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Memorandum

To/Attention	Sonya Bubas, Region of Peel	**Date**	January 31, 2021
From	Scott Johnston, IBI Group	**Project No**	109535
cc			
Subject	**Old Church Road Extension Traffic Update**		

The purpose of this memorandum is to provide a supporting traffic analysis for the Old Church Road extension, which is part of a larger study titled: *Airport Road EA King Street to Huntsmill Drive Traffic Operations Analysis (March, 2018)*. This memo looks to investigate concerns that the extension could encourage cut through traffic impacting local residence. Additionally, the Environmental Assessment did not consider proposed developments at the Northwest corner of the Airport Road and Old Church Road which this memo will include for the traffic analysis.

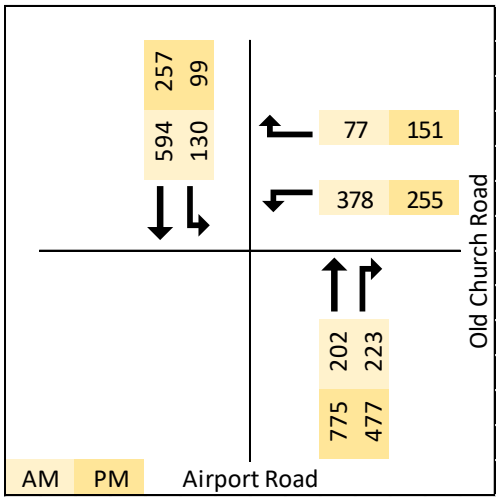
Traffic Forecasts

Traffic forecasts at Old Church Road were based on previous work done in the Environmental Assessment. The report forecasted growth rates to the horizon year of 2041, this was applied to the corridor and the resulting volumes were carried forward.

Future Background 2041 Volumes

Background volumes were established in the Airport Road EA and were carried forward into this memo. The Exhibit below shows the volumes carried forward.

Exhibit 1: Future 2041 Volumes



Source: Airport Road EA Traffic Operations Analysis. Exhibit 3-9: Future 2041 Traffic Volumes

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Cut through Volumes

The proposed extension of Old Church Road to Ivan Avenue will provide an alternate access to residence on Ivan Road, which was previously accessed at Parsons Avenue. This may potentially result in cut through traffic travelling between Walker Road and Airport Road. Additionally, vehicles traveling on Old Church Road can now continue onto Ivan Avenue and Olivers Lane to reach Walker Road instead of using Airport Road. A travel time analysis was conducted to estimate the potential for shortcutting traffic. Cut through routes were assessed on the basis that most drivers take the fastest route. Exhibit 2 shows the routes listed in Exhibit 3. Exhibit 3 summaries the travel time estimates using distance, intersection delay and travel speed.

Exhibit 2: Cut Through Analysis Routes

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Exhibit 3: Analysis of Cut Through Potential

From (origin)	To (destination)	Route	Distance (m)	Speed (s)	Time (s)	Total Travel Time (s)
Walker Road west of Olivers Lane To Airport Road (near Foodland)	Typical Route (Green)	Walker Rd	552	40	50	148
		EBR @ Walker			33	
		Airport Rd	902	50	65	
	Short Cut Route (Red)	Olivers Ln/Ivan Ave	841	40	76	177
		Turn delay			10	
		2 Stop signs			20	
		EBR @ Old Church Rd			27	
		Airport Rd	612	50	44	
Walker Road west of Olivers Lane To Old Church Road (near Community Complex)	Typical Route (Yellow)	Walker Rd	552	40	50	158
		EBR @ Walker			33	
		Airport Rd	280	50	20	
		SBL @ Old Church Rd			15	
		Old Church Rd	550	50	40	
	Short Cut Route (Blue)	Olivers Ln/Ivan Ave	841	40	76	173
		Turn delay			10	
		2 Stop signs			20	
		EBT @ Old Church Rd			27	
		Old Church Rd	550	50	40	
Airport Road (Near Foodland) To Walker Road West of Olivers Lane	Typical Route (Green reverse)	Airport Rd	900	50	65	116
		NBL @ Walker Rd			1	
		Walker Rd	560	40	50	
	Short Cut Route (Red reverse)	Airport Rd	600	40	54	186
		NBL @ Old Church Rd			22	
		3 Stop Signs			30	
		Turn delay			10	
		Ivan Ave/Olivers Ln	780	40	70	

Findings of the travel time analysis are:

- The eastbound travel time on the typical route from Walker Road to Airport Road is 148 seconds accounting for turning delay at Walker Road. The Short Cut Route takes 177 seconds, which is longer than the typical route.
- The eastbound travel time on the typical route from Walker Road to Old Church Road is 158 seconds accounting for turning delay at Walker Road and Airport Road. The short cut route takes 173 seconds which is also longer than the typical route.

- Westbound travel time for the typical route is 116 seconds while the alternative route travel time is 186 seconds, notably longer.

Overall, the proposed Old Church Road extension does not appear to offer travel time benefits to drivers from outside of the immediate neighbourhood. Drivers are more likely to use typical routes which offer quicker travel times and less stops.

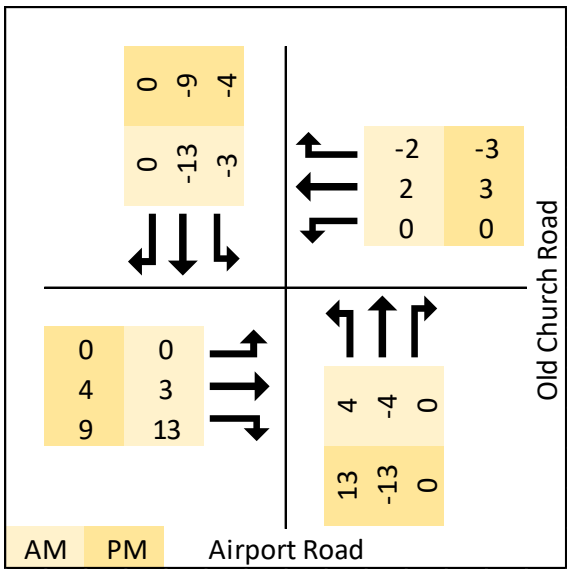
Currently, the eastbound right at Walker Road and Airport Road has enough room for a right turning vehicle to slip past a through moving vehicle. This assumption lowers the delay at the intersection reducing the travel time for main route. It is recommended that a right turn slip through be implemented at the eastbound right movement, this will reduce the delay at the intersection and prevent cut through traffic along Ivan Avenue.

In addition to the above, the traffic volumes on Walker Road, even accounting for future development, are expected to remain relatively light. Even if a highly-conservative 20% of traffic were to use the extension, the diverting volumes using Ivan Avenue would be approximately as follows:

- 16 eastbound and 6 westbound in AM peak hour.
- 13 eastbound and 16 westbound in the PM peak hour.

For analysis purposes, the resulting volumes were movements distributed at Old Church Road. The exhibit below summaries the cut through traffic and volumes differences.

Exhibit 4:Cut Through Volumes at Airport Road and Old Church Road



Local Neighbourhood Trips

The Old Church Road extension will shift local neighbourhood traffic for more direct access to the residential neighbourhood using Ivan Avenue. Vehicles travelling on Ivan Avenue no longer need to go to Parsons Avenue to access Airport Road. Trips made my residents were estimated using ITE Trip Generation Manual for single family detached housing based on land area. The residential land serviced by Ivan Avenue was used to estimate the volumes at Old Church Road and Airport Road with the extension. It is assumed the residence along Parsons Avenue and Emma Street will continue to use their respective accesses. The exhibit below shows the land

areas used to calculate trip generation rates. The areas below were defined by properties with street access.

Exhibit 5: Residential Catchment Areas

Peak period egress and ingress volumes were added to the intersection and summarized in the following table.

Exhibit 6: Local Trip Generation Summary

Street	Area (m2)	Acres	AM in	AM out	PM in	PM out
Ivan Ave	98415	24.32	15	35	44	20
Parsons Ave	43053	10.64	7	15	19	9
Emma St	29048	7.18	5	10	13	6

Development Traffic

Two commercially zoned parcels of land are expected to be developed and have access to the Old Church Road extension as shown in Exhibit 7. The trips generated by these developments were estimated using the ITE Trip Generation Manual for shopping center. In lieu of site plans it was estimated that the leasable floor area would be 50% of the total land area. The two parcels of land were considered as a single area. The following exhibits summarizes the estimated volumes generated by the development and the area included in the land parcel.

Both local trips and development trips were added together and distributed at Old Church Road and Airport Road. The incoming volumes were distributed based on the ratio of each approach

to the total volume of the intersection. The outbound trips where distributed evenly across all eastbound movements. The exhibit below summarizes the volumes estimated in this section.

Exhibit 7: Commercial Development Boundaries

Exhibit 8: Commercial Trip Generation Summary

Land Area (m2)	leasable space (m2)	leasable space (sf)	AM in	AM out	PM in	PM out
3509	1764.5	18878	18	11	70	76

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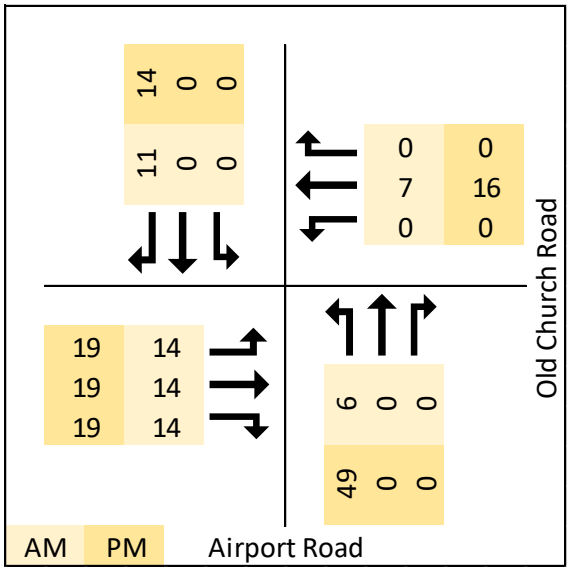
Exhibit 9: Combined Local Neighbourhood and Development Trips



Total Future 2041 Volumes

The Table below summarizes the volumes expected at Old Church Road and Airport Road in the year 2041

Exhibit 10: Summary of Future 2041 Volumes

Intersection	Mvmt	Background		Local and Development		Cut Through		Total 2041	
		AM	PM	AM	PM	AM	PM	AM	PM
Old Church Road	NBL	0	0	9	71	4	13	13	84
	NBT	202	775	0	0	-4	-13	198	762
	NBR	223	477	0	0	0	0	223	477
	SBL	130	99	0	0	-3	-4	127	95
	SBT	594	257	0	0	-13	-9	581	248
	SBR	0	0	15	20	0	0	15	20
	EBL	0	0	15	32	0	0	15	32
	EBT	0	0	15	32	3	4	18	36
	EBR	0	0	15	32	13	9	28	41
	WBL	378	255	0	0	0	0	378	255
	WBT	0	0	9	23	2	3	11	26
	WBR	77	151	0	0	-2	-3	75	148

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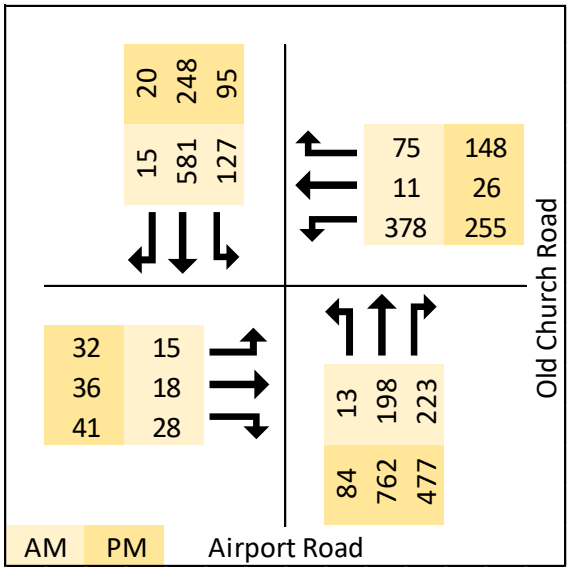
Exhibit 11: Total 2041 Volumes at Airport Road and Old Church Road



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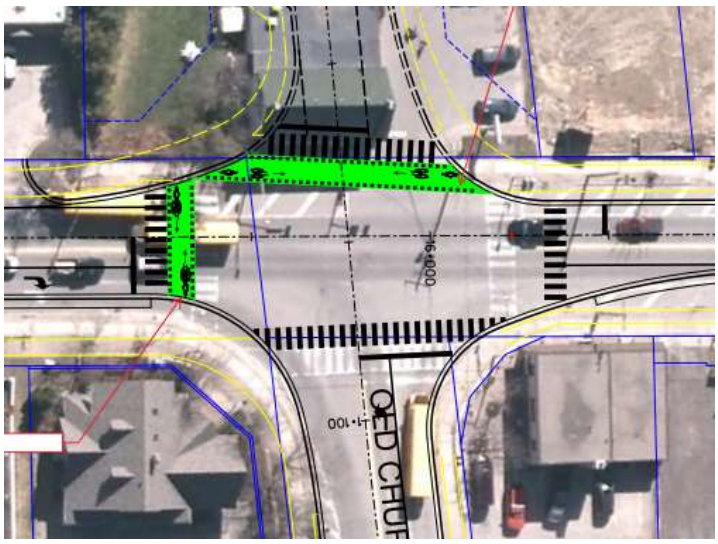
Traffic Operations

The Preliminary lane configurations were assessed in Synchro, the Preliminary Design is shown below in Exhibit 12. The lane configuration is as follows:

- Eastbound left lane and through right lane
- Westbound left lane and through right lane
- Northbound through left lane and right lane
- Southbound left, through, right lane

Exhibit 12: Preliminary Lane Configuration



Source: Preliminary Preferred Design for Airport Road

Old Church Road and Airport Road is configured according to the preliminary drawings and is expected to operate as follows

- During the AM peak period the southbound shared lane is expected to operate with high demand with moderate delay as a single shared lane, this movement competes for green time with the east west phases.
- In the PM peak period, the westbound left is expected to experience high demand and moderate delays, the movement competes for green time with the north south phases. The southbound approach is expected to operate with high demand as all southbound movements are made from one lane.

Overall, the intersection is expected to operate well with no critical movements or significant delays.

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Exhibit 13: Airport Road and Old Church 2041 Intersection Operations

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	All Movements					
				Movement	LOS	Delay (s)	V/C Ratio	95th Percentile Queue (m)	Storage Capacity (m)
AM Peak									
Old Church Road & Airport Road	C	28.2	0.9	EBL	D	38	0.16	8	20
				EBTR	D	39	0.23	13	-
				WBL	C	30	0.76	71	20
				WBTR	B	19	0.08	10	-
				NBTL	B	13	0.30	40	-
				NBR	B	11	0.15	12	40
				SBLTR	D	37	0.92	206	-
PM Peak									
Old Church Road & Airport Road	C	24	0.86	EBL	D	42	0.36	14	20
				EBTR	D	40	0.31	19	-
				WBL	D	48	0.84	65	20
				WBTR	C	27	0.16	18	-
				NBTL	C	21	0.82	202	-
				NBR	B	10	0.39	36	40
				SBLTR	C	27	0.80	108	-

Alternate Configuration: North and South Left Turn Lanes

Shared through-left turn lanes are often seen as undesirable on Regional Roads. An alternative configuration was considered with dedicated left turn lanes and shared through-right lanes. It should be noted that this alternative configuration has feasibility issues due to geometries of the road, and if implemented there could be property impacts.

The southbound and northbound approaches can be reconfigured to a left and through right lanes. In this configuration advanced left turn phasing can easily be implemented. The intersection performance under this configuration is summarized below.

- During the AM peak period the southbound through right lane improves as the left turn volumes are shifted to an exclusive lane and the right turn volumes added are minor in effect. This reduces delay overall at the intersection.
- In the PM peak period, the southbound left turn is expected to perform poorly as an exclusive left lane, the movement conflicts with high volume northbound through and right movements reducing capacity. Adding a permissive southbound left phase only further deteriorates the northbound through right movement. The westbound left is expected to operate poorly due to competition of green time with the north and south movements.

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Overall, the intersection operates poorly, with the PM peak period having two movements operating at LOS F. This indicates that the configuration does not provide adequate capacity for the westbound left and southbound left movements, even when permissive protected phases are added to these movements.

Exhibit 14: Airport Road and Old Church 2041 Intersection Operations, Alternative Configuration

Intersection	Intersection LOS	Intersection Delay	Intersection V/C Ratio	All Movements					
				Movement	LOS	Delay (s)	V/C Ratio	95th Percentile Queue (m)	Storage Capacity (m)
AM Peak									
Old Church Road & Airport Road	C	21.3	0.74	EBL	D	38	0.16	8	20
				EBTR	D	39	0.23	13	-
				WBL	C	30	0.76	71	20
				WBTR	B	19	0.08	10	-
				NBL	B	11	0.05	5	20
				NBTR	B	16	0.52	76	-
				SBL	B	14	0.33	29	20
				SBTR	B	20	0.67	127	-
PM Peak									
Old Church Road & Airport Road	E	66.2	1.27	EBL	D	42	0.35	14	20
				EBTR	D	41	0.30	19	-
				WBL	F	96	1.02	83	20
				WBTR	C	30	0.17	19	-
				NBL	A	7	0.12	12	20
				NBTR	E	73	1.10	335	-
				SBL	F	215	1.28	40	20
				SBTR	A	8	0.25	32	-

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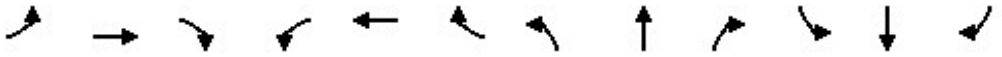
Summary of Findings

This memo provides an updated traffic analysis of Airport Road and Old Church Road. Concerns that the extension would encourage cut through traffic were investigated and nearby developments that were not considered in previous studies were included in the analysis.

Analysis of cut through routes showed that the extension has little potential for cut through traffic, travel times on typical routes are faster. Traffic forecasts were updated to include future developments at Airport Road and Old Church Road.

Findings of the analysis are that the extension of Old Church Road is expected to operate well with the forecasted conditions under the preliminary preferred design. The intersection will be able to handle local volumes and volumes generated by developments. Traffic operation is expected to perform well with the provided signal timing plan, no critical movements are expected during both peak periods. Therefore, its is recommended that the preferred preliminary design be carried forward as no major mitigation measures are required.

It is recommended to either add a dedicated right turn lane or a right turn pocket lane at the eastbound approach of Walkers Road and Airport Road. This will reduce the right turn delay at the intersection and reduce the likelihood of cut through traffic on Ivan Avenue.

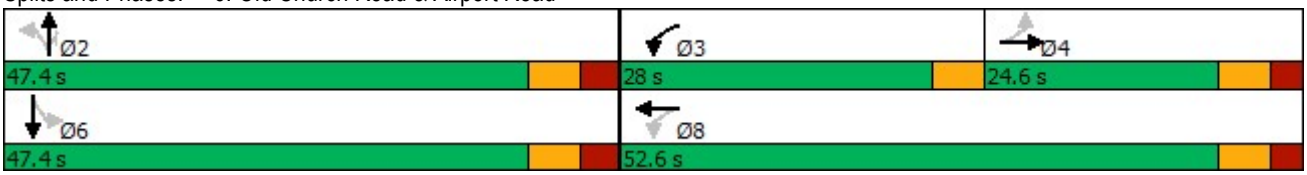


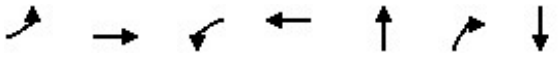
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Future Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		20.0	20.0		40.0	20.0		20.0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.99	0.98							
Frt		0.909			0.869				0.850		0.997	
Flt Protected	0.950			0.950				0.997			0.991	
Satd. Flow (prot)	1789	1712	0	1755	1360	0	0	1472	1526	0	1738	0
Flt Permitted	0.976			0.494				0.948			0.890	
Satd. Flow (perm)	1838	1712	0	906	1360	0	0	1399	1526	0	1561	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			75				223		1	
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		64.7			131.2			161.2			99.5	
Travel Time (s)		4.9			9.8			11.6			7.2	
Confl. Peds. (#/hr)				3		1						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	4%	2%	23%	2%	32%	7%	11%	9%	2%
Adj. Flow (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	46	0	378	86	0	0	211	223	0	723	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		6.1	10.0		2.0	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		6.1	0.6		2.0	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			28.7			28.7	
Detector 2 Size(m)		0.6			0.6			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	24.6	24.6		28.0	28.0		42.0	42.0	42.0	42.0	42.0	
Total Split (s)	24.6	24.6		28.0	52.6		47.4	47.4	47.4	47.4	47.4	
Total Split (%)	24.6%	24.6%		28.0%	52.6%		47.4%	47.4%	47.4%	47.4%	47.4%	
Maximum Green (s)	18.0	18.0		24.0	46.0		40.3	40.3	40.3	40.3	40.3	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.6	2.6		0.0	2.6		3.1	3.1	3.1	3.1	3.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	6.6	6.6		4.0	6.6			7.1	7.1		7.1	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0	7.0	7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		10.0	10.0		17.0	17.0	17.0	17.0	17.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0	0	0	0	
Act Effct Green (s)	6.8	6.8		26.8	24.1			41.1	41.1		41.1	
Actuated g/C Ratio	0.09	0.09		0.34	0.30			0.52	0.52		0.52	
v/c Ratio	0.10	0.27		0.74	0.18			0.29	0.25		0.89	
Control Delay	38.7	25.1		30.5	6.6			15.0	3.0		36.5	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	38.7	25.1		30.5	6.6			15.0	3.0		36.5	
LOS	D	C		C	A			B	A		D	
Approach Delay		28.4			26.1			8.8			36.5	
Approach LOS		C			C			A			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 79.2			
Natural Cycle: 105			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 26.2		Intersection LOS: C	
Intersection Capacity Utilization 94.6%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 6: Old Church Road & Airport Road

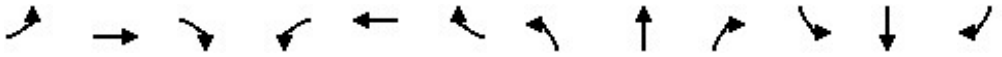




Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	15	46	378	86	211	223	723
v/c Ratio	0.10	0.27	0.74	0.18	0.29	0.25	0.89
Control Delay	38.7	25.1	30.5	6.6	15.0	3.0	36.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	25.1	30.5	6.6	15.0	3.0	36.5
Queue Length 50th (m)	2.3	2.7	46.3	1.1	19.8	0.0	107.1
Queue Length 95th (m)	8.3	12.8	71.1	9.7	40.1	11.9	#206.0
Internal Link Dist (m)		40.7		107.2	137.2		75.5
Turn Bay Length (m)	20.0		20.0			40.0	
Base Capacity (vph)	426	418	618	836	726	899	810
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.11	0.61	0.10	0.29	0.25	0.89

Intersection Summary

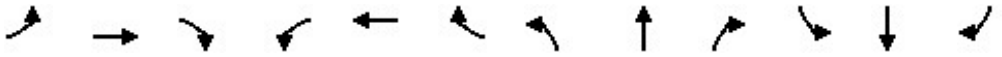
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Future Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		4.0	6.6			7.1	7.1		7.1	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.98			1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.91		1.00	0.87			1.00	0.85		1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)	1789	1711		1750	1361			1472	1526		1739	
Flt Permitted	0.98	1.00		0.49	1.00			0.95	1.00		0.89	
Satd. Flow (perm)	1838	1711		910	1361			1400	1526		1561	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	18	28	378	11	75	13	198	223	127	581	15
RTOR Reduction (vph)	0	27	0	0	50	0	0	0	111	0	0	0
Lane Group Flow (vph)	15	19	0	378	36	0	0	211	112	0	723	0
Confl. Peds. (#/hr)				3		1						
Heavy Vehicles (%)	2%	2%	2%	4%	2%	23%	2%	32%	7%	11%	9%	2%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	4.1	4.1		27.1	27.1			41.1	41.1		41.1	
Effective Green, g (s)	4.1	4.1		27.1	27.1			41.1	41.1		41.1	
Actuated g/C Ratio	0.05	0.05		0.33	0.33			0.50	0.50		0.50	
Clearance Time (s)	6.6	6.6		4.0	6.6			7.1	7.1		7.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	92	85		495	450			702	765		783	
v/s Ratio Prot		0.01		c0.18	0.03							
v/s Ratio Perm	0.01			c0.08				0.15	0.07		c0.46	
v/c Ratio	0.16	0.23		0.76	0.08			0.30	0.15		0.92	
Uniform Delay, d1	37.3	37.4		23.5	18.8			12.0	11.0		18.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.8	1.4		6.9	0.1			1.1	0.4		18.1	
Delay (s)	38.1	38.8		30.4	18.9			13.1	11.4		37.0	
Level of Service	D	D		C	B			B	B		D	
Approach Delay (s)		38.6			28.3			12.2			37.0	
Approach LOS		D			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	81.9	Sum of lost time (s)	17.7
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

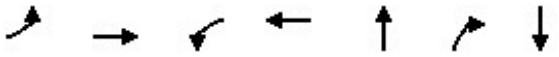


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Future Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		20.0	20.0		40.0	20.0		20.0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.99	0.97				0.97			
Frt		0.920			0.872				0.850		0.993	
Flt Protected	0.950			0.950				0.995			0.987	
Satd. Flow (prot)	1789	1733	0	1772	1626	0	0	1842	1617	0	1619	0
Flt Permitted	0.647			0.440				0.921			0.454	
Satd. Flow (perm)	1219	1733	0	813	1626	0	0	1705	1565	0	744	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			148				276		5	
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		64.7			131.2			161.2			99.5	
Travel Time (s)		4.9			9.8			11.6			7.2	
Confl. Peds. (#/hr)				4		4			6	6		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	3%	2%	0%	2%	4%	1%	15%	18%	2%
Adj. Flow (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	77	0	255	174	0	0	846	477	0	363	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (m)	2.0	10.0		6.1	10.0		2.0	30.5	6.1	6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	0.6		6.1	0.6		2.0	1.8	6.1	6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)		9.4			9.4			28.7			28.7	
Detector 2 Size(m)		0.6			0.6			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Detector Phase	4	4		3	8		2	2	2	6	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0		7.0	8.0		8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	24.6	24.6		11.0	28.0		42.0	42.0	42.0	42.0	42.0	
Total Split (s)	24.6	24.6		14.4	39.0		61.0	61.0	61.0	61.0	61.0	
Total Split (%)	24.6%	24.6%		14.4%	39.0%		61.0%	61.0%	61.0%	61.0%	61.0%	
Maximum Green (s)	18.0	18.0		10.4	32.4		53.9	53.9	53.9	53.9	53.9	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.6	2.6		0.0	2.6		3.1	3.1	3.1	3.1	3.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Lost Time (s)	6.6	6.6		4.0	6.6			7.1	7.1		7.1	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Max	Max	Max	Max	Max	
Walk Time (s)	7.0	7.0			8.0		8.0	8.0	8.0	8.0	8.0	
Flash Dont Walk (s)	11.0	11.0			10.0		17.0	17.0	17.0	17.0	17.0	
Pedestrian Calls (#/hr)	0	0			0		0	0	0	0	0	
Act Effct Green (s)	7.9	7.9		22.2	19.6			54.2	54.2		54.2	
Actuated g/C Ratio	0.09	0.09		0.25	0.22			0.62	0.62		0.62	
v/c Ratio	0.29	0.40		0.79	0.36			0.80	0.44		0.79	
Control Delay	45.2	27.8		47.4	9.2			21.8	5.4		29.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	
Total Delay	45.2	27.8		47.4	9.2			21.8	5.4		29.2	
LOS	D	C		D	A			C	A		C	
Approach Delay		32.9			31.9			15.9			29.2	
Approach LOS		C			C			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 87.6			
Natural Cycle: 100			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 22.0		Intersection LOS: C	
Intersection Capacity Utilization 103.5%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 6: Old Church Road & Airport Road



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	32	77	255	174	846	477	363
v/c Ratio	0.29	0.40	0.79	0.36	0.80	0.44	0.79
Control Delay	45.2	27.8	47.4	9.2	21.8	5.4	29.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	27.8	47.4	9.2	21.8	5.4	29.2
Queue Length 50th (m)	5.3	5.9	37.1	3.5	105.7	14.6	44.0
Queue Length 95th (m)	13.9	18.7	#64.8	18.4	#201.9	35.8	#107.7
Internal Link Dist (m)		40.7		107.2	137.2		75.5
Turn Bay Length (m)	20.0		20.0			40.0	
Base Capacity (vph)	251	390	321	697	1055	1073	462
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.20	0.79	0.25	0.80	0.44	0.79

Intersection Summary

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Future Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		4.0	6.6			7.1	7.1		7.1	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.97			1.00	0.97		1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Frt	1.00	0.92		1.00	0.87			1.00	0.85		0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00		0.99	
Satd. Flow (prot)	1789	1733		1766	1629			1842	1568		1617	
Flt Permitted	0.65	1.00		0.44	1.00			0.92	1.00		0.45	
Satd. Flow (perm)	1219	1733		818	1629			1704	1568		744	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	36	41	255	26	148	84	762	477	95	248	20
RTOR Reduction (vph)	0	38	0	0	113	0	0	0	108	0	2	0
Lane Group Flow (vph)	32	39	0	255	61	0	0	846	369	0	361	0
Confl. Peds. (#/hr)				4		4			6	6		
Heavy Vehicles (%)	2%	2%	2%	3%	2%	0%	2%	4%	1%	15%	18%	2%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)	6.6	6.6		21.1	21.1			54.2	54.2		54.2	
Effective Green, g (s)	6.6	6.6		21.1	21.1			54.2	54.2		54.2	
Actuated g/C Ratio	0.07	0.07		0.24	0.24			0.61	0.61		0.61	
Clearance Time (s)	6.6	6.6		4.0	6.6			7.1	7.1		7.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	90	128		305	386			1037	954		453	
v/s Ratio Prot		0.02		c0.10	0.04							
v/s Ratio Perm	0.03			c0.10				c0.50	0.24		0.49	
v/c Ratio	0.36	0.31		0.84	0.16			0.82	0.39		0.80	
Uniform Delay, d1	39.2	39.0		30.7	26.9			13.5	8.9		13.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.4	1.4		17.7	0.2			7.1	1.2		13.6	
Delay (s)	41.6	40.4		48.4	27.1			20.6	10.1		26.8	
Level of Service	D	D		D	C			C	B		C	
Approach Delay (s)		40.7			39.8			16.8			26.8	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	103.5%	ICU Level of Service	G
Analysis Period (min)	15		

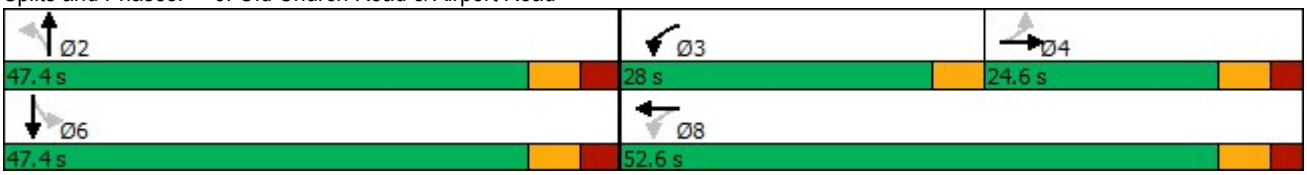
c Critical Lane Group

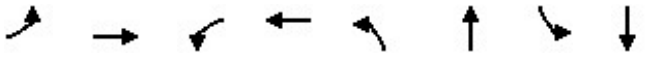
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Future Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		20.0	20.0		40.0	20.0		20.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.99	0.98							
Frt		0.909			0.869			0.921			0.996	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1712	0	1755	1360	0	1789	1490	0	1644	1758	0
Flt Permitted	0.976			0.494			0.299			0.449		
Satd. Flow (perm)	1838	1712	0	906	1360	0	563	1490	0	777	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			75			68			2	
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		64.7			131.2			161.2			99.5	
Travel Time (s)		4.9			9.8			11.6			7.2	
Confl. Peds. (#/hr)				3		1						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	4%	2%	23%	2%	32%	7%	11%	9%	2%
Adj. Flow (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	46	0	378	86	0	13	421	0	127	596	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	97		97	24		14	97		14	24		97
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		6.1	10.0		2.0	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		6.1	0.6		2.0	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			28.7			28.7	
Detector 2 Size(m)		0.6			0.6			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		2	2		6	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	24.6	24.6		28.0	28.0		42.0	42.0		42.0	42.0	
Total Split (s)	24.6	24.6		28.0	52.6		47.4	47.4		47.4	47.4	
Total Split (%)	24.6%	24.6%		28.0%	52.6%		47.4%	47.4%		47.4%	47.4%	
Maximum Green (s)	18.0	18.0		24.0	46.0		40.3	40.3		40.3	40.3	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.6	2.6		0.0	2.6		3.1	3.1		3.1	3.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.6	6.6		4.0	6.6		7.1	7.1		7.1	7.1	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		10.0	10.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	6.8	6.8		26.8	24.1		41.1	41.1		41.1	41.1	
Actuated g/C Ratio	0.09	0.09		0.34	0.30		0.52	0.52		0.52	0.52	
v/c Ratio	0.10	0.27		0.74	0.18		0.04	0.52		0.32	0.65	
Control Delay	38.7	25.1		30.5	6.6		14.5	15.7		17.3	21.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	38.7	25.1		30.5	6.6		14.5	15.7		17.3	21.0	
LOS	D	C		C	A		B	B		B	C	
Approach Delay		28.4			26.1			15.6			20.4	
Approach LOS		C			C			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 79.2			
Natural Cycle: 95			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 21.0		Intersection LOS: C	
Intersection Capacity Utilization 83.1%		ICU Level of Service E	
Analysis Period (min) 15			

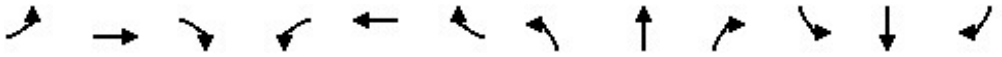
Splits and Phases: 6: Old Church Road & Airport Road





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	15	46	378	86	13	421	127	596
v/c Ratio	0.10	0.27	0.74	0.18	0.04	0.52	0.32	0.65
Control Delay	38.7	25.1	30.5	6.6	14.5	15.7	17.3	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.7	25.1	30.5	6.6	14.5	15.7	17.3	21.0
Queue Length 50th (m)	2.3	2.7	46.3	1.1	1.1	38.0	12.1	71.6
Queue Length 95th (m)	8.3	12.8	71.1	9.7	4.6	75.6	29.1	127.3
Internal Link Dist (m)		40.7		107.2		137.2		75.5
Turn Bay Length (m)	20.0		20.0		20.0		20.0	
Base Capacity (vph)	426	418	618	836	292	806	403	913
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.11	0.61	0.10	0.04	0.52	0.32	0.65

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Future Volume (vph)	15	18	28	378	11	75	13	198	223	127	581	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		4.0	6.6		7.1	7.1		7.1	7.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.87		1.00	0.92		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1711		1750	1361		1789	1489		1644	1759	
Flt Permitted	0.98	1.00		0.49	1.00		0.30	1.00		0.45	1.00	
Satd. Flow (perm)	1838	1711		910	1361		564	1489		777	1759	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	18	28	378	11	75	13	198	223	127	581	15
RTOR Reduction (vph)	0	27	0	0	50	0	0	34	0	0	1	0
Lane Group Flow (vph)	15	19	0	378	36	0	13	387	0	127	595	0
Confl. Peds. (#/hr)				3		1						
Heavy Vehicles (%)	2%	2%	2%	4%	2%	23%	2%	32%	7%	11%	9%	2%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	4.1	4.1		27.1	27.1		41.1	41.1		41.1	41.1	
Effective Green, g (s)	4.1	4.1		27.1	27.1		41.1	41.1		41.1	41.1	
Actuated g/C Ratio	0.05	0.05		0.33	0.33		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.6	6.6		4.0	6.6		7.1	7.1		7.1	7.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	92	85		495	450		283	747		389	882	
v/s Ratio Prot		0.01		c0.18	0.03			0.26			c0.34	
v/s Ratio Perm	0.01			c0.08			0.02			0.16		
v/c Ratio	0.16	0.23		0.76	0.08		0.05	0.52		0.33	0.67	
Uniform Delay, d1	37.3	37.4		23.5	18.8		10.4	13.7		12.2	15.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.4		6.9	0.1		0.3	2.6		2.2	4.1	
Delay (s)	38.1	38.8		30.4	18.9		10.7	16.3		14.4	19.5	
Level of Service	D	D		C	B		B	B		B	B	
Approach Delay (s)		38.6			28.3			16.1			18.6	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	81.9	Sum of lost time (s)	17.7
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

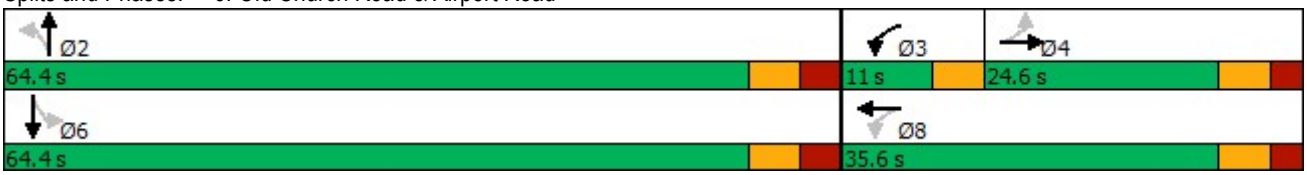
c Critical Lane Group

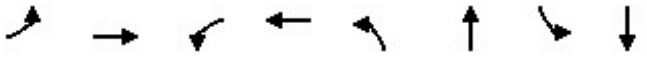
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Future Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	20.0		0.0	20.0		20.0	20.0		40.0	20.0		20.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	2.5			2.5			2.5			2.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor				0.99	0.97			0.99				
Frt		0.920			0.872			0.942			0.989	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1733	0	1772	1626	0	1789	1738	0	1587	1627	0
Flt Permitted	0.647			0.443			0.594			0.070		
Satd. Flow (perm)	1219	1733	0	819	1626	0	1119	1738	0	117	1627	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			148			53			7	
Link Speed (k/h)		48			48			50			50	
Link Distance (m)		64.7			131.2			161.2			99.5	
Travel Time (s)		4.9			9.8			11.6			7.2	
Confl. Peds. (#/hr)				4		4			6	6		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	2%	2%	3%	2%	0%	2%	4%	1%	15%	18%	2%
Adj. Flow (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	32	77	0	255	174	0	84	1239	0	95	268	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.7			3.7			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		1.6			1.6			1.6			1.6	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		6.1	10.0		2.0	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		6.1	0.6		2.0	1.8		6.1	1.8	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			28.7			28.7	
Detector 2 Size(m)		0.6			0.6			1.8			1.8	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		3	8		2	2		6	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	5.0		7.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	24.6	24.6		11.0	28.0		42.0	42.0		42.0	42.0	
Total Split (s)	24.6	24.6		11.0	35.6		64.4	64.4		64.4	64.4	
Total Split (%)	24.6%	24.6%		11.0%	35.6%		64.4%	64.4%		64.4%	64.4%	
Maximum Green (s)	18.0	18.0		7.0	29.0		57.3	57.3		57.3	57.3	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.6	2.6		0.0	2.6		3.1	3.1		3.1	3.1	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.6	6.6		4.0	6.6		7.1	7.1		7.1	7.1	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0			8.0		8.0	8.0		8.0	8.0	
Flash Dont Walk (s)	11.0	11.0			10.0		17.0	17.0		17.0	17.0	
Pedestrian Calls (#/hr)	0	0			0		0	0		0	0	
Act Effct Green (s)	7.9	7.9		19.6	17.0		57.5	57.5		57.5	57.5	
Actuated g/C Ratio	0.09	0.09		0.22	0.19		0.65	0.65		0.65	0.65	
v/c Ratio	0.30	0.40		0.96	0.40		0.12	1.08		1.25	0.25	
Control Delay	45.3	27.8		79.9	10.5		7.3	68.3		212.8	7.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	45.3	27.8		79.9	10.5		7.3	68.3		212.8	7.7	
LOS	D	C		E	B		A	E		F	A	
Approach Delay		33.0			51.7			64.5			61.4	
Approach LOS		C			D			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 88.3			
Natural Cycle: 140			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 60.0		Intersection LOS: E	
Intersection Capacity Utilization 112.2%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 6: Old Church Road & Airport Road



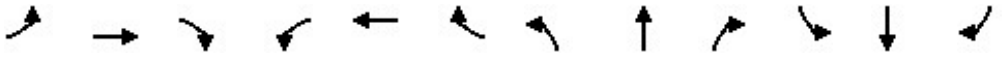


Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	32	77	255	174	84	1239	95	268
v/c Ratio	0.30	0.40	0.96	0.40	0.12	1.08	1.25	0.25
Control Delay	45.3	27.8	79.9	10.5	7.3	68.3	212.8	7.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.3	27.8	79.9	10.5	7.3	68.3	212.8	7.7
Queue Length 50th (m)	5.3	5.9	39.2	3.6	5.1	~241.4	~20.9	17.3
Queue Length 95th (m)	13.9	18.7	#82.7	19.4	11.7	#335.4	#40.4	31.8
Internal Link Dist (m)		40.7		107.2		137.2		75.5
Turn Bay Length (m)	20.0		20.0		20.0		20.0	
Base Capacity (vph)	249	387	266	635	728	1150	76	1062
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.20	0.96	0.27	0.12	1.08	1.25	0.25

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Future Volume (vph)	32	36	41	255	26	148	84	762	477	95	248	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.6	6.6		4.0	6.6		7.1	7.1		7.1	7.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.97		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.87		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1733		1766	1629		1789	1739		1587	1626	
Flt Permitted	0.65	1.00		0.44	1.00		0.59	1.00		0.07	1.00	
Satd. Flow (perm)	1219	1733		823	1629		1119	1739		116	1626	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	32	36	41	255	26	148	84	762	477	95	248	20
RTOR Reduction (vph)	0	38	0	0	117	0	0	19	0	0	3	0
Lane Group Flow (vph)	32	39	0	255	57	0	84	1220	0	95	265	0
Confl. Peds. (#/hr)				4		4			6	6		
Heavy Vehicles (%)	2%	2%	2%	3%	2%	0%	2%	4%	1%	15%	18%	2%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	6.7	6.7		18.5	18.5		57.5	57.5		57.5	57.5	
Effective Green, g (s)	6.7	6.7		18.5	18.5		57.5	57.5		57.5	57.5	
Actuated g/C Ratio	0.07	0.07		0.21	0.21		0.64	0.64		0.64	0.64	
Clearance Time (s)	6.6	6.6		4.0	6.6		7.1	7.1		7.1	7.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	91	129		251	335		717	1114		74	1042	
v/s Ratio Prot		0.02		c0.09	0.03			0.70			0.16	
v/s Ratio Perm	0.03			c0.12			0.08			c0.82		
v/c Ratio	0.35	0.30		1.02	0.17		0.12	1.10		1.28	0.25	
Uniform Delay, d1	39.4	39.3		34.6	29.3		6.2	16.1		16.1	6.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	1.3		61.0	0.2		0.3	56.8		198.5	0.6	
Delay (s)	41.8	40.6		95.6	29.5		6.6	72.9		214.6	7.5	
Level of Service	D	D		F	C		A	E		F	A	
Approach Delay (s)		41.0			68.8			68.7			61.7	
Approach LOS		D			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	66.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	89.7	Sum of lost time (s)	17.7
Intersection Capacity Utilization	112.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group