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Traffic Operations Assessment PROPOSED RESTAURANT DEVELOPMENT

16054-16060 Airport Road Town of Caledon, ON

December 4, 2019 Project No: NT-19-052 520 Industrial Parkway South, Suite 201 Aurora, Ontario L4G 6W8

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NextEng Consulting Group Inc.

December-4-19

N&N Donut Inc. 201-60 Lacoste Boulevard Brampton ON, L6P 2K2

Attention: Asif Patel

Re: Traffic Operations Assessment Proposed Restaurant Development 16054-16060 Airport Road – Town of Caledon, ON Our Project No. NT-19-052

NexTrans Consulting Engineers (A Division of NextEng Consulting Group Inc.) is pleased to present the enclosed Transportation Operations Assessment for a Site Plan Application in support of a proposed restaurant with ancillary drive-through located southwest of Airport Road and Walker Road, in the Town of Caledon.

The development proposal is to demolish the existing single-detached house and construct a restaurant with ancillary drive-through to provide 232.26 m² of gross floor area (GFA). A total of 16 parking spaces are proposed. Access to the site is envisioned via a full movement driveway onto Airport Road.

The study concludes that the development proposal can adequately be accommodated by the existing transportation network with manageable traffic impact to the adjacent public roadways. We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

Nextrans Consulting Engineers A Division of NextEng Consulting Group Inc.

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1.0 INTRODUCTION

Nextrans Consulting Engineers was retained by Weston Consulting (the 'Client') to undertake a Transportation Operations Assessment for a Site Plan Application in support of a proposed restaurant with ancillary drive-through located southwest of Airport Road and Walker Road, in the Town of Caledon. The location of the proposed development is illustrated in **Figure 1-1**.



Figure 1-1 – Site Location

The subject site is currently occupied by a single-detached house. Based on the preliminary site plan prepared by Weston Consulting, dated March 2019, the development proposal is to demolish the existing single-detached house and construct a restaurant with ancillary drive-through to provide 232.26 m² of gross floor area (GFA). A total of 16 parking spaces are proposed. Access to the site is envisioned via a full movement driveway onto Airport Road. The preliminary site plan is provided in **Figure 1-2**; **Appendix A** also provides a larger scale version of the proposed site plan.

Given the commercial-based nature of the development proposal, the analysis will include the weekday morning and afternoon peak periods for assessment purposes.



2.0 EXISTING TRAFFIC CONDITIONS

2.1. Existing Road Network

The existing subject lands are located southwest of Airport Road and Walker Road, in the Town of Caledon. The road network is described as follows:

Airport Road: Airport Road is classified as an arterial road and maintains a posted speed limit of 50 km/h. Airport Road maintains a two (2) lane cross section in the vicinity of the subject site and has layby parking provided on both sides of the roadway. Sidewalks are provided on both sides of the roadway.

Walker Road: Walker Road is classified as a local road and maintains a posted speed limit of 50 km/hr. Walker Road maintains a two (2) lane cross section in the vicinity of the subject site. Sidewalks are provided on the south side of the roadway.

Old Church Road: Old Church Road is classified as an arterial road and maintains a posted speed limit of 50 km/hr. Old Church Road maintains a two (2) lane cross section in the vicinity of the subject site and has layby parking provided on both sides of the roadway. Sidewalks are provided on both sides of the roadway.

2.2. Existing Active Transportation Network

Sidewalks

The area surrounding the proposed development is well serviced with dedicated walkways. Currently, sidewalks are available on both sides of Airport Road and Old Church Road. Sidewalks are provided on the south side of Walker Road.

Bicycle Lanes

There are no dedicated bicycle lanes within the vicinity of the subject site.

2.3. Existing Traffic Volumes

Existing traffic volumes at the study area intersections were undertaken by Spectrum Traffic on behalf of Nextrans Consulting Engineers on Tuesday, May 14, 2019 during the morning (7:00 a.m. to 10:00 a.m.) and afternoon (4:00 p.m. to 7:00 p.m.) peak periods. Detailed existing traffic data and signal timing plan are provided in **Appendix B**.

The signal timing plan shows the intersection as a 3-legged intersection, with signals provided for the northbound, southbound and westbound directions. However, the turning movement counts represent the intersection as a 4-legged intersection. Based on discussion with Peel Region, the eastbound direction is assumed to follow the same signal timing plan as the westbound direction, since Synchro 10 cannot analyze the intersection as a one-way stop and three-way signalized intersection. As such, the eastbound signal timing at the LCBO Site Access will follow the westbound signal timing plan on Old Church Road.

2.4. Existing Traffic Assessment

The existing volumes are illustrated in **Figure 2-1** and were analyzed using Synchro 10 software. The methodology of the software follows the procedures described and outlined in the Highway Capacity Manual, HCM 2000, published by the Transportation Research Board. The detailed results are provided in **Appendix C** and summarized in **Table 2.1**.



Figure 2-1 – Existing Traffic Volumes

		V	Veekday Al Peak Hour	M	V	Veekday PI Peak Hour	M
Intersection	Movement	LOS (v/c)	Delay (s)	95 th Queue (m)	LOS (v/c)	Delay (s)	95 th Queue (m)
Airport Road and Old Church Road / LCBO Site Access (Signalized)	Overall EBLTR WBL WBTR NBLT NBR SBLTR	B (0.77) B (0.02) C (0.78) B (0.09) B (0.18) B (0.16) C (0.77)	19.8 14.4 27.4 14.9 10.8 10.7 22.3	- 1.7 55.5 0.4 20.1 10.8 116 7	B (0.69) B (0.11) C (0.69) B (0.20) B (0.20) A (0.21) B (0.44)	16.1 15.6 23.8 16.1 18.2 10.0 12.6	- 7.8 42.7 2.4 103.0 13.6 47 4

Table 2.1 – Level of Service – Existing Traffic Assessments

As summarized in **Table 2.1**, under existing conditions, the study area intersection is currently operating at excellent levels of service during both peak periods with no critical movements.

3.0 FUTURE BACKGROUND CONDITIONS

A 5-year (2024) horizon period was selected and assumed in this analysis, which generally coincides with the full build out of the proposed development. Since the Peel Region AADT Data only has data for the year of 2012, a conservative 1% growth rate per annum is assumed for the north-south through traffic on Airport Road.

The future (2024) background traffic volumes are provided in **Figure 3-1**. **Table 3.1** summarizes the level of service at the given intersections under future background traffic conditions. Detailed output analysis can be found in **Appendix D**.



Figure 3-1 – Future (2024) Background Traffic Volumes

Table 24.	Cuture /	1 N C O C	Deelenround	Troffic		of Comilan
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		-				

		v	Veekday Al Peak Hour	M	v	Veekday PI Peak Hour	N
Intersection	Movement	LOS (v/c)	Delay (s)	95 th Queue (m)	LOS (v/c)	Delay (s)	95 th Queue (m)
	Overall	C (0.78)	20.1	-	B (0.72)	16.5	-
Airport Bood and Old	EBLTR	B (0.02)	14.4	1.7	B (0.11)	15.6	7.8
Church Deed / CDO	WBL	C (0.78)	27.4	55.5	C (0.69)	23.8	42.7
	WBTR	B (0.09)	14.9	0.4	B (0.20)	16.2	2.5
(Signalized)	NBLT	B (0.19)	10.9	20.9	B (0.73)	19.5	110.8
	NBR	B (0.16)	10.7	10.8	A (0.21)	10.0	13.6
	SBLTR	C (0.78)	23.1	119.9	B (0.46)	12.9	49.4

As summarized in **Table 3.1**, it is shown that during future background traffic conditions the subject study area intersection continues to operate at excellent level of services with no changes to expected operations.

4.0 SITE TRAFFIC

The development proposal is to convert and renovate the existing two (2) detached dwelling units into a restaurant with a drive-through, providing 232.26 m² of gross floor area. Trip rates and site generated trips were derived from the information contained in the *Trip Generation Manual*, 10th Edition published by the Institute of Transportation Engineers (ITE) for "Fast-Food Restaurant with Drive-Through Window" (LUC 934). The trip generation summary is shown in **Table 4.1**.

ITE Land Lico	Daramator	Morn	ing Peak	Hour	Aftern	oon Peak	Hour
	Falameter	In	Out	Total	In	Out	Total
Fast-Food Restaurant with Drive-Through Window (2,500 ft ²)	Gross Trips	51	49	100	43	39	82
	Gross Rate	20.40	19.60	40.00	17.20	15.60	32.80
Total	New Trips	51	49	100	43	39	82

As shown in Table 4.1, the proposed development is anticipated to generate 100 two-way auto trips (51 inbound and 49 outbound) during the AM peak hours and 82 two-way auto trips (43 inbound and 39 outbound) during the PM peak hours.

The assumptions for the trip distribution rates are based on existing traffic patterns and routes that drivers would likely take to access the subject site and engineering judgement based on ease of site access. As a result, site trip distribution is summarized for the inbound and outbound site traffic movements during the morning and afternoon peak hours in Table 4.2 with the trip assignment illustrated in Figure 4-1.

Direction	Vie	AM Pe	ak Hour	PM Pe	ak Hour							
Direction	Via	Inbound	Outbound	Inbound	Outbound							
North	Airport Road	29%	29%	26%	26%							
South	Airport Road	16%	16%	43%	43%							
East	Old Church Road	55%	55%	31%	31%							
	Total	100%	100%	100%	100%							

Table 4.2 – Site Traffic Trip Distribution





5.0 FUTURE TOTAL TRAFFIC CONDITIONS

The forecasted 2024 future total traffic volumes (future background volumes plus site generated traffic volumes) are illustrated in **Figure 5-1** and were analyzed using Synchro 10 software with stopped controlled at the proposed site access. The detailed calculations are provided in **Appendix E** and summarized in **Table 5.1**.



Figure 5-1 – Future (2024) Total Traffic Volumes

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		V	Veekday Al Peak Hour	M	Weekday PM Peak Hour			
Intersection	Movement	LOS (v/c)	Delay (s)	95 th Queue (m)	LOS (v/c)	Delay (s)	95 th Queue (m)	
	Overall	C (0.83)	22.3	-	B (0.73)	17.2	-	
Airport Poad and Old	EBLTR	B (0.02)	14.4	1.7	B (0.11)	15.6	7.8	
Church Deed / LCDO	WBL	C (0.78)	27.4	55.5	C (0.68)	23.6	42.7	
	WBTR	B (0.11)	15.0	0.0	B (0.25)	16.4	4.1	
Sile Access	NBLT	B (0.23)	11.3	25.7	C (0.76)	20.6	115.3	
(Signalized)	NBR	B (0.16)	10.7	10.8	B (0.21)	10.1	13.6	
	SBLTR	C (0.86)	28.9	136.3	B (0.55)	14.9	57.4	
Airport Road and Site	EBLR	B (0.11)	13.1	2.8	C (0.11)	15.3	3.2	
Access	NBLT	A (0.05)	2.0	1.1	A (0.02)	0.6	0.5	

Under future total traffic conditions, the study intersection and proposed accesses are expected to continue operating with excellent level of service during both peak periods.

6.0 PARKING ASSESSMENT

. The technical parking requirement for the proposed development is detailed in Table 6.1.

Use	Gross Floor Area	Rate	Parking Requirement	Parking Provided	Difference
Restaurant	232.26 m ²	1 space per 15 m ²	16	16	0
	Total		16	16	0

 Table 6.1 – Vehicle Parking Requirements

Based on Town of Caledon Zoning By-law dated March 2016, a minimum of 16 parking spaces will be required for the proposed development. The preliminary site plan provides for a total of 16 parking spaces which meets the parking requirements. On this basis, the proposed parking provision at the subject site is satisfied.

Additionally, there are approximately 16 on-street parking spaces available on Airport Road, within 100-m radius of the subject site.

7.0 SITE PLAN REVIEW

AutoTURN software was used to generate a vehicular turning template to confirm and demonstrate the accessibility of the proposed loading space and drive through route. As illustrated in **Appendix F**, the AutoTURN analysis demonstrates that a 6.31-m long pick up truck can effectively maneuver through the proposed drive through route, and a 12-m long front load garbage truck can maneuver to the proposed loading space and through the site.

Additionally, it is NexTrans' opinion that the site access location is functional from a traffic perspective since Airport Road does not generate high volumes of traffic, and can be accommodated by the existing transportation network with manageable traffic impact to the adjacent public roadways.

8.0 CONCLUSION

The findings and conclusions of our analysis are as follows:

- The development proposal is to demolish the existing single-detached house and construct a restaurant with ancillary drive-through to provide 232.26 m² of gross floor area (GFA). A total of 16 parking spaces are proposed. Access to the site is envisioned via a full movement driveway onto Airport Road.
- The proposed development is anticipated to generate 100 two-way auto trips (51 inbound and 49 outbound) during the AM peak hours and 82 two-way auto trips (43 inbound and 39 outbound) during the PM peak hours.
- The intersection capacity analysis results (based on the methodology and procedures outlined in the Highway Capacity Manual, HCM 2000, published by the Transportation Research Board) indicate that the study intersections and existing accesses are expected to operate with excellent levels of service.
- Based on Town of Caledon Zoning By-law dated March 2016, a minimum of 16 parking spaces will be required for the proposed development. The preliminary site plan provides for a total of 16 parking spaces which meets the parking requirements. On this basis, the proposed parking provision at the subject site is satisfied. Additionally, there are approximately 16 on-street parking spaces available on Airport Road, within 100-m radius of the subject site.
- The proposed site plan and site access are accessible from a circulation perspective.

Appendix A - Proposed Site Plan





DETAILS OF DEVELOPMENT										
ONING DESIGNATION			CV Zone							
ITE LAYOUT		REQUIRED	PROPOSED							
ETBACKS	FRONT YARD	9.00 m	10.18 m							
	REAR YARD	10.50 m	25.00 m							
	INT. SIDE YARD	3.00 m	16.11 m							
	INT. SIDE YARD	3.00 m	6.80 m							
ANDSCAPE AREA (%)	MINIMUM	20.0%	33 7%							
			00.770							
ARKING & LOADING		REQUIRED	PROPOSED							
ARRIER-FREE PARKING	SPACES	1	2							
	STALL LENGTH	6.00 m	6.00 m							
	STALL WIDTH	3.15 m	3.15 m							
TANDARD PARKING	SPACES	14	14							
	STALL LENGTH	6.00 m	6.00 m							
	STALL WIDTH	2.75 m	2.75 m							
		. –	10							
JTAL FARMING SFACES		15	16							
RIVE AISLE WIDTH	TWO-WAY	15 6.00 m	16 6.00 m							
RIVE AISLE WIDTH	TWO-WAY SPACES	15 6.00 m 1	16 6.00 m 1							
RIVE AISLE WIDTH DADING SPACE	TWO-WAY SPACES LENGTH	15 6.00 m 1 9.00 m	16 6.00 m 1 9.00 m							

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MM	REVIEWED BY	16054 & 16060 Airport Road, Caledon, ON	PROJECT NO.
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July	2019	Site Plan	SP
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Appendix B – Existing Traffic Data



Turning Movement Count Location Name: AIRPORT RD & OLD CHURCH RD Date: Tue, May 14, 2019 Deployment Lead: David Chu

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Turning Movement Count (1 . AIRPORT RD & OLD CHURCH RD) CustID: 00729337 MioID: 655474

Start Time				N Approa AIRPORT	ich RD				E Ol	E Approa D CHURC	ch H RD				9	S Approa AIRPORT	ch RD				Ea	W Appro	ach pproach		Int. Total (15 min)	Int. Total (1 hr)
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07:00:00	0	120	13	0	1	133	5	0	45	0	0	50	12	17	0	0	0	29	0	0	0	0	1	0	212	
07:15:00	0	104	14	0	0	118	9	0	59	0	0	68	21	32	0	0	0	53	0	1	1	0	3	2	241	
07:30:00	0	80	19	0	3	99	15	0	51	0	0	66	31	26	0	0	0	57	0	2	0	0	0	2	224	
07:45:00	1	86	25	0	2	112	21	0	82	0	1	103	50	28	0	0	0	78	0	0	0	0	3	0	293	970
08:00:00	0	92	21	0	1	113	16	0	87	0	0	103	61	27	0	0	1	88	0	3	0	0	1	3	307	1065
08:15:00	1	94	30	0	1	125	20	3	71	0	0	94	63	24	0	0	0	87	0	2	0	0	0	2	308	1132
08:30:00	0	73	35	0	1	108	15	2	53	0	0	70	45	30	0	0	1	75	0	0	0	0	1	0	253	1161
08:45:00	0	90	22	0	0	112	13	0	51	0	0	64	56	34	1	0	0	91	0	0	0	0	0	0	267	1135
09:00:00	1	73	23	0	0	97	9	3	65	0	0	77	53	31	1	0	0	85	0	1	0	0	1	1	260	1088
09:15:00	0	75	16	0	1	91	20	1	51	0	1	72	34	46	0	0	1	80	0	0	0	0	3	0	243	1023
09:30:00	1	67	14	0	0	82	8	0	31	0	3	39	31	45	1	0	1	77	1	0	0	0	1	1	199	969
09:45:00	0	55	13	0	1	68	11	0	35	0	2	46	33	40	0	0	0	73	0	3	1	0	2	4	191	893
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16:00:00	0	50	8	0	1	58	31	5	49	0	0	85	77	98	4	0	8	179	1	1	4	0	16	6	328	
16:15:00	4	57	13	0	3	74	31	0	47	0	1	78	82	85	4	0	1	171	2	2	2	0	15	6	329	
16:30:00	6	46	14	0	0	66	48	8	66	0	1	122	81	106	3	0	3	190	3	3	6	0	19	12	390	
16:45:00	3	52	6	0	0	61	51	6	52	0	2	109	68	118	4	0	2	190	7	4	4	0	12	15	375	1422
17:00:00	2	40	14	0	1	56	28	4	62	0	4	94	65	110	2	0	1	177	1	3	5	0	23	9	336	1430
17:15:00	1	41	9	0	3	51	41	3	50	0	3	94	67	102	4	0	2	173	4	2	4	0	22	10	328	1429
17:30:00	2	32	11	0	0	45	19	5	44	0	4	68	85	95	1	0	0	181	1	2	6	0	19	9	303	1342
17:45:00	3	42	9	0	0	54	16	1	32	0	0	49	70	79	7	0	0	156	2	1	5	0	22	8	267	1234
18:00:00	0	43	13	0	0	56	22	2	39	0	0	63	61	88	2	0	1	151	1	3	5	0	20	9	279	1177
18:15:00	4	38	8	0	0	50	18	3	51	0	0	72	71	72	0	0	0	143	2	1	0	0	14	3	268	1117
18:30:00	3	44	8	0	0	55	13	3	32	0	4	48	51	68	2	0	1	121	1	4	2	0	23	7	231	1045
18:45:00	0	36	9	0	2	45	14	5	35	0	3	54	59	54	2	0	0	115	3	8	1	0	18	12	226	1004
Grand Total	32	1530	367	0	21	1929	494	54	1240	0	29	1788	1327	1455	38	0	23	2820	29	46	46	0	239	121	6658	-
Approach%	1.7%	79.3%	19%	0%		-	27.6%	3%	69.4%	0%		-	47.1%	51.6%	1.3%	0%		-	24%	38%	38%	0%		-	-	-
Totals %	0.5%	23%	5.5%	0%		29%	7.4%	0.8%	18.6%	0%		26.9%	19.9%	21.9%	0.6%	0%		42.4%	0.4%	0.7%	0.7%	0%		1.8%	-	-
Heavy	1	153	28	0		-	39	1	38	0		-	40	130	2	0		-	0	0	0	0		-	-	-
Heavy %	3.1%	10%	7.6%	0%		-	7.9%	1.9%	3.1%	0%		-	3%	8.9%	5.3%	0%		-	0%	0%	0%	0%		-	-	-
Bicycles	0	1	0	0		-	2	1	0	0		-	1	1	0	0		-	0	0	0	0		-	-	-
Bicycle %	0%	0.1%	0%	0%		-	0.4%	1.9%	0%	0%		-	0.1%	0.1%	0%	0%		-	0%	0%	0%	0%		-	-	-

Turning Movement Count





Turning Movement Count Location Name: AIRPORT RD & OLD CHURCH RD Date: Tue, May 14, 2019 Deployment Lead: David Chu

Peak Hour: 07:45 AM - 08:45 AM

Weather: Light Intensity Shower Rain (6 °C)

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Start Time			l A	N Approa AIRPORT	ch RD				E OLI	Approa d D CHURC	:h H RD					S Approa	ach TRD				E	W Appro	ach Approach		Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
07:45:00	1	86	25	0	2	112	21	0	82	0	1	103	50	28	0	0	0	78	0	0	0	0	3	0	293
08:00:00	0	92	21	0	1	113	16	0	87	0	0	103	61	27	0	0	1	88	0	3	0	0	1	3	307
08:15:00	1	94	30	0	1	125	20	3	71	0	0	94	63	24	0	0	0	87	0	2	0	0	0	2	308
08:30:00	0	73	35	0	1	108	15	2	53	0	0	70	45	30	0	0	1	75	0	0	0	0	1	0	253
Grand Total	2	345	111	0	5	458	72	5	293	0	1	370	219	109	0	0	2	328	0	5	0	0	5	5	1161
Approach%	0.4%	75.3%	24.2%	0%		-	19.5%	1.4%	79.2%	0%		-	66.8%	33.2%	0%	0%			0%	100%	0%	0%			
Totals %	0.2%	29.7%	9.6%	0%		39.4%	6.2%	0.4%	25.2%	0%		31.9%	18.9%	9.4%	0%	0%		28.3%	0%	0.4%	0%	0%		0.4%	-
PHF	0.5	0.92	0.79	0		0.92	0.86	0.42	0.84	0		0.9	0.87	0.91	0	0		0.93	0	0.42	0	0		0.42	-
Heavy	0	30	9	0		39	18	1	8	0		27	5	31	0	0		36	0	0	0	0		0	-
Heavy %	0%	8.7%	8.1%	0%		8.5%	25%	20%	2.7%	0%		7.3%	2.3%	28.4%	0%	0%		11%	0%	0%	0%	0%		0%	-
Lights	2	315	102	0		419	54	4	285	0		343	214	78	0	0		292	0	5	0	0		5	-
Lights %	100%	91.3%	91.9%	0%		91.5%	75%	80%	97.3%	0%		92.7%	97.7%	71.6%	0%	0%		89%	0%	100%	0%	0%		100%	-
Single-Unit Trucks	0	8	3	0		11	4	1	6	0		11	3	13	0	0		16	0	0	0	0		0	-
Single-Unit Trucks %	0%	2.3%	2.7%	0%		2.4%	5.6%	20%	2%	0%		3%	1.4%	11.9%	0%	0%		4.9%	0%	0%	0%	0%		0%	-
Buses	0	0	6	0		6	14	0	1	0		15	1	5	0	0		6	0	0	0	0		0	-
Buses %	0%	0%	5.4%	0%		1.3%	19.4%	0%	0.3%	0%		4.1%	0.5%	4.6%	0%	0%		1.8%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	22	0	0		22	0	0	1	0		1	1	13	0	0		14	0	0	0	0		0	-
Articulated Trucks %	0%	6.4%	0%	0%		4.8%	0%	0%	0.3%	0%		0.3%	0.5%	11.9%	0%	0%		4.3%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	2		-	-	-	-	4	-	-
Pedestrians%	-	-	-	-	23.1%		-	-	-	-	7.7%		-	-	-	-	15.4%		-	-	-	-	30.8%		-
Bicycles on Crosswalk	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0		-	-	-	-	1	-	-
Bicycles on Crosswalk%	-	-	-	-	15.4%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	7.7%		-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-



Turning Movement Count Location Name: AIRPORT RD & OLD CHURCH RD Date: Tue, May 14, 2019 Deployment Lead: David Chu

						Pe	ak Ho	our: (04:15	PM - (05:15	PM Wea	ther:	Overo	cast C	Cloud	s (13	.38 °C)							
Start Time			l /	N Approa AIRPORT	rch RD				E OL	E Approa	ch XH RD				S	Approa	ch RD				۱ Eas	N Approa	ach oproach		Int. Total (15 min)
	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	Right	Thru	Left	U-Turn	Peds	Approach Total	
16:15:00	4	57	13	0	3	74	31	0	47	0	1	78	82	85	4	0	1	171	2	2	2	0	15	6	329
16:30:00	6	46	14	0	0	66	48	8	66	0	1	122	81	106	3	0	3	190	3	3	6	0	19	12	390
16:45:00	3	52	6	0	0	61	51	6	52	0	2	109	68	118	4	0	2	190	7	4	4	0	12	15	375
17:00:00	2	40	14	0	1	56	28	4	62	0	4	94	65	110	2	0	1	177	1	3	5	0	23	9	336
Grand Total	15	195	47	0	4	257	158	18	227	0	8	403	296	419	13	0	7	728	13	12	17	0	69	42	1430
Approach%	5.8%	75.9%	18.3%	0%		-	39.2%	4.5%	56.3%	0%			40.7%	57.6%	1.8%	0%		-	31%	28.6%	40.5%	0%		-	· ·
Totals %	1%	13.6%	3.3%	0%		18%	11%	1.3%	15.9%	0%		28.2%	20.7%	29.3%	0.9%	0%		50.9%	0.9%	0.8%	1.2%	0%		2.9%	-
PHF	0.63	0.86	0.84	0		0.87	0.77	0.56	0.86	0		0.83	0.9	0.89	0.81	0		0.96	0.46	0.75	0.71	0		0.7	-
Heavy	0	28	3	0		31	5	0	6	0		11	5	21	0	0		26	0	0	0	0		0	
Heavy %	0%	14.4%	6.4%	0%		12.1%	3.2%	0%	2.6%	0%		2.7%	1.7%	5%	0%	0%		3.6%	0%	0%	0%	0%		0%	-
Lights	15	167	44	0		226	153	18	221	0		392	291	398	13	0		702	13	12	17	0		42	
Lights %	100%	85.6%	93.6%	0%		87.9%	96.8%	100%	97.4%	0%		97.3%	98.3%	95%	100%	0%		96.4%	100%	100%	100%	0%		100%	-
Single-Unit Trucks	0	11	2	0		13	4	0	3	0		7	3	13	0	0		16	0	0	0	0		0	-
Single-Unit Trucks %	0%	5.6%	4.3%	0%		5.1%	2.5%	0%	1.3%	0%		1.7%	1%	3.1%	0%	0%		2.2%	0%	0%	0%	0%		0%	-
Buses	0	4	1	0		5	1	0	2	0		3	1	2	0	0		3	0	0	0	0		0	-
Buses %	0%	2.1%	2.1%	0%		1.9%	0.6%	0%	0.9%	0%		0.7%	0.3%	0.5%	0%	0%		0.4%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	13	0	0		13	0	0	1	0		1	1	6	0	0		7	0	0	0	0		0	-
Articulated Trucks %	0%	6.7%	0%	0%		5.1%	0%	0%	0.4%	0%		0.2%	0.3%	1.4%	0%	0%		1%	0%	0%	0%	0%		0%	-
Pedestrians	-	-	-	-	4	-	-	-	-	-	8	-	-	-	-	-	7	-	-	-	-	-	69	-	-
Pedestrians%	-	-	-	-	4.5%		-	-	-	-	9.1%		-	-	-	-	8%		-	-	-	-	78.4%		-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-



Turning Movement Count Location Name: AIRPORT RD & OLD CHURCH RD Date: Tue, May 14, 2019 Deployment Lead: David Chu







		REGION	AL MUN	ICIPALIT	Y OF PEE	Ľ			
Database	Date	N	lay 10, 2019		Pr	epared Date:		May 10, 2019	
Database	Rev		iNet		C	ompleted By:		MJY	
Timing Ca	ard / Field rev		iNet			Checked By:		RC	
Locatior	Airp	ort Rd @ Old	Church R	d			TIN	IE PERIOD (se	ec.)
		Vehicle	Pede	estrian	Amber	All Red	*Peak Split= (G **Max = Green	reen+Amber+A	All Red)
Phase	Direction	Minimum	Minimu	im (sec.)	(sec.)	(sec.)	AM	OFF	PM
#		(sec.)	WALK	FDWALK			Peak Split	Max	Peak Split
1	NIU	-	-	-	-	-	-	-	-
2	Airport Rd - SB	8.0	8.0	17.0	4.0	3.1	42.0	25.0	42.0
3	NIU	-	-	-	-	-	-	-	-
4	Old Church Rd - WB	8.0	8.0	10.0	4.0	2.6	28.0	20.0	28.0
5	NIU	-	-	-	-	-	-	-	-
6	Airport Rd - NB	8.0	8.0	17.0	4.0	3.1	42.0	25.0	42.0
7	NIU	-	-	-	-	-	-	-	-
8	NIU	-	-	-	-	-	-	-	-
	System Control	Yes		TIME	(M-F)	PEAK	CYCLE LEN	IGTH (sec.)	OFFSET (sec.)
	Local Control	No		06:00	- 09:00	AM	7	0	19
	Semi-Actuated Mode	Yes		09:00	- 15:00	OFF	-	•	-
			-	15:00	- 18:30	РМ	7	0	45

Appendix C – Existing Traffic Level of Service Calculations

		1	-	Ť	1	ŧ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	12	349	96	120	252	530
v/c Ratio	0.02	0.78	0.20	0.18	0.30	0.77
Control Delay	13.2	31.9	5.7	13.1	3.2	26.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	31.9	5.7	13.1	3.2	26.1
Queue Length 50th (m)	0.9	35.5	0.9	7.8	0.0	48.7
Queue Length 95th (m)	1.7	55.5	0.4	20.1	10.8	#116.7
Internal Link Dist (m)	8.5		141.6	59.2		183.2
Turn Bay Length (m)						
Base Capacity (vph)	864	627	634	675	843	691
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.56	0.15	0.18	0.30	0.77
Interception Summary						

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 3: Airport Road & LCBO Site Access/Old Church Road

06/14/2019

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		5	ţ,			्र	1		4.	
Traffic Volume (vph)	0	5	0	293	5	72	0	109	219	111	354	2
Future Volume (vph)	0	5	0	293	5	72	0	109	219	111	354	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	0.98			1.00	0.98		1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		1.00		1.00	0.87			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		1921		1766	1308			1501	1566		1742	
Flt Permitted		1.00		0.75	1.00			1.00	1.00		0.87	
Satd. Flow (perm)		1921		1394	1308			1501	1566		1535	
Peak-hour factor, PHF	0.25	0.42	0.25	0.84	0.42	0.86	0.25	0.91	0.87	0.79	0.92	0.50
Adj. Flow (vph)	0	12	0	349	12	84	0	120	252	141	385	4
RTOR Reduction (vph)	0	0	0	0	57	0	0	0	139	0	1	0
Lane Group Flow (vph)	0	12	0	349	39	0	0	120	113	0	529	0
Confl. Peds. (#/hr)	5		2	2		5	5		1	1		5
Heavy Vehicles (%)	0%	0%	0%	3%	20%	25%	0%	28%	2%	8%	9%	0%
Turn Type		NA		Perm	NA			NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		20.1		20.1	20.1			28.1	28.1		28.1	
Effective Green, g (s)		20.1		20.1	20.1			28.1	28.1		28.1	
Actuated g/C Ratio		0.32		0.32	0.32			0.45	0.45		0.45	
Clearance Time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		618		449	421			675	705		691	
v/s Ratio Prot		0.01			0.03			0.08				
v/s Ratio Perm				c0.25					0.07		c0.34	
v/c Ratio		0.02		0.78	0.09			0.18	0.16		0.77	
Uniform Delay, d1		14.4		19.1	14.8			10.2	10.2		14.4	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.0		8.2	0.1			0.6	0.5		7.9	
Delay (s)		14.4		27.4	14.9			10.8	10.7		22.3	
Level of Service		В		С	В			В	В		С	
Approach Delay (s)		14.4			24.7			10.7			22.3	
Approach LOS		В			С			В			С	
Intersection Summary												
HCM 2000 Control Delav			19.8	Н	CM 2000	Level of S	Service		В			
HCM 2000 Volume to Capacity	v ratio		0.77						_			
Actuated Cycle Length (s)	,		62.4	S	um of lost	time (s)			14.2			
Intersection Capacity Utilizatio	n		66.3%	IC	U Level o	of Service			С			
Analysis Period (min)			15									

c Critical Lane Group

	٦	$\mathbf{\hat{v}}$	1	Ť	Ļ	4		
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	¥			र्स	1			
Traffic Volume (veh/h)	0	0	0	181	458	0		
Future Volume (Veh/h)	0	0	0	181	458	0		
Sign Control	Stop			Free	Free			
Grade	0%			0%	0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	0	0	0	197	498	0		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type				None	None			
Median storage veh)								
Upstream signal (m)				207				
pX, platoon unblocked								
vC, conflicting volume	695	498	498					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	695	498	498					
tC, single (s)	6.4	6.2	4.1					
tC, 2 stage (s)								
tF (s)	3.5	3.3	2.2					
p0 queue free %	100	100	100					
cM capacity (veh/h)	408	572	1066					
Direction, Lane #	EB 1	NB 1	SB 1					
Volume Total	0	197	498					
Volume Left	0	0	0					
Volume Right	0	0	0					
cSH	1700	1066	1700					
Volume to Capacity	0.00	0.00	0.29					
Queue Length 95th (m)	0.0	0.0	0.0					
Control Delay (s)	0.0	0.0	0.0					
Lane LOS	А							
Approach Delay (s)	0.0	0.0	0.0					
Approach LOS	А							
Intersection Summary								
Average Delay			0.0					
Intersection Capacity Utiliz	ation		27.4%	IC	CU Level o	of Service	A	
Analysis Period (min)			15					

		•	-	Ť	1	ŧ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	68	264	237	487	329	307
v/c Ratio	0.15	0.69	0.39	0.70	0.37	0.44
Control Delay	10.4	28.3	5.7	22.1	3.1	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	28.3	5.7	22.1	3.1	14.8
Queue Length 50th (m)	3.1	25.2	2.5	39.7	0.0	20.6
Queue Length 95th (m)	7.8	42.7	2.4	#103.0	13.6	47.4
Internal Link Dist (m)	8.5		141.6	59.2		183.2
Turn Bay Length (m)						
Base Capacity (vph)	711	616	854	696	899	693
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.43	0.28	0.70	0.37	0.44
Interpretion Summony						

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 3: Airport Road & LCBO Site Access/Old Church Road

06/14/2019

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		1	ţ,			र्स	1		4	
Traffic Volume (vph)	17	12	13	227	18	158	13	419	296	47	195	15
Future Volume (vph)	17	12	13	227	18	158	13	419	296	47	195	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	0.98			1.00	0.97		0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.94		1.00	0.87			1.00	0.85		0.99	
Flt Protected		0.98		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		1757		1753	1592			1506	1548		1722	
Flt Permitted		0.83		0.71	1.00			0.98	1.00		0.85	
Satd. Flow (perm)		1488		1315	1592			1484	1548		1472	
Peak-hour factor, PHF	0.71	0.75	0.46	0.86	0.56	0.77	0.81	0.89	0.90	0.84	0.86	0.63
Adj. Flow (vph)	24	16	28	264	32	205	16	471	329	56	227	24
RTOR Reduction (vph)	0	20	0	0	145	0	0	0	174	0	4	0
Lane Group Flow (vph)	0	48	0	264	92	0	0	487	155	0	303	0
Confl. Peds. (#/hr)	4		7	7		4	69		8	8		69
Heavy Vehicles (%)	0%	0%	0%	3%	0%	3%	0%	28%	2%	8%	9%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.5		17.5	17.5			28.2	28.2		28.2	
Effective Green, g (s)		17.5		17.5	17.5			28.2	28.2		28.2	
Actuated g/C Ratio		0.29		0.29	0.29			0.47	0.47		0.47	
Clearance Time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		434		384	465			698	728		692	
v/s Ratio Prot					0.06							
v/s Ratio Perm		0.03		c0.20				c0.33	0.10		0.21	
v/c Ratio		0.11		0.69	0.20			0.70	0.21		0.44	
Uniform Delay, d1		15.5		18.8	15.9			12.5	9.3		10.6	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.1		5.1	0.2			5.7	0.7		2.0	
Delay (s)		15.6		23.8	16.1			18.2	10.0		12.6	
Level of Service		В		С	В			В	А		В	
Approach Delay (s)		15.6			20.2			14.9			12.6	
Approach LOS		В			С			В			В	
			10.4		014 0000	1						
HCIVI 2000 Control Delay	the matter		16.1	H		Level of S	Service		В			
HCIVI 2000 Volume to Capaci	ity ratio		0.69	_		1			44.0			
Actuated Cycle Length (S)			59.9	SI	um of lost	time (s)			14.2			
Intersection Capacity Utilizati	UN		14.0%	IC	O Level C	DI SELVICE			U			
Analysis Period (min)			15									

c Critical Lane Group

	٠	$\mathbf{\hat{v}}$	1	Ť	ŧ	~	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	Y			र्स	t,		
Traffic Volume (veh/h)	0	0	0	594	257	0	
Future Volume (Veh/h)	0	0	0	594	257	0	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	0	0	646	279	0	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (m)				207			
pX, platoon unblocked	0.83						
vC, conflicting volume	925	279	279				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	804	279	279				
tC, single (s)	6.4	6.2	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	100	100	100				
cM capacity (veh/h)	291	760	1284				
Direction, Lane #	EB 1	NB 1	SB 1				
Volume Total	0	646	279				
Volume Left	0	0	0				
Volume Right	0	0	0				
cSH	1700	1284	1700				
Volume to Capacity	0.00	0.00	0.16				
Queue Length 95th (m)	0.0	0.0	0.0				
Control Delay (s)	0.0	0.0	0.0				
Lane LOS	А						
Approach Delay (s)	0.0	0.0	0.0				
Approach LOS	А						
Intersection Summary							
Average Delay			0.0				
Intersection Capacity Utilization	n		34.6%	IC	CU Level c	of Service	А
Analysis Period (min)			15				

Appendix D - Future Background Traffic Level of Service Calculations

		1	-	Ť	1	ŧ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	12	349	96	126	252	540
v/c Ratio	0.02	0.78	0.20	0.19	0.30	0.78
Control Delay	13.2	31.9	5.7	13.2	3.2	27.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	31.9	5.7	13.2	3.2	27.0
Queue Length 50th (m)	0.9	35.5	0.9	8.3	0.0	50.0
Queue Length 95th (m)	1.7	55.5	0.4	20.9	10.8	#119.9
Internal Link Dist (m)	8.5		141.6	59.2		183.2
Turn Bay Length (m)						
Base Capacity (vph)	864	627	634	675	843	691
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.56	0.15	0.19	0.30	0.78
Intersection Summary						

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 3: Airport Road & LCBO Site Access/Old Church Road

06/14/2019

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		\$		1	f,			्र	1		\$	
Traffic Volume (vph)	0	5	0	293	5	72	0	115	219	111	363	2
Future Volume (vph)	0	5	0	293	5	72	0	115	219	111	363	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	0.98			1.00	0.98		1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		1.00		1.00	0.87			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		1921		1766	1308			1501	1566		1742	
Flt Permitted		1.00		0.75	1.00			1.00	1.00		0.87	
Satd. Flow (perm)		1921		1394	1308			1501	1566		1536	
Peak-hour factor, PHF	0.25	0.42	0.25	0.84	0.42	0.86	0.25	0.91	0.87	0.79	0.92	0.50
Adj. Flow (vph)	0	12	0	349	12	84	0	126	252	141	395	4
RTOR Reduction (vph)	0	0	0	0	57	0	0	0	139	0	1	0
Lane Group Flow (vph)	0	12	0	349	39	0	0	126	113	0	539	0
Confl. Peds. (#/hr)	5		2	2		5	5		1	1		5
Heavy Vehicles (%)	0%	0%	0%	3%	20%	25%	0%	28%	2%	8%	9%	0%
Turn Type		NA		Perm	NA			NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		20.1		20.1	20.1			28.1	28.1		28.1	
Effective Green, g (s)		20.1		20.1	20.1			28.1	28.1		28.1	
Actuated g/C Ratio		0.32		0.32	0.32			0.45	0.45		0.45	
Clearance Time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		618		449	421			675	705		691	
v/s Ratio Prot		0.01			0.03			0.08				
v/s Ratio Perm				c0.25					0.07		c0.35	
v/c Ratio		0.02		0.78	0.09			0.19	0.16		0.78	
Uniform Delay, d1		14.4		19.1	14.8			10.3	10.2		14.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.0		8.2	0.1			0.6	0.5		8.5	
Delay (s)		14.4		27.4	14.9			10.9	10.7		23.1	
Level of Service		В		С	В			В	В		С	
Approach Delay (s)		14.4			24.7			10.7			23.1	
Approach LOS		В			С			В			С	
Intersection Summary												
HCM 2000 Control Delay			20.1	Н	CM 2000	Level of 9	Service		C			
HCM 2000 Volume to Canacity	/ ratio		0.78	11	2000	20101010			0			
Actuated Cycle Length (s)	1000		62.4	S	im of lost	time (s)			14.2			
Intersection Canacity Utilization	n		66.8%			of Service			C.			
Analysis Period (min)	•		15		5 201010				Ũ			

c Critical Lane Group

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Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	Y			र्स	ef 👘			
Traffic Volume (veh/h)	0	0	0	187	476	0		
Future Volume (Veh/h)	0	0	0	187	476	0		
Sign Control	Stop			Free	Free			
Grade	0%			0%	0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	0	0	0	203	517	0		
Pedestrians								
Lane Width (m)								
Walking Speed (m/s)								
Percent Blockage								
Right turn flare (veh)								
Median type				None	None			
Median storage veh)								
Upstream signal (m)				207				
pX, platoon unblocked								
vC, conflicting volume	720	517	517					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	720	517	517					
tC, single (s)	6.4	6.2	4.1					
tC, 2 stage (s)								
tF (s)	3.5	3.3	2.2					
p0 queue free %	100	100	100					
cM capacity (veh/h)	395	558	1049					
Direction, Lane #	EB 1	NB 1	SB 1					
Volume Total	0	203	517					
Volume Left	0	0	0					
Volume Right	0	0	0					
cSH	1700	1049	1700					
Volume to Capacity	0.00	0.00	0.30					
Queue Length 95th (m)	0.0	0.0	0.0					
Control Delay (s)	0.0	0.0	0.0					
Lane LOS	А							
Approach Delay (s)	0.0	0.0	0.0					
Approach LOS	А							
Intersection Summary							 	
Average Delay			0.0					
Intersection Capacity Utiliz	zation		28.4%	IC	CU Level o	of Service	A	
Analysis Period (min)			15					

Queues 3: Airport Road & LCBO Site Access/Old Church Road

		•	+	Ť	1	ŧ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	68	264	237	512	329	318
v/c Ratio	0.15	0.69	0.39	0.74	0.37	0.46
Control Delay	10.4	28.3	5.8	23.7	3.1	15.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	28.3	5.8	23.7	3.1	15.1
Queue Length 50th (m)	3.1	25.2	2.7	42.9	0.0	21.6
Queue Length 95th (m)	7.8	42.7	2.5	#110.8	13.6	49.4
Internal Link Dist (m)	8.5		141.6	59.2		183.2
Turn Bay Length (m)						
Base Capacity (vph)	711	616	853	696	899	688
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.43	0.28	0.74	0.37	0.46
Intersection Summary						

Intersection Summary

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 3: Airport Road & LCBO Site Access/Old Church Road

06/14/2019

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		1	t,			्र	1		\$	
Traffic Volume (vph)	17	12	13	227	18	158	13	441	296	47	205	15
Future Volume (vph)	17	12	13	227	18	158	13	441	296	47	205	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	0.98			1.00	0.97		0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.94		1.00	0.87			1.00	0.85		0.99	
Flt Protected		0.98		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		1757		1753	1592			1506	1548		1724	
Flt Permitted		0.83		0.71	1.00			0.98	1.00		0.84	
Satd. Flow (perm)		1488		1315	1592			1484	1548		1461	
Peak-hour factor, PHF	0.71	0.75	0.46	0.86	0.56	0.77	0.81	0.89	0.90	0.84	0.86	0.63
Adj. Flow (vph)	24	16	28	264	32	205	16	496	329	56	238	24
RTOR Reduction (vph)	0	20	0	0	144	0	0	0	174	0	4	0
Lane Group Flow (vph)	0	48	0	264	93	0	0	512	155	0	314	0
Confl. Peds. (#/hr)	4		7	7		4	69		8	8		69
Heavy Vehicles (%)	0%	0%	0%	3%	0%	3%	0%	28%	2%	8%	9%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.5		17.5	17.5			28.2	28.2		28.2	
Effective Green, g (s)		17.5		17.5	17.5			28.2	28.2		28.2	
Actuated g/C Ratio		0.29		0.29	0.29			0.47	0.47		0.47	
Clearance Time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		434		384	465			698	728		687	
v/s Ratio Prot					0.06							
v/s Ratio Perm		0.03		c0.20				c0.34	0.10		0.22	
v/c Ratio		0.11		0.69	0.20			0.73	0.21		0.46	
Uniform Delay, d1		15.5		18.8	15.9			12.8	9.3		10.7	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.1		5.1	0.2			6.7	0.7		2.2	
Delay (s)		15.6		23.8	16.2			19.5	10.0		12.9	
Level of Service		В		С	В			В	А		В	
Approach Delay (s)		15.6			20.2			15.8			12.9	
Approach LOS		В			С			В			В	
Intersection Summary												
HCM 2000 Control Delay			16.5	H	CM 2000	Level of 9	Service		B			
HCM 2000 Volume to Canacity	/ ratio		0 72			_0.0.01			-			
Actuated Cycle Length (s)	1000		59.9	S	um of lost	time (s)			14.2			
Intersection Capacity Utilization	n		75.9%	IC	U Level o	of Service			D			
Analysis Period (min)			15						_			

c Critical Lane Group

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Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	Y			ŧ	et.		
Traffic Volume (veh/h)	0	0	0	616	267	0	
Future Volume (Veh/h)	0	0	0	616	267	0	
Sign Control	Stop			Free	Free		
Grade	0%			0%	0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	0	0	670	290	0	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (m)				207			
pX, platoon unblocked	0.80						
vC, conflicting volume	960	290	290				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	827	290	290				
tC, single (s)	6.4	6.2	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	100	100	100				
cM capacity (veh/h)	274	749	1272				
Direction, Lane #	EB 1	NB 1	SB 1				
Volume Total	0	670	290				
Volume Left	0	0	0				
Volume Right	0	0	0				
cSH	1700	1272	1700				
Volume to Capacity	0.00	0.00	0.17				
Queue Length 95th (m)	0.0	0.0	0.0				
Control Delay (s)	0.0	0.0	0.0				
Lane LOS	A						
Approach Delay (s)	0.0	0.0	0.0				
Approach LOS	Α						
Intersection Summary							
Average Delay			0.0				
Intersection Capacity Utiliz	zation		35.8%	IC	CU Level o	of Service	A
Analysis Period (min)			15				

Appendix E – Future Total Traffic Level of Service Calculations

Queues 3: Airport Road & LCBO Site Access/Old Church Road

	-+	1	-	Ť	1	ŧ
Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	12	349	113	157	252	586
v/c Ratio	0.02	0.78	0.23	0.23	0.30	0.86
Control Delay	13.2	31.9	5.5	13.5	3.2	33.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.2	31.9	5.5	13.5	3.2	33.7
Queue Length 50th (m)	0.9	35.5	0.9	10.6	0.0	57.5
Queue Length 95th (m)	1.7	55.5	0.0	25.7	10.8	#136.3
Internal Link Dist (m)	8.5		141.6	59.2		183.2
Turn Bay Length (m)						
Base Capacity (vph)	864	627	641	675	843	680
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.56	0.18	0.23	0.30	0.86
Intersection Summary						

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 3: Airport Road & LCBO Site Access/Old Church Road

08/06/2019

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		5	1			्र	1		4	
Traffic Volume (vph)	0	5	0	293	5	87	0	143	219	125	390	2
Future Volume (vph)	0	5	0	293	5	87	0	143	219	125	390	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	0.97			1.00	0.98		1.00	
Flpb, ped/bikes		1.00		1.00	1.00			1.00	1.00		1.00	
Frt		1.00		1.00	0.87			1.00	0.85		1.00	
Flt Protected		1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		1921		1766	1302			1501	1566		1742	
Flt Permitted		1.00		0.75	1.00			1.00	1.00		0.86	
Satd. Flow (perm)		1921		1394	1302			1501	1566		1511	
Peak-hour factor, PHF	0.25	0.42	0.25	0.84	0.42	0.86	0.25	0.91	0.87	0.79	0.92	0.50
Adj. Flow (vph)	0	12	0	349	12	101	0	157	252	158	424	4
RTOR Reduction (vph)	0	0	0	0	68	0	0	0	139	0	1	0
Lane Group Flow (vph)	0	12	0	349	45	0	0	157	113	0	585	0
Confl. Peds. (#/hr)	5		2	2		5	5		1	1		5
Heavy Vehicles (%)	0%	0%	0%	3%	20%	25%	0%	28%	2%	8%	9%	0%
Turn Type		NA		Perm	NA			NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		20.1		20.1	20.1			28.1	28.1		28.1	
Effective Green, g (s)		20.1		20.1	20.1			28.1	28.1		28.1	
Actuated g/C Ratio		0.32		0.32	0.32			0.45	0.45		0.45	
Clearance Time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		618		449	419			675	705		680	
v/s Ratio Prot		0.01			0.03			0.10				
v/s Ratio Perm				c0.25					0.07		c0.39	
v/c Ratio		0.02		0.78	0.11			0.23	0.16		0.86	
Uniform Delay, d1		14.4		19.1	14.8			10.5	10.2		15.4	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.0		8.2	0.1			0.8	0.5		13.5	
Delay (s)		14.4		27.4	15.0			11.3	10.7		28.9	
Level of Service		В		С	В			В	В		С	
Approach Delay (s)		14.4			24.3			10.9			28.9	
Approach LOS		В			С			В			С	
Intersection Summary												
HCM 2000 Control Delay			22.3	H	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capacity	ratio		0.83									
Actuated Cycle Length (s)			62.4	Si	um of lost	time (s)			14.2			
Intersection Capacity Utilization	I		83.2%	IC	U Level o	of Service			E			
Analysis Period (min)			15									

c Critical Lane Group

	٠	$\mathbf{\hat{v}}$	1	Ť	Ļ	4		
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	Y			र्स	f)			
Traffic Volume (veh/h)	8	41	43	187	476	8		
Future Volume (Veh/h)	8	41	43	187	476	8		
Sign Control	Stop			Free	Free			
Grade	0%			0%	0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Hourly flow rate (vph)	9	45	47	203	517	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)				207				
pX, platoon unblocked								
vC, conflicting volume	818	522	526					
vC1, stage 1 conf vol								
vC2, stage 2 conf vol								
vCu, unblocked vol	818	522	526					
tC, single (s)	6.4	6.2	4.1					
tC, 2 stage (s)								
tF (s)	3.5	3.3	2.2					
p0 queue free %	97	92	95					
cM capacity (veh/h)	330	555	1041					
Direction, Lane #	EB 1	NB 1	SB 1					
Volume Total	54	250	526					
Volume Left	9	47	0					
Volume Right	45	0	9					
cSH	498	1041	1700					
Volume to Capacity	0.11	0.05	0.31					
Queue Length 95th (m)	2.8	1.1	0.0					
Control Delay (s)	13.1	2.0	0.0					
Lane LOS	В	А						
Approach Delay (s)	13.1	2.0	0.0					
Approach LOS	В							
Intersection Summary								
Average Delay			1.4					
Intersection Capacity Utilization	า		51.1%	IC	CU Level c	of Service	A	
Analysis Period (min)			15					

Queues 3: Airport Road & LCBO Site Access/Old Church Road

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Lane Group	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	68	264	251	526	329	344
v/c Ratio	0.15	0.69	0.42	0.76	0.37	0.55
Control Delay	10.3	28.0	6.8	25.0	3.2	17.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	28.0	6.8	25.0	3.2	17.5
Queue Length 50th (m)	3.1	25.2	4.6	44.6	0.0	24.9
Queue Length 95th (m)	7.8	42.7	4.1	#115.3	13.6	57.4
Internal Link Dist (m)	8.5		141.6	59.2		183.2
Turn Bay Length (m)						
Base Capacity (vph)	707	614	845	694	897	622
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.43	0.30	0.76	0.37	0.55
Intersection Summary						

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

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 3: Airport Road & LCBO Site Access/Old Church Road

08/06/2019

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4		1	ţ,			र्स	1		4	
Traffic Volume (vph)	17	12	13	227	18	169	13	454	296	57	217	15
Future Volume (vph)	17	12	13	227	18	169	13	454	296	57	217	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	0.98			1.00	0.97		0.99	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.94		1.00	0.87			1.00	0.85		0.99	
Flt Protected		0.98		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)		1757		1753	1589			1506	1548		1724	
Flt Permitted		0.83		0.71	1.00			0.98	1.00		0.76	
Satd. Flow (perm)		1482		1315	1589			1484	1548		1325	
Peak-hour factor, PHF	0.71	0.75	0.46	0.86	0.56	0.77	0.81	0.89	0.90	0.84	0.86	0.63
Adj. Flow (vph)	24	16	28	264	32	219	16	510	329	68	252	24
RTOR Reduction (vph)	0	20	0	0	136	0	0	0	175	0	3	0
Lane Group Flow (vph)	0	48	0	264	115	0	0	526	154	0	341	0
Confl. Peds. (#/hr)	4		7	7		4	69		8	8		69
Heavy Vehicles (%)	0%	0%	0%	3%	0%	3%	0%	28%	2%	8%	9%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.7		17.7	17.7			28.2	28.2		28.2	
Effective Green, g (s)		17.7		17.7	17.7			28.2	28.2		28.2	
Actuated g/C Ratio		0.29		0.29	0.29			0.47	0.47		0.47	
Clearance Time (s)		7.1		7.1	7.1			7.1	7.1		7.1	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		436		387	467			696	726		621	
v/s Ratio Prot					0.07							
v/s Ratio Perm		0.03		c0.20				c0.35	0.10		0.26	
v/c Ratio		0.11		0.68	0.25			0.76	0.21		0.55	
Uniform Delay, d1		15.5		18.7	16.1			13.1	9.4		11.4	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.1		4.9	0.3			7.5	0.7		3.5	
Delay (s)		15.6		23.6	16.4			20.6	10.1		14.9	
Level of Service		В		С	В			С	В		В	
Approach Delay (s)		15.6			20.1			16.6			14.9	
Approach LOS		В			С			В			В	
Intersection Summary												
HCM 2000 Control Dolay			17.0		CM 2000		Sonvico		D			
HCM 2000 Volume to Canacit	ty ratio		0.73			Level UI			D			
Actuated Cycle Length (c)	iy ralio		60.1	c.	um of loot	time (c)			1/ 0			
Intersection Consoity Litilization	n		77 20/			of Service			14.Z			
			11.370	IC.					U			
			15									

c Critical Lane Group

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	M			្ឋ	1.	
Traffic Volume (veh/h)	17	22	24	616	267	19
Future Volume (Veh/h)	17	22	24	616	267	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0 92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	24	26	670	290	21
Pedestrians	10	21	20	010	200	<u> </u>
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage yeb)				NULLE	NULLE	
linetroom signal (m)				207		
nV plateon unblocked	0 70			207		
vC conflicting volume	1022	200	211			
vC1. stage 1 confuct	IUZZ	300	311			
vC1, stage 1 conti vol						
VCZ, Stage Z coni voi	004	200	244			
VCu, unbiocked voi	894	300	311			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	<u>.</u>					
t⊦ (s)	3.5	3.3	2.2			
p0 queue free %	93	97	98			
cM capacity (veh/h)	240	739	1249			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	42	696	311			
Volume Left	18	26	0			
Volume Right	24	0	21			
cSH	391	1249	1700			
Volume to Capacity	0.11	0.02	0.18			
Queue Length 95th (m)	2.7	0.5	0.0			
Control Delay (s)	15.3	0.6	0.0			
Lane LOS	C	A	0.0			
Approach Delay (s)	15.3	0.6	0.0			
Approach LOS	C	0.0	0.0			
Interpretion Common	-					
Average Delev			1.0			
Average Delay	ation		1.0	14		4 Cardes
Intersection Capacity Utiliz	allon		01.9%	IC		DI SEIVICE
Analysis Period (min)			15			

Appendix F – AutoTURN Maneuverability

