	1576		402	1632	
Peak-hour factor, PHF	0.94	0.94	0.96	1.00	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	834	76	79	843	4	195	9	335	36	14	13
RTOR Reduction (vph)	0	0	25	0	0	0	0	217	0	0	10	0
Lane Group Flow (vph)	11	834	51	79	847	0	195	127	0	36	17	0
Heavy Vehicles (%)	20%	3%	7%	9%	8%	33%	5%	38%	2%	0%	8%	8%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	55.6	55.6	55.6	63.7	63.7		18.9	18.9		18.9	18.9	
Effective Green, g (s)	55.6	55.6	55.6	63.7	63.7		18.9	18.9		18.9	18.9	
Actuated g/C Ratio	0.59	0.59	0.59	0.68	0.68		0.20	0.20		0.20	0.20	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	247	1087	889	271	1186		268	315		80	327	
v/s Ratio Prot		c0.45		0.02	c0.48			0.08			0.01	
v/s Ratio Perm	0.03		0.03	0.18			c0.15			0.09		
v/c Ratio	0.04	0.77	0.06	0.29	0.71		0.73	0.40		0.45	0.05	
Uniform Delay, d1	8.2	14.5	8.2	10.9	9.6		35.3	32.8		33.1	30.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	5.2	0.1	0.2	3.7		8.1	0.3		1.5	0.0	
Delay (s)	8.5	19.7	8.3	11.1	13.3		43.4	33.1		34.6	30.5	
Level of Service	A	B	A	B	B		D	C		C	C	
Approach Delay (s)		18.6			13.1			36.8			32.8	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	94.3	Sum of lost time (s)	14.7
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1132	5	3	884	4	5
Future Volume (Veh/h)	1132	5	3	884	4	5
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)	1179	5	3	921	4	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (m)	251					
pX, platoon unblocked			0.61		0.61	0.61
vC, conflicting volume			1184		2108	1182
vC1, stage 1 conf vol					1182	
vC2, stage 2 conf vol					927	
vCu, unblocked vol			980		2501	976
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	97
cM capacity (veh/h)			433		185	187

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1184	3	921	9
Volume Left	0	3	0	4
Volume Right	5	0	0	5
cSH	1700	433	1700	186
Volume to Capacity	0.70	0.01	0.54	0.05
Queue Length 95th (m)	0.0	0.2	0.0	1.2
Control Delay (s)	0.0	13.4	0.0	25.3
Lane LOS		B		D
Approach Delay (s)	0.0	0.0		25.3
Approach LOS				D

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	989	873	3	2	9
Future Volume (Veh/h)	11	989	873	3	2	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	1041	919	3	2	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		361	378			
pX, platoon unblocked	0.70				0.80	0.70
vC, conflicting volume	922				1986	920
vC1, stage 1 conf vol					920	
vC2, stage 2 conf vol					1065	
vCu, unblocked vol	679				1276	677
tC, single (s)	4.2				6.9	6.2
tC, 2 stage (s)					5.9	
tF (s)	2.3				4.0	3.3
p0 queue free %	98				99	97
cM capacity (veh/h)	620				201	321

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	12	1041	922	11
Volume Left	12	0	0	2
Volume Right	0	0	3	9
cSH	620	1700	1700	290
Volume to Capacity	0.02	0.61	0.54	0.04
Queue Length 95th (m)	0.5	0.0	0.0	0.9
Control Delay (s)	10.9	0.0	0.0	17.9
Lane LOS	B			C
Approach Delay (s)	0.1		0.0	17.9
Approach LOS				C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1132	5	21	864	4	67
Future Volume (Veh/h)	1132	5	21	864	4	67
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1230	5	23	939	4	73
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (m)				181		
pX, platoon unblocked					0.75	
vC, conflicting volume			1235		2218	1232
vC1, stage 1 conf vol					1232	
vC2, stage 2 conf vol					985	
vCu, unblocked vol			1235		2457	1232
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.3		3.5	3.3
p0 queue free %			96		98	66
cM capacity (veh/h)			544		200	215

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1235	23	939	77
Volume Left	0	23	0	4
Volume Right	5	0	0	73
cSH	1700	544	1700	214
Volume to Capacity	0.73	0.04	0.55	0.36
Queue Length 95th (m)	0.0	1.1	0.0	12.4
Control Delay (s)	0.0	11.9	0.0	31.0
Lane LOS		B		D
Approach Delay (s)	0.0	0.3		31.0
Approach LOS				D

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	1198	887	7	37	1
Future Volume (vph)	7	1198	887	7	37	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8	6.8		6.0	6.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1863	3310		1752	1615
Flt Permitted	0.30	1.00	1.00		0.95	1.00
Satd. Flow (perm)	489	1863	3310		1752	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	7	1274	944	7	39	1
RTOR Reduction (vph)	0	0	0	0	0	1
Lane Group Flow (vph)	7	1274	951	0	39	0
Heavy Vehicles (%)	17%	2%	9%	0%	3%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	54.5	54.5	54.5		3.6	3.6
Effective Green, g (s)	54.5	54.5	54.5		3.6	3.6
Actuated g/C Ratio	0.77	0.77	0.77		0.05	0.05
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	375	1432	2544		88	82
v/s Ratio Prot		c0.68	0.29		c0.02	
v/s Ratio Perm	0.01					0.00
v/c Ratio	0.02	0.89	0.37		0.44	0.00
Uniform Delay, d1	1.9	6.0	2.7		32.7	31.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	8.6	0.4		1.3	0.0
Delay (s)	2.0	14.6	3.1		34.0	31.9
Level of Service	A	B	A		C	C
Approach Delay (s)		14.6	3.1		33.9	
Approach LOS		B	A		C	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	12.8
Intersection Capacity Utilization	82.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	5.5	158.8	14.8	13.2	109.2	53.9	34.9	7.3	12.5
Average Queue (m)	1.1	101.2	7.7	8.3	82.4	39.3	27.7	2.1	7.2
95th Queue (m)	4.7	171.0	15.5	12.4	129.7	51.9	41.8	6.8	14.6
Link Distance (m)		191.5			224.2		136.2		253.5
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	31.0		36.0	70.0		29.0		20.0	
Storage Blk Time (%)		26			6	21	6		
Queuing Penalty (veh)		21			5	69	12		

Intersection: 2: Cayuga Ave & Mohawk Road

Movement	WB
Directions Served	L
Maximum Queue (m)	15.7
Average Queue (m)	3.1
95th Queue (m)	13.5
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	20.0
Storage Blk Time (%)	0
Queuing Penalty (veh)	1

Intersection: 3: Mohawk Road & Green Ravine Dr

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	14.7	9.1
Average Queue (m)	4.8	2.8
95th Queue (m)	14.8	8.8
Link Distance (m)		129.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	20.0	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 4: Algonquin Ave & Mohawk Road

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (m)	16.3	15.2	35.2
Average Queue (m)	3.3	9.6	27.3
95th Queue (m)	14.0	18.7	44.0
Link Distance (m)	177.2		181.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		20.0	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		1	

Intersection: 5: Mohawk Road & Filman Rd

Movement	EB	EB	B11	WB	WB	SB
Directions Served	L	T	T	T	TR	L
Maximum Queue (m)	9.1	86.5	77.2	41.1	15.1	8.5
Average Queue (m)	3.6	65.9	38.6	23.8	4.8	5.9
95th Queue (m)	10.9	120.3	92.0	51.4	15.1	11.4
Link Distance (m)		59.5	88.5	87.2	87.2	64.2
Upstream Blk Time (%)		17				
Queuing Penalty (veh)		207				
Storage Bay Dist (m)	20.0					
Storage Blk Time (%)		19				
Queuing Penalty (veh)		1				

Network Summary

Network wide Queuing Penalty: 318

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	824	282	303	810	5	236	37	176	21	28	7
Future Volume (vph)	12	824	282	303	810	5	236	37	176	21	28	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.88		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1827	1553	1805	1843		1719	1566		1719	1648	
Flt Permitted	0.29	1.00	1.00	0.07	1.00		0.73	1.00		0.40	1.00	
Satd. Flow (perm)	516	1827	1553	124	1843		1325	1566		726	1648	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	896	307	329	880	5	257	40	191	23	30	8
RTOR Reduction (vph)	0	0	54	0	0	0	0	147	0	0	6	0
Lane Group Flow (vph)	13	896	253	329	885	0	257	84	0	23	32	0
Heavy Vehicles (%)	8%	4%	4%	0%	3%	0%	5%	3%	7%	5%	7%	29%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	58.3	58.3	58.3	80.3	80.3		24.8	24.8		24.8	24.8	
Effective Green, g (s)	60.1	60.1	60.1	79.3	82.1		26.7	26.7		26.7	26.7	
Actuated g/C Ratio	0.51	0.51	0.51	0.68	0.70		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	265	940	799	343	1295		302	357		165	376	
v/s Ratio Prot		0.49		c0.15	0.48			0.05			0.02	
v/s Ratio Perm	0.03		0.16	c0.50			c0.19			0.03		
v/c Ratio	0.05	0.95	0.32	0.96	0.68		0.85	0.23		0.14	0.08	
Uniform Delay, d1	14.1	27.0	16.4	39.3	9.9		43.1	36.7		35.9	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	20.0	1.0	37.1	2.9		19.3	0.1		0.1	0.0	
Delay (s)	14.5	47.0	17.5	76.5	12.9		62.4	36.8		36.0	35.5	
Level of Service	B	D	B	E	B		E	D		D	D	
Approach Delay (s)		39.2			30.1			50.3			35.7	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	116.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1004	18	1	1165	1	4
Future Volume (Veh/h)	1004	18	1	1165	1	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1154	21	1	1339	1	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (m)	251					
pX, platoon unblocked			0.51		0.51	0.51
vC, conflicting volume			1175		2506	1164
vC1, stage 1 conf vol					1164	
vC2, stage 2 conf vol					1341	
vCu, unblocked vol			867		3459	846
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	97
cM capacity (veh/h)			403		151	187

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1175	1	1339	6
Volume Left	0	1	0	1
Volume Right	21	0	0	5
cSH	1700	403	1700	180
Volume to Capacity	0.69	0.00	0.79	0.03
Queue Length 95th (m)	0.0	0.1	0.0	0.8
Control Delay (s)	0.0	14.0	0.0	25.7
Lane LOS		B		D
Approach Delay (s)	0.0	0.0		25.7
Approach LOS				D

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	879	1151	4	4	17
Future Volume (Veh/h)	11	879	1151	4	4	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	11	897	1174	4	4	17
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (m)		361	378			
pX, platoon unblocked	0.22				0.43	0.22
vC, conflicting volume	1178				2095	1176
vC1, stage 1 conf vol					1176	
vC2, stage 2 conf vol					919	
vCu, unblocked vol	16				636	7
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.4
p0 queue free %	97				98	93
cM capacity (veh/h)	350				215	231

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	11	897	1178	21
Volume Left	11	0	0	4
Volume Right	0	0	4	17
cSH	350	1700	1700	228
Volume to Capacity	0.03	0.53	0.69	0.09
Queue Length 95th (m)	0.8	0.0	0.0	2.4
Control Delay (s)	15.6	0.0	0.0	22.4
Lane LOS	C			C
Approach Delay (s)	0.2		0.0	22.4
Approach LOS				C

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	982	17	87	1153	6	38
Future Volume (Veh/h)	982	17	87	1153	6	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1034	18	92	1214	6	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (m)				181		
pX, platoon unblocked					0.20	
vC, conflicting volume			1052		2441	1043
vC1, stage 1 conf vol					1043	
vC2, stage 2 conf vol					1398	
vCu, unblocked vol			1052		6216	1043
tC, single (s)			4.1		6.6	6.3
tC, 2 stage (s)					5.6	
tF (s)			2.2		3.7	3.4
p0 queue free %			86		89	85
cM capacity (veh/h)			669		55	268

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1052	92	1214	46
Volume Left	0	92	0	6
Volume Right	18	0	0	40
cSH	1700	669	1700	178
Volume to Capacity	0.62	0.14	0.71	0.26
Queue Length 95th (m)	0.0	3.8	0.0	7.9
Control Delay (s)	0.0	11.2	0.0	32.1
Lane LOS		B		D
Approach Delay (s)	0.0	0.8		32.1
Approach LOS				D

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	1015	1246	22	21	3
Future Volume (vph)	8	1015	1246	22	21	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1810	3369		1805	1615
Flt Permitted	0.19	1.00	1.00		0.95	1.00
Satd. Flow (perm)	312	1810	3369		1805	1615
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	1057	1298	23	22	3
RTOR Reduction (vph)	0	0	1	0	0	3
Lane Group Flow (vph)	8	1057	1320	0	22	0
Heavy Vehicles (%)	17%	5%	7%	0%	0%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	55.7	55.7	55.7		3.5	3.5
Effective Green, g (s)	58.5	58.5	58.5		5.5	5.5
Actuated g/C Ratio	0.81	0.81	0.81		0.08	0.08
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	253	1470	2737		137	123
v/s Ratio Prot		c0.58	0.39		c0.01	
v/s Ratio Perm	0.03					0.00
v/c Ratio	0.03	0.72	0.48		0.16	0.00
Uniform Delay, d1	1.3	3.0	2.1		31.1	30.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	3.1	0.6		0.2	0.0
Delay (s)	1.5	6.1	2.7		31.3	30.7
Level of Service	A	A	A		C	C
Approach Delay (s)		6.1	2.7		31.2	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	4.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	6.2	207.4	43.5	77.4	225.7	36.3	148.1	13.2	18.5
Average Queue (m)	1.4	197.2	34.4	63.3	100.9	33.5	86.8	4.3	5.2
95th Queue (m)	5.5	201.5	57.3	91.8	182.7	45.7	159.5	12.2	14.3
Link Distance (m)		191.5			224.2		136.2		253.5
Upstream Blk Time (%)		50			0		21		
Queuing Penalty (veh)		0			5		0		
Storage Bay Dist (m)	31.0		36.0	70.0		29.0		20.0	
Storage Blk Time (%)		46	0	14	5	43	13		0
Queuing Penalty (veh)		134	2	114	14	93	30		0

Intersection: 2: Cayuga Ave & Mohawk Road

Movement	WB	WB	NB
Directions Served	L	T	LR
Maximum Queue (m)	9.0	48.7	6.2
Average Queue (m)	0.7	1.6	0.7
95th Queue (m)	4.4	16.0	3.9
Link Distance (m)		98.6	276.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)	20.0		
Storage Blk Time (%)		1	
Queuing Penalty (veh)		0	

Intersection: 3: Mohawk Road & Green Ravine Dr

Movement	EB	SB
Directions Served	L	LR
Maximum Queue (m)	9.2	23.5
Average Queue (m)	1.9	6.7
95th Queue (m)	7.9	17.5
Link Distance (m)		129.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)	20.0	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Algonquin Ave & Mohawk Road

Movement	WB	B11	B11	NB
Directions Served	L	T		LR
Maximum Queue (m)	27.2	90.8	73.8	53.0
Average Queue (m)	12.5	36.1	14.1	14.6
95th Queue (m)	22.0	99.5	55.7	33.3
Link Distance (m)		58.7	58.7	181.6
Upstream Blk Time (%)		7	1	
Queuing Penalty (veh)		43	4	
Storage Bay Dist (m)	29.0			
Storage Blk Time (%)	0			
Queuing Penalty (veh)	3			

Intersection: 5: Mohawk Road & Filman Rd

Movement	EB	EB	B11	WB	WB	SB
Directions Served	L	T	T	T	TR	L
Maximum Queue (m)	9.3	80.3	62.5	97.6	91.8	8.5
Average Queue (m)	1.9	30.2	2.7	48.2	27.6	4.6
95th Queue (m)	7.3	78.7	21.5	104.1	74.8	11.1
Link Distance (m)		58.7	89.2	87.2	87.2	64.2
Upstream Blk Time (%)		2		5	1	
Queuing Penalty (veh)		22		0	0	
Storage Bay Dist (m)	28.0					
Storage Blk Time (%)		7				
Queuing Penalty (veh)		1				

Network Summary

Network wide Queuing Penalty: 464

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	784	73	79	792	4	183	8	315	34	13	12
Future Volume (vph)	10	784	73	79	792	4	183	8	315	34	13	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1504	1845	1509	1656	1756		1719	1576		1805	1632	
Flt Permitted	0.27	1.00	1.00	0.16	1.00		0.74	1.00		0.20	1.00	
Satd. Flow (perm)	422	1845	1509	279	1756		1338	1576		375	1632	
Peak-hour factor, PHF	0.94	0.94	0.96	1.00	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	11	834	76	79	843	4	195	9	335	36	14	13
RTOR Reduction (vph)	0	0	24	0	0	0	0	218	0	0	10	0
Lane Group Flow (vph)	11	834	52	79	847	0	195	126	0	36	17	0
Heavy Vehicles (%)	20%	3%	7%	9%	8%	33%	5%	38%	2%	0%	8%	8%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	55.6	55.6	55.6	63.8	63.8		18.9	18.9		18.9	18.9	
Effective Green, g (s)	57.4	57.4	57.4	62.8	65.6		20.8	20.8		20.8	20.8	
Actuated g/C Ratio	0.61	0.61	0.61	0.67	0.69		0.22	0.22		0.22	0.22	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	256	1121	917	246	1220		294	347		82	359	
v/s Ratio Prot		c0.45		0.01	c0.48			0.08			0.01	
v/s Ratio Perm	0.03		0.03	0.20			c0.15			0.10		
v/c Ratio	0.04	0.74	0.06	0.32	0.69		0.66	0.36		0.44	0.05	
Uniform Delay, d1	7.4	13.2	7.5	11.8	8.5		33.6	31.2		31.8	29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	4.5	0.1	0.3	3.3		4.3	0.2		1.4	0.0	
Delay (s)	7.8	17.7	7.6	12.0	11.8		37.9	31.4		33.1	29.0	
Level of Service	A	B	A	B	B		D	C		C	C	
Approach Delay (s)		16.8			11.8			33.8			31.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	94.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1132	5	3	884	4	5
Future Volume (Veh/h)	1132	5	3	884	4	5
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)	1179	5	3	921	4	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	251					
pX, platoon unblocked			0.63		0.63	0.63
vC, conflicting volume			1184		1648	1182
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			996		1736	992
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		92	97
cM capacity (veh/h)			441		50	156

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1184	310	614	9
Volume Left	0	3	0	4
Volume Right	5	0	0	5
cSH	1700	441	1700	80
Volume to Capacity	0.70	0.01	0.36	0.11
Queue Length 95th (m)	0.0	0.2	0.0	2.9
Control Delay (s)	0.0	0.2	0.0	55.4
Lane LOS		A		F
Approach Delay (s)	0.0	0.1		55.4
Approach LOS				F

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	989	873	3	2	9
Future Volume (Veh/h)	11	989	873	3	2	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	12	1041	919	3	2	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		361	378			
pX, platoon unblocked					0.66	
vC, conflicting volume	922				1986	461
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	922				2231	461
tC, single (s)	4.3				7.8	6.9
tC, 2 stage (s)						
tF (s)	2.3				4.0	3.3
p0 queue free %	98				84	98
cM capacity (veh/h)	694				13	553

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	1053	613	309	11
Volume Left	12	0	0	2
Volume Right	0	0	3	9
cSH	694	1700	1700	63
Volume to Capacity	0.02	0.36	0.18	0.17
Queue Length 95th (m)	0.4	0.0	0.0	4.7
Control Delay (s)	0.6	0.0	0.0	73.8
Lane LOS	A			F
Approach Delay (s)	0.6	0.0		73.8
Approach LOS				F

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1132	5	21	864	4	67
Future Volume (Veh/h)	1132	5	21	864	4	67
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1230	5	23	939	4	73
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				181		
pX, platoon unblocked					0.96	
vC, conflicting volume			1235		1748	1232
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1235		1692	1232
tC, single (s)			4.3		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			96		95	56
cM capacity (veh/h)			528		79	167

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	1235	23	470	470	77
Volume Left	0	23	0	0	4
Volume Right	5	0	0	0	73
cSH	1700	528	1700	1700	158
Volume to Capacity	0.73	0.04	0.28	0.28	0.49
Queue Length 95th (m)	0.0	1.1	0.0	0.0	18.6
Control Delay (s)	0.0	12.1	0.0	0.0	47.7
Lane LOS		B			E
Approach Delay (s)	0.0	0.3			47.7
Approach LOS					E

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	7	1198	887	7	37	1
Future Volume (vph)	7	1198	887	7	37	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1863	3310		1752	1615
Flt Permitted	0.29	1.00	1.00		0.95	1.00
Satd. Flow (perm)	478	1863	3310		1752	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	7	1274	944	7	39	1
RTOR Reduction (vph)	0	0	0	0	0	1
Lane Group Flow (vph)	7	1274	951	0	39	0
Heavy Vehicles (%)	17%	2%	9%	0%	3%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	54.5	54.5	54.5		3.6	3.6
Effective Green, g (s)	57.3	57.3	57.3		5.6	5.6
Actuated g/C Ratio	0.81	0.81	0.81		0.08	0.08
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	386	1505	2675		138	127
v/s Ratio Prot		c0.68	0.29		c0.02	
v/s Ratio Perm	0.01					0.00
v/c Ratio	0.02	0.85	0.36		0.28	0.00
Uniform Delay, d1	1.3	4.1	1.8		30.8	30.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.1	6.1	0.4		0.4	0.0
Delay (s)	1.4	10.2	2.2		31.2	30.1
Level of Service	A	B	A		C	C
Approach Delay (s)		10.1	2.2		31.1	
Approach LOS		B	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	70.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	38.3	158.9	43.5	37.4	145.6	36.3	110.7	27.4	70.8
Average Queue (m)	2.5	92.5	14.3	14.3	74.1	30.9	52.5	10.0	7.4
95th Queue (m)	14.4	154.2	41.3	28.3	131.9	42.7	94.2	20.6	35.2
Link Distance (m)		191.5		223.2	223.2		136.2		251.5
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	31.0		36.0			29.0		20.0	
Storage Blk Time (%)		29	0			14	22	4	2
Queuing Penalty (veh)		24	0			47	40	1	1

Intersection: 2: Cayuga Ave & Mohawk Road

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	16.1	12.6
Average Queue (m)	1.1	2.3
95th Queue (m)	7.6	8.5
Link Distance (m)	98.3	278.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: Mohawk Road & Green Ravine Dr

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	47.1	26.6
Average Queue (m)	7.9	4.5
95th Queue (m)	28.9	14.5
Link Distance (m)	98.3	127.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Algonquin Ave & Mohawk Road

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (m)	112.6	23.9	79.4
Average Queue (m)	10.2	4.6	24.0
95th Queue (m)	56.4	14.4	57.3
Link Distance (m)	177.0		181.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		20.0	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		2	

Intersection: 5: Mohawk Road & Filman Rd

Movement	EB	EB	B11	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (m)	57.7	85.2	99.4	47.2	52.4	14.0	7.8
Average Queue (m)	3.7	49.9	18.6	18.2	12.2	5.7	0.5
95th Queue (m)	21.3	104.2	68.5	41.4	33.6	12.2	3.7
Link Distance (m)		59.5	88.5	87.2	87.2	64.2	
Upstream Blk Time (%)	0	9	1				
Queuing Penalty (veh)	0	109	12				
Storage Bay Dist (m)	28.0						20.0
Storage Blk Time (%)		12					
Queuing Penalty (veh)		1					

Network Summary

Network wide Queuing Penalty: 236

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	824	282	303	810	5	236	37	176	21	28	7
Future Volume (vph)	12	824	282	303	810	5	236	37	176	21	28	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.88		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1827	1553	1805	1843		1719	1566		1719	1648	
Flt Permitted	0.29	1.00	1.00	0.07	1.00		0.73	1.00		0.40	1.00	
Satd. Flow (perm)	516	1827	1553	124	1843		1325	1566		726	1648	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	896	307	329	880	5	257	40	191	23	30	8
RTOR Reduction (vph)	0	0	54	0	0	0	0	147	0	0	6	0
Lane Group Flow (vph)	13	896	253	329	885	0	257	84	0	23	32	0
Heavy Vehicles (%)	8%	4%	4%	0%	3%	0%	5%	3%	7%	5%	7%	29%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	58.3	58.3	58.3	80.3	80.3		24.8	24.8		24.8	24.8	
Effective Green, g (s)	60.1	60.1	60.1	79.3	82.1		26.7	26.7		26.7	26.7	
Actuated g/C Ratio	0.51	0.51	0.51	0.68	0.70		0.23	0.23		0.23	0.23	
Clearance Time (s)	5.8	5.8	5.8	3.0	5.8		5.9	5.9		5.9	5.9	
Vehicle Extension (s)	3.0	3.0	3.0	2.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	265	940	799	343	1295		302	357		165	376	
v/s Ratio Prot		0.49		c0.15	0.48			0.05			0.02	
v/s Ratio Perm	0.03		0.16	c0.50			c0.19			0.03		
v/c Ratio	0.05	0.95	0.32	0.96	0.68		0.85	0.23		0.14	0.08	
Uniform Delay, d1	14.1	27.0	16.4	39.3	9.9		43.1	36.7		35.9	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	20.0	1.0	37.1	2.9		19.3	0.1		0.1	0.0	
Delay (s)	14.5	47.0	17.5	76.5	12.9		62.4	36.8		36.0	35.5	
Level of Service	B	D	B	E	B		E	D		D	D	
Approach Delay (s)		39.2			30.1			50.3			35.7	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	116.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1004	18	1	1165	1	4
Future Volume (Veh/h)	1004	18	1	1165	1	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	1154	21	1	1339	1	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	251					
pX, platoon unblocked			0.51		0.51	0.51
vC, conflicting volume			1175		1836	1164
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			865		2156	845
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	97
cM capacity (veh/h)			403		21	159

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	1175	447	893	6
Volume Left	0	1	0	1
Volume Right	21	0	0	5
cSH	1700	403	1700	77
Volume to Capacity	0.69	0.00	0.53	0.08
Queue Length 95th (m)	0.0	0.1	0.0	2.0
Control Delay (s)	0.0	0.1	0.0	55.9
Lane LOS		A		F
Approach Delay (s)	0.0	0.0		55.9
Approach LOS				F

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	879	1151	4	4	17
Future Volume (Veh/h)	11	879	1151	4	4	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	11	897	1174	4	4	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)		361	378			
pX, platoon unblocked	0.99				0.56	0.99
vC, conflicting volume	1178				2095	589
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1165				2506	571
tC, single (s)	4.1				6.8	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	98				70	96
cM capacity (veh/h)	603				13	450

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	908	783	395	21
Volume Left	11	0	0	4
Volume Right	0	0	4	17
cSH	603	1700	1700	62
Volume to Capacity	0.02	0.46	0.23	0.34
Queue Length 95th (m)	0.4	0.0	0.0	9.8
Control Delay (s)	0.6	0.0	0.0	89.5
Lane LOS	A			F
Approach Delay (s)	0.6	0.0		89.5
Approach LOS				F

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	982	17	87	1153	6	38
Future Volume (Veh/h)	982	17	87	1153	6	38
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1034	18	92	1214	6	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)				181		
pX, platoon unblocked					0.90	
vC, conflicting volume			1052		1834	1043
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1052		1704	1043
tC, single (s)			4.1		7.1	7.1
tC, 2 stage (s)						
tF (s)			2.2		3.7	3.4
p0 queue free %			86		89	81
cM capacity (veh/h)			669		55	211

Direction, Lane #	EB 1	WB 1	WB 2	WB 3	NB 1
Volume Total	1052	92	607	607	46
Volume Left	0	92	0	0	6
Volume Right	18	0	0	0	40
cSH	1700	669	1700	1700	154
Volume to Capacity	0.62	0.14	0.36	0.36	0.30
Queue Length 95th (m)	0.0	3.8	0.0	0.0	9.4
Control Delay (s)	0.0	11.2	0.0	0.0	38.1
Lane LOS		B			E
Approach Delay (s)	0.0	0.8			38.1
Approach LOS					E

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	1015	1246	22	21	3
Future Volume (vph)	8	1015	1246	22	21	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1543	1810	3369		1805	1615
Flt Permitted	0.19	1.00	1.00		0.95	1.00
Satd. Flow (perm)	312	1810	3369		1805	1615
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	1057	1298	23	22	3
RTOR Reduction (vph)	0	0	1	0	0	3
Lane Group Flow (vph)	8	1057	1320	0	22	0
Heavy Vehicles (%)	17%	5%	7%	0%	0%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	4		1	
Permitted Phases	4					1
Actuated Green, G (s)	55.7	55.7	55.7		3.5	3.5
Effective Green, g (s)	58.5	58.5	58.5		5.5	5.5
Actuated g/C Ratio	0.81	0.81	0.81		0.08	0.08
Clearance Time (s)	6.8	6.8	6.8		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0
Lane Grp Cap (vph)	253	1470	2737		137	123
v/s Ratio Prot		c0.58	0.39		c0.01	
v/s Ratio Perm	0.03					0.00
v/c Ratio	0.03	0.72	0.48		0.16	0.00
Uniform Delay, d1	1.3	3.0	2.1		31.1	30.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	3.1	0.6		0.2	0.0
Delay (s)	1.5	6.1	2.7		31.3	30.7
Level of Service	A	A	A		C	C
Approach Delay (s)		6.1	2.7		31.2	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	4.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 1: McNiven Rd/Lime Kiln Rd & Mohawk Road

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	38.1	203.4	43.5	138.3	196.2	36.3	152.1	22.1	12.7
Average Queue (m)	3.0	197.8	32.4	71.2	75.2	33.5	75.9	5.7	3.1
95th Queue (m)	14.6	202.5	56.9	125.2	144.3	42.9	146.6	16.7	8.6
Link Distance (m)		191.5		224.8	224.8		136.2		253.5
Upstream Blk Time (%)		49					17		
Queuing Penalty (veh)		0					0		
Storage Bay Dist (m)	31.0		36.0			29.0		20.0	
Storage Blk Time (%)		44	0			40	14	3	
Queuing Penalty (veh)		131	1			85	32	1	

Intersection: 2: Cayuga Ave & Mohawk Road

Movement	NB
Directions Served	LR
Maximum Queue (m)	6.3
Average Queue (m)	0.4
95th Queue (m)	2.8
Link Distance (m)	278.1
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: Mohawk Road & Green Ravine Dr

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (m)	72.3	21.0
Average Queue (m)	7.7	5.2
95th Queue (m)	38.5	15.4
Link Distance (m)	98.3	127.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Algonquin Ave & Mohawk Road

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (m)	6.6	28.7	27.7
Average Queue (m)	0.2	13.0	10.3
95th Queue (m)	2.2	23.6	20.3
Link Distance (m)	177.0		181.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		20.0	
Storage Blk Time (%)		2	
Queuing Penalty (veh)		14	

Intersection: 5: Mohawk Road & Filman Rd

Movement	EB	EB	B11	WB	WB	SB	SB
Directions Served	L	T	T	T	TR	L	R
Maximum Queue (m)	14.9	91.5	25.7	63.4	56.1	14.8	7.9
Average Queue (m)	2.6	32.6	2.5	23.6	16.6	4.3	0.3
95th Queue (m)	10.0	85.7	12.8	59.9	47.1	11.7	2.6
Link Distance (m)		58.7	89.2	87.2	87.2	64.2	
Upstream Blk Time (%)		3					
Queuing Penalty (veh)		27					
Storage Bay Dist (m)	30.0						20.0
Storage Blk Time (%)		5				0	
Queuing Penalty (veh)		0				0	

Network Summary

Network wide Queuing Penalty: 291

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SUBMITTED BY CIMA CANADA INC.
400–3027 Harvester Road
Burlington, ON L7N 3G7
T: 289 288-0287   F: 289 288-0285
cima.ca