

1310 Adelaide Street Transportation Impact Study

Prepared for:

York Developments



November 5, 2015

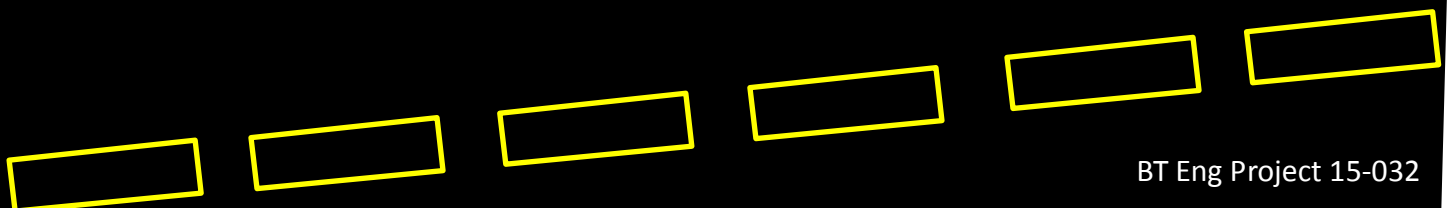


Table of Contents

1.0	Introduction	1
1.1	Background	1
1.2	Proposed Development	1
1.3	Scope of the Analysis	2
2.0	Existing Conditions	3
2.1	Roadway Geometry	3
2.2	Transit Service	3
2.3	Provisions for Pedestrians and Cyclists	4
2.4	Traffic Operations	4
3.0	Background Traffic	5
4.0	Site Travel Demands.....	7
4.1	Trip Generation	7
4.2	Trip Distribution and Assignment.....	7
5.0	Total Traffic	9
5.1	Travel Demands.....	9
5.2	Warrants for Auxiliary Lanes.....	9
5.3	Traffic Operations.....	10
6.0	Conclusions and Recommendations.....	11

Appendix A – Traffic Analysis Reports

List of Figures

Figure 1 - Site Location	1
Figure 2 - Site Plan	2
Figure 3 - Existing Area Transit Services	3
Figure 4 - Existing Traffic Demand.....	4
Figure 5 - 2021 Background Traffic Demand	6
Figure 6 - Site Generated (New) Traffic	8
Figure 7 – Pass-by Traffic	8
Figure 8 - 2021 Total Traffic	9



List of Tables

Table 1 - Existing Traffic Operations 5

Table 2 – 2021 Background Traffic Operations 6

Table 3 - Trip Generation 7

Table 4 – Total Traffic Operations 10

1.0 Introduction

1.1 Background

BT Engineering (BTE) was retained by York Developments to complete a Transportation Impact Study for the proposed commercial development located at 1310 Adelaide Street North, London. The proposed development is located at the southeast quadrant of the Adelaide Street North and Windermere Road intersection as illustrated in **Figure 1**.

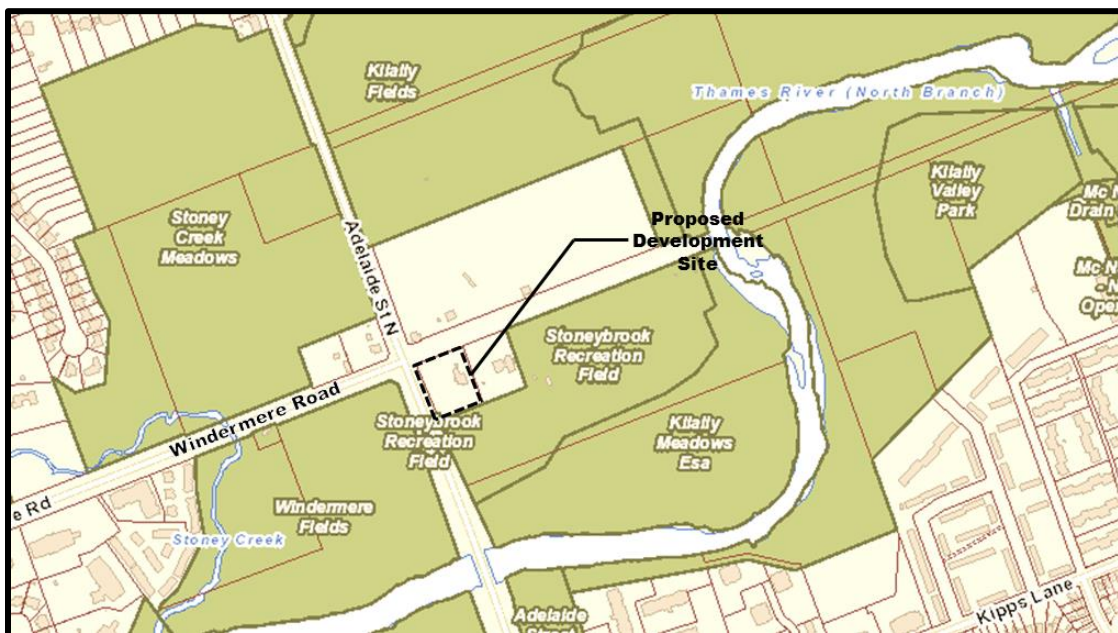


Figure 1 - Site Location

The site is located within walking distance of the Tin Cup Driving Range, Stoney Creek Recreational Field, Dan Pulham Field and the North London Athletic Fields.

1.2 Proposed Development

The proposed development, as illustrated in **Figure 2**, would include a 10,010 square foot commercial building with an estimated 1,784 square foot patio area or approximately 11,800 square feet of total development. The development would contain a restaurant and either medical offices or general office space. Tenants have not yet been confirmed. As a worst case scenario it has been assumed that the restaurant would occupy approximately half of the combined building and patio area. This would represent a 5,900 square foot restaurant and 5,900 square feet of medical/dental office space.

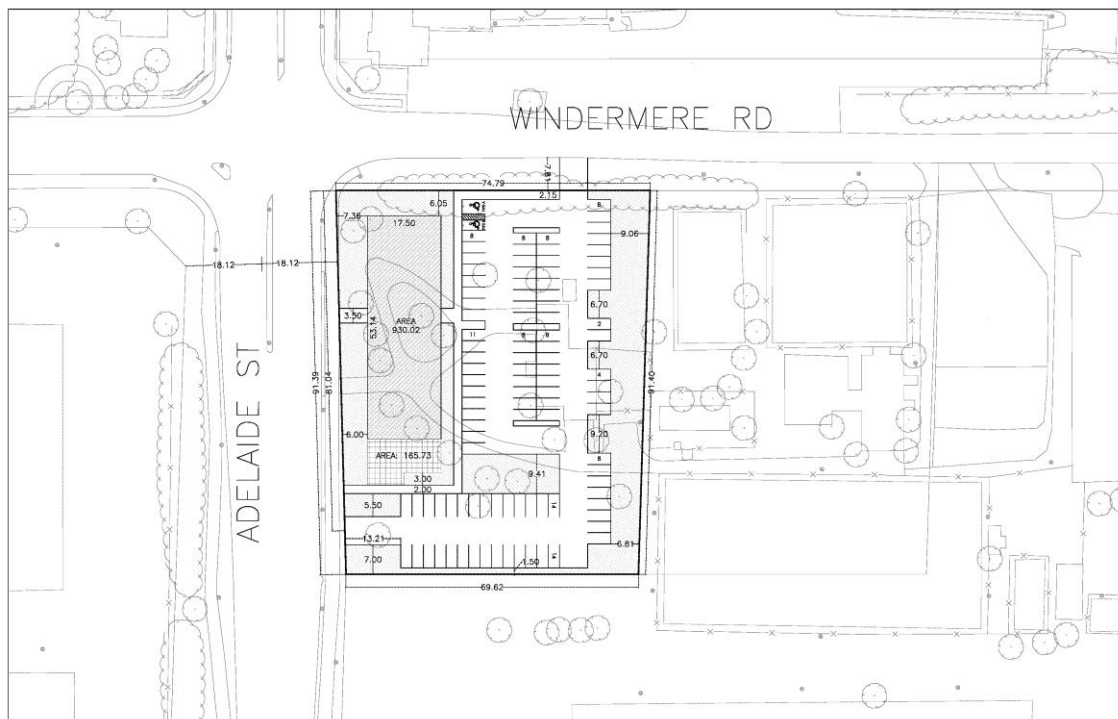


Figure 2 - Site Plan

Two accesses to the site have been proposed. One access, located near the south end of the site, would be provided from Adelaide Street with a second access, located near the east limit of the site, off Windermere Road. Given the proximity to the signalized intersection, it is recommended that the proposed Adelaide Street access be restricted to right-in / right-out movements, consistent with London's Access Management Guidelines.

1.3 Scope of the Analysis

Development of the site is anticipated to take place in 2016; therefore the study has examined existing conditions and a 2021 horizon year for total development. The analysis has focused on the Adelaide Street/ Windermere Road intersection and the proposed accesses to the development.

2.0 Existing Conditions

2.1 Roadway Geometry

Adelaide Street is a 4-lane arterial that carries an average of 33,000 vehicles/day. To the west, Windermere Road is a 2-lane arterial carrying an average of approximately 13,000 vehicles/day. East of Adelaide Street, Windermere Road has no exit. It functions as a local street carrying less than 1,000 vehicles/day. The existing intersection is signalized with left turn lanes on all 4 approaches and a channelized right turn lane on eastbound Windermere Road.

Adelaide Street and Windermere Road (east of Adelaide Street) are designated as primary commuter cycling routes in the City of London's 2005 Bicycle Master Plan.

2.2 Transit Service

The existing transit network in the area of the site is shown in **Figure 3**. The site is currently served by London Transit Route 16 - Adelaide and London Transit Route 32 - Windermere. On weekdays, throughout the day, Transit Route 16 - Adelaide operates on 15 minute headways, and Transit Route 32 - Windermere operates on 30 minute headways. Both transit routes provide access via transfer to the wider transit network. In 2016 the introduction of an express bus service (Route 92) has been proposed on Adelaide Street. London's 2030 "Smart Moves" Transportation Master Plan recommended that traffic growth along the subject section of Adelaide Street be accommodated through corridor optimization and the provision of transit priority measures.

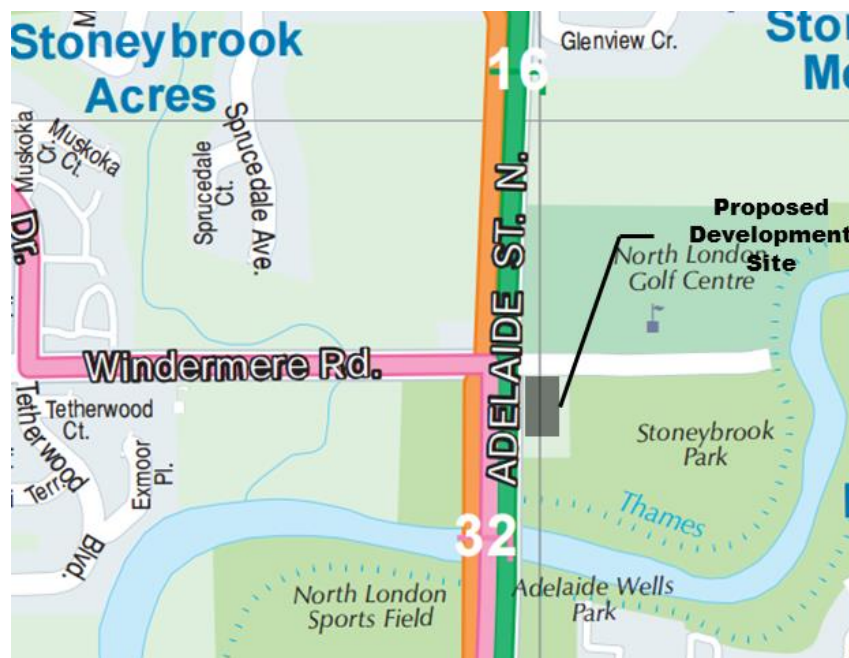


Figure 3 - Existing Area Transit Services

2.3 Provisions for Pedestrians and Cyclists

Sidewalks and in boulevard bicycle paths exist on both sides of Adelaide Street. The bicycle paths extend from south of Kipps Lane to north of Fanshawe Park Road and they connect to the Thames Valley Parkway which runs along the south side of the Thames River.

West of Adelaide Street, Windermere Road has a sidewalk on the north side of the corridor. East of Adelaide Street, Windermere Road is a rural cross section and no sidewalks are provided. A granular shoulder is currently available for pedestrians on the south side of Windermere Road, along the frontage of the subject site.

2.4 Traffic Operations

Existing traffic demands at the intersection of Adelaide Street and Windermere Road were based on a turning movement count recorded on April 18, 2013 and provided by the City of London. A 3% growth in traffic was assumed to factor the recorded traffic volumes to existing (2015) levels, as presented in **Figure 4**. The current traffic operations in the area of the site were evaluated using Synchro 9 as summarized in **Table 1**. #95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

. Copies of the analysis reports are provided in Appendix A.

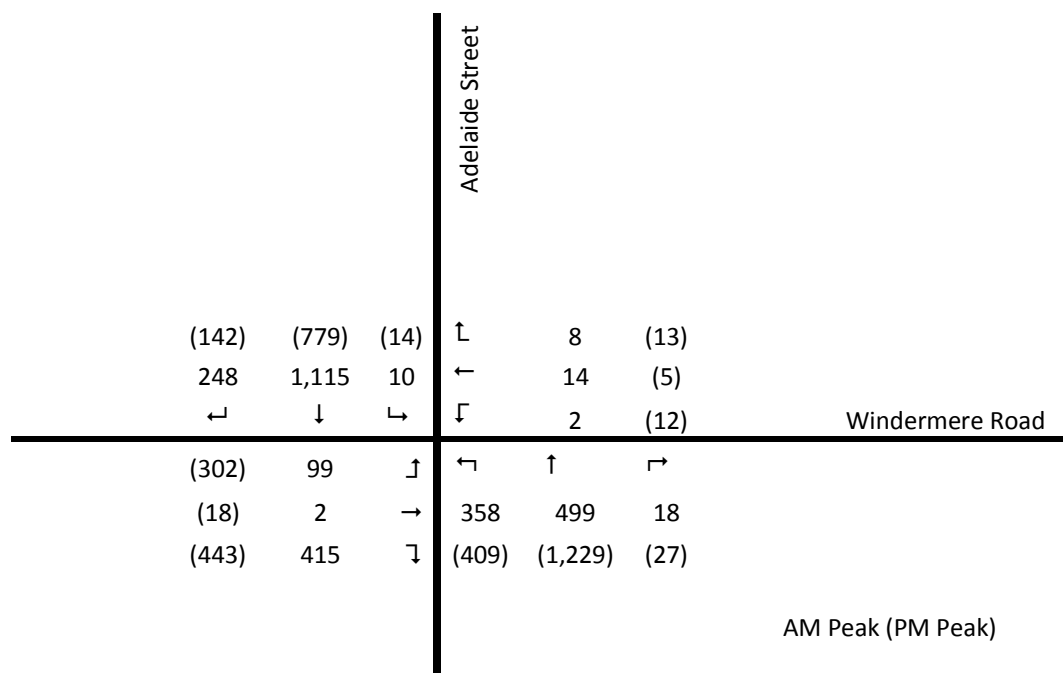


Figure 4 - Existing Traffic Demand

Table 1 - Existing Traffic Operations

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		v/c	Delay (s)	LOS	95 th queue (m)	v/c	Delay (s)	LOS	95 th queue (m)
Adelaide Street and Windermere Road	EB L	0.53	51.8	D	36	0.86	59.7	E	#109.2
	EB T	0.01	35.5	D	2.4	0.04	28.4	C	8.8
	EB R	0.84	24.1	C	53.1	0.61	6.5	A	24.4
	WB L	0.01	35.5	D	2.4	0.03	28.4	C	6.6
	WB TR	0.09	27.3	C	9.4	0.04	15.8	B	6.2
	NB L	0.89	53.2	D	#124.5	0.89	48.1	D	#120.0
	NB TR	0.21	4.9	A	29	0.58	12.2	B	102.3
	SB L	0.03	17.6	B	4.7	0.1	27.6	C	7.4
	SB TR	0.84	30.1	C	#208.5	0.73	33.6	C	128.3
	<i>Overall</i>		28.2	C			26.1	C	

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

Queue shown is maximum after two cycles.

Overall, the intersection of Adelaide Street and Windermere Road currently operates within its capacity, at a very good level of service, during the peak hours.

3.0 Background Traffic

The subject site could be developed with full occupancy in 2016. As a result, 2021 was assumed as the five year planning horizon beyond full development. 2021 Background Traffic volumes, as presented in **Figure 5**, assumed a 1.5% annual growth in background traffic.

Capacity analyses of the 2021 Background Traffic conditions are summarized in **Table 2**. Copies of the analysis reports are provided in **Appendix A**. The projected growth in background traffic will result in some increase in delays for critical movements; however, the intersection of Adelaide Street and Windermere Road can be expected to continue operating within its capacity.

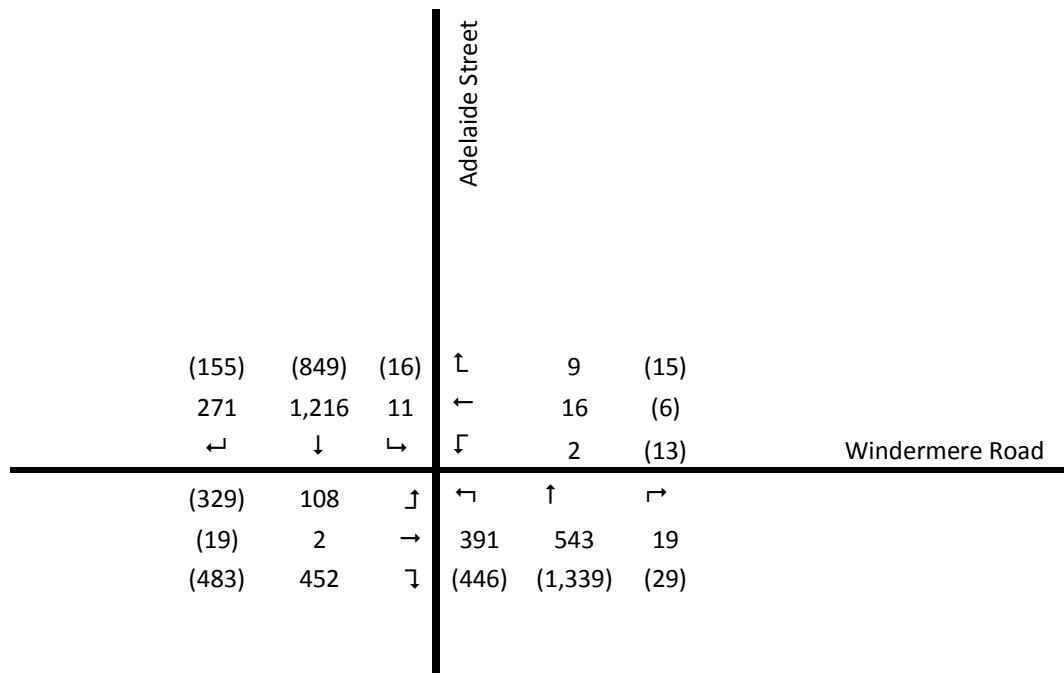


Figure 5 - 2021 Background Traffic Demand

Table 2 – 2021 Background Traffic Operations

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		v/c	Delay (s)	LOS	95 th queue (m)	v/c	Delay (s)	LOS	95 th queue (m)
Adelaide Street/ Windermere Road	EB L	0.5	51.7	D	41.6	0.91	65.6	E	#124.8
	EB T	0.01	37.5	D	2.6	0.04	28.4	C	9.1
	EB R	0.87	29.5	C	72.8	0.65	8.1	A	34.5
	WB L	0.01	37.5	D	2.6	0.04	28.4	C	6.9
	WB TR	0.09	28.3	C	10.9	0.05	15.7	B	7
	NB L	0.92	60.3	E	#149.0	0.96	61	E	#146.7
	NB TR	0.22	4.6	A	29.3	0.65	13.7	B	117.7
	SB L	0.03	17.2	B	4.9	0.14	28.8	C	8.2
	SB TR	0.9	35.8	D	#242.4	0.85	39.9	D	#152.0
	Overall		32.7	C			33.4	C	

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

4.0 Site Travel Demands

4.1 Trip Generation

Trip generation rates from the ITE Trip Generation Manual, 9th Edition, were used to estimate the traffic volumes that will be generated by the proposed development. The projected AM and PM peak hour traffic volumes are presented in **Table 3**. As a worst case scenario, the restaurant generated traffic was assumed to include only approximately 20% pass-by traffic and the proposed office development was assumed to be Medical / Dental Offices.

Table 3 - Trip Generation

Land Use	Size '000 ft ²	ITE Code	AM PEAK HOUR				PM PEAK HOUR			
			Trip Rate	Dir Split (in/out)	In	Out	Trip Rate	Dir Split (in/out)	In	Out
Medical-Dental Office Building	5.90	720	2.39	.79/.21	11	3	3.57	.28/.72	6	15
High Turnover (Sit-Down) Restaurant	5.90	932	13.33	.53/.47	42	37	18.49	.54/.56	59	61
<i>Total Auto Trips</i>					53	40			65	76
<i>Pass-by Auto Trips</i>					8	8			10	10
Net New Trips (vehs)					45	32			55	66

4.2 Trip Distribution and Assignment

The distribution and assignment of site generated traffic is presented in **Figure 6** and **Figure 7**. The distribution of site traffic was based on existing travel patterns observed in the study area.

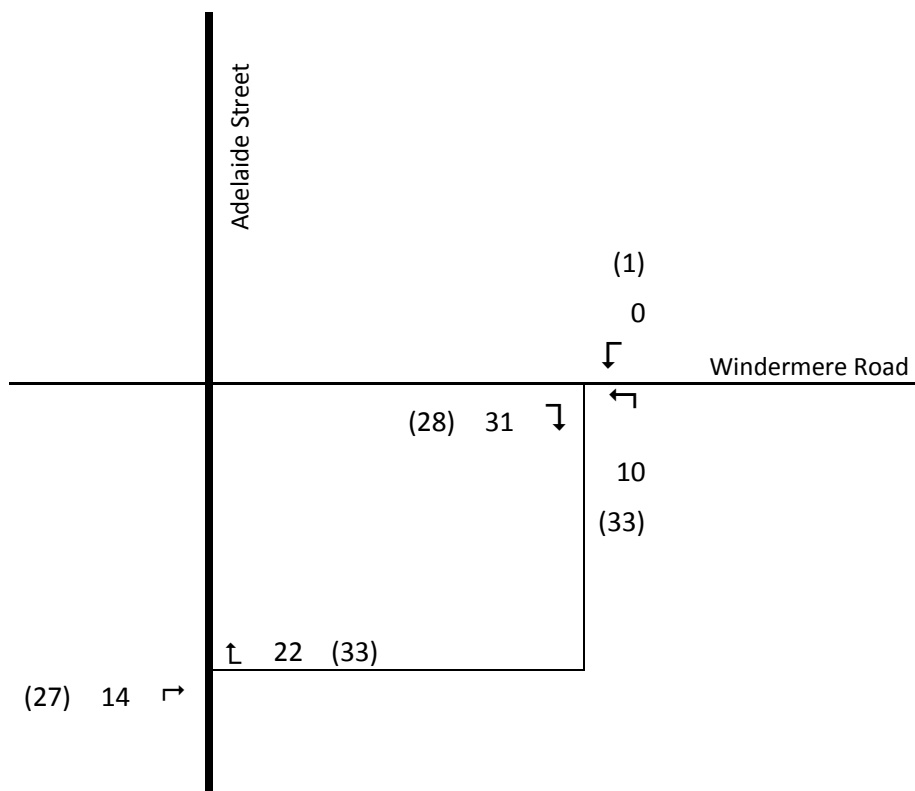


Figure 6 - Site Generated (New) Traffic

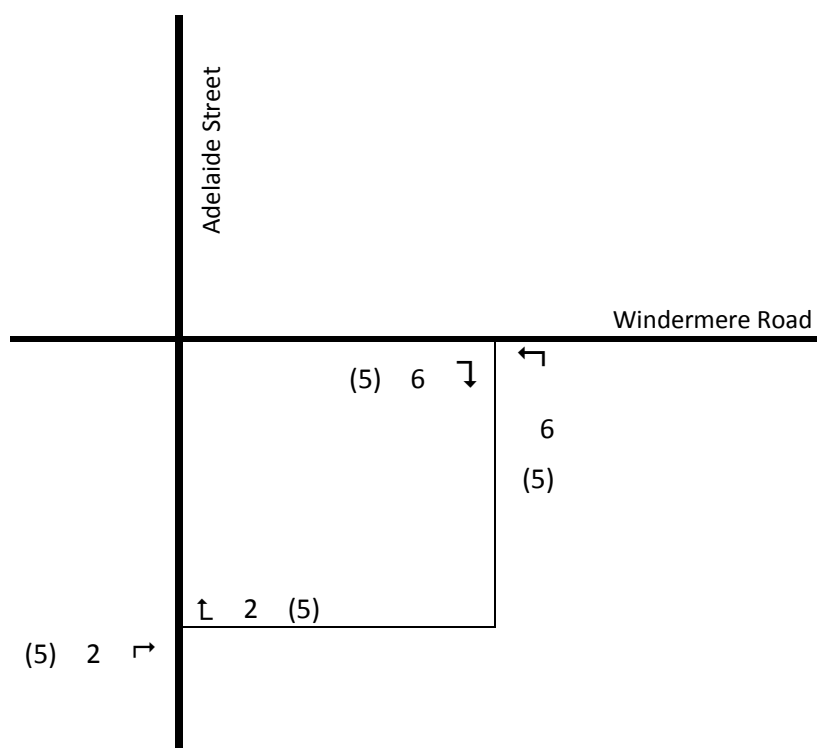


Figure 7 – Pass-by Traffic

5.0 Total Traffic

5.1 Travel Demands

The total traffic volumes for the 2021 horizon year were derived by summing the projected 2021 background traffic and the site generated traffic volumes. The resulting 2021 total peak hour traffic projections are presented in **Figure 8**.

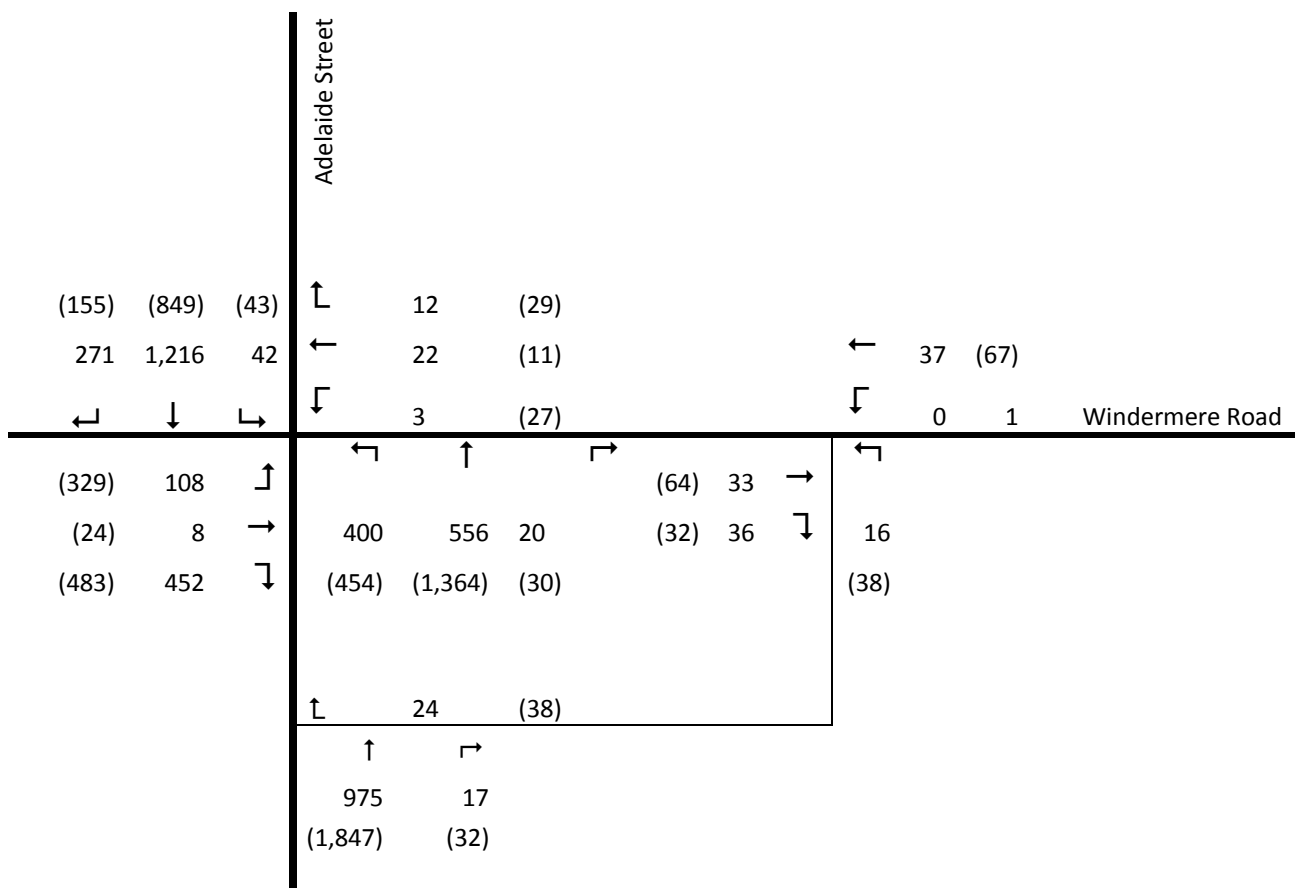


Figure 8 - 2021 Total Traffic

5.2 Warrants for Auxiliary Lanes

The need for auxiliary lanes, at the proposed site entrances, was assessed using TAC and MTO warrants. The peak hour northbound and eastbound right turn volumes entering the site are less than 40 vph, well below the threshold of 60 vph (TAC and MTO use this generalized value for right turn lanes/channelization). On this basis, the provision of right turn lanes at the proposed entrances is not warranted.

5.3 Traffic Operations

A summary of the traffic operations projected for the year 2021 with the addition of site generated traffic during the AM and PM peak hours is provided in **Table 4**. Copies of the analysis reports are provided in **Appendix A**.

This analysis has confirmed that the proposed development can be suitably accommodated by the existing road network.

Table 4 – Total Traffic Operations

Intersection	Movement	AM Peak Hour				PM Peak Hour			
		v/c	Delay (s)	LOS	95 th queue (m)	v/c	Delay (s)	LOS	95 th queue (m)
Adelaide Street/ Windermere Road	EB L	0.51	52.4	D	41.7	0.92	71.4	E	#134.8
	EB T	0.03	38.1	D	6.1	0.05	31	C	11.3
	EB R	0.86	27.3	C	68.9	0.65	8.3	A	35.9
	WB L	0.01	37.7	D	3.2	0.07	31.5	C	12.3
	WB TR	0.12	29.3	C	13.5	0.09	14.5	B	10.7
	NB L	0.91	59.4	E	#150.7	0.96	65.4	E	#162.0
	NB TR	0.23	4.6	A	30	0.65	14.7	B	130.2
	SB L	0.12	18.9	B	13.4	0.39	42.1	D	20.8
	SB TR	0.91	36.9	D	#246.2	0.85	42.3	D	#156.1
	Overall		32.6	C			32.7	C	
Windermere Road Site Access	EBTR	0.04	0	A	0	0.06	0	A	0
	WBTL	0	0	A	0	0	0.1	A	0
	NBLR	0.02	9	A	0.4	0.05	9.5	A	1.2
	Overall		1.2	A			1.8	A	
Adelaide Street Site Access	WBR	0.05	12.8	B	1.3	0.18	23.7	C	4.7
	NBTR	0.42	0	A	0	0.79	0	A	0
	Overall		0.1	A			0	A	

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

6.0 Conclusions and Recommendations

The proposed commercial development at 1310 Adelaide Street North would consist of 5900 square feet of office space and a 5900 square foot restaurant (including the patio area). The timing of the development is dependent on obtaining tenants for the site but the planned development could potentially be constructed in 2016. The Transportation Impact Study evaluated existing (2015) and projected 2021 traffic conditions for the AM and PM peak hours.

The provision of two entrances to the site improves internal site circulation for patrons and emergency vehicles and limits the volume of turning vehicles at the Adelaide Street North and Windermere Road intersection. Given the proximity to the signalized intersection, it is recommended that the entrance to be located on Adelaide Street, near the south limit of the site, be restricted to right-in/ right-out movements. The turn restrictions could be controlled with the conversion of the existing painted median on Adelaide Street to a raised median beyond the entrance.

The analysis has confirmed that the proposed entrances would operate well within their capacities. The traffic generated by the development was projected to have a no significant impact on the operation or performance of the adjacent signalized intersection of Adelaide Street North and Windermere Road). The limited volume of additional traffic could be accommodated with adjustments to the existing signal timings.

It is recognized that the proposed site plan is preliminary; however, the handicapped parking spaces should be relocated adjacent to the building's entrance. It is recommended that the development of the site also include:

- Provision of a sidewalk or walkway on the south side of Windermere between the proposed access and Adelaide Street.
- Bicycle parking for the proposed restaurant, recognizing the proximity of the site to both the Thames Valley Parkway and adjacent sports fields.

Appendix A

Traffic Analysis Reports

Lanes, Volumes, Timings

Adelaide Street & Windermere Road

Existing Traffic
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	2	415	2	14	8	358	499	18	10	1115	248
Future Volume (vph)	99	2	415	2	14	8	358	499	18	10	1115	248
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		100.0	40.0		0.0	150.0		0.0	55.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.944			0.995			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1778	0	1789	3561	0	1789	3482	0
Flt Permitted	0.742			0.757			0.067			0.441		
Satd. Flow (perm)	1398	1883	1601	1426	1778	0	126	3561	0	831	3482	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			360		9			7			31	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		348.7			304.6			157.5			198.6	
Travel Time (s)		20.9			18.3			9.5			11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	2	451	2	15	9	389	542	20	11	1212	270
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	2	451	2	24	0	389	562	0	11	1482	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)		4.9			4.9			4.9			4.9	
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
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0		11.0	30.0		30.0	30.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0		26.0	80.0		54.0	54.0	
Total Split (%)	27.3%	27.3%	27.3%	27.3%	27.3%		23.6%	72.7%		49.1%	49.1%	
Maximum Green (s)	24.0	24.0	24.0	24.0	24.0		22.0	74.0		48.0	48.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0		4.0	6.0		6.0	6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
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	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0	7.0	

Lanes, Volumes, Timings
Adelaide Street & Windermere Road

Existing Traffic
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	17.0	17.0	17.0	17.0	17.0			17.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)	16.0	16.0	16.0	16.0	16.0		84.0	82.0		55.4	55.4	
Actuated g/C Ratio	0.15	0.15	0.15	0.15	0.15		0.76	0.75		0.50	0.50	
v/c Ratio	0.53	0.01	0.84	0.01	0.09		0.89	0.21		0.03	0.84	
Control Delay	51.8	35.5	24.1	35.5	27.3		53.2	4.9		17.6	30.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	51.8	35.5	24.1	35.5	27.3		53.2	4.9		17.6	30.1	
LOS	D	D	C	D	C		D	A		B	C	
Approach Delay		29.5			27.9			24.7			30.0	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	22.1	0.4	18.2	0.4	2.9		61.6	15.1		1.2	142.5	
Queue Length 95th (m)	36.0	2.4	53.1	2.4	9.4		#124.5	29.0		4.7	#208.5	
Internal Link Dist (m)		324.7			280.6			133.5			174.6	
Turn Bay Length (m)	100.0		100.0	40.0			150.0			55.0		
Base Capacity (vph)	305	410	630	311	394		454	2656		418	1767	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.35	0.00	0.72	0.01	0.06		0.86	0.21		0.03	0.84	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 28.2

Intersection LOS: C

Intersection Capacity Utilization 87.8%

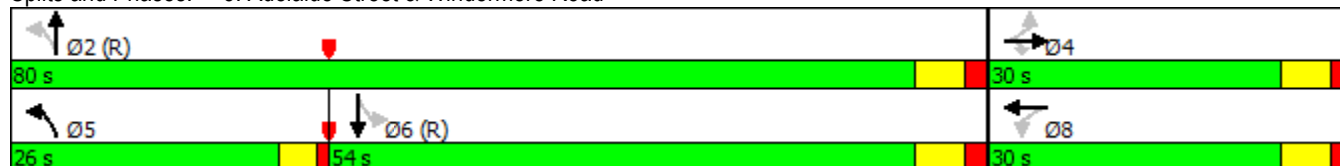
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Adelaide Street & Windermere Road



Lanes, Volumes, Timings
Adelaide Street & Windermere Road

Existing Traffic
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	302	18	443	12	5	13	409	1229	27	14	779	142
Future Volume (vph)	302	18	443	12	5	13	409	1229	27	14	779	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		100.0	40.0		0.0	150.0		0.0	55.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.889			0.997			0.977	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1674	0	1789	3568	0	1789	3496	0
Flt Permitted	0.745			0.744			0.107			0.199		
Satd. Flow (perm)	1403	1883	1601	1401	1674	0	202	3568	0	375	3496	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			482		14			4			20	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		348.7			304.6			157.5			198.6	
Travel Time (s)		20.9			18.3			9.5			11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	20	482	13	5	14	445	1336	29	15	847	154
Shared Lane Traffic (%)												
Lane Group Flow (vph)	328	20	482	13	19	0	445	1365	0	15	1001	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)		4.8			4.8			4.8			4.8	
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
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0		11.0	30.0		30.0	30.0	
Total Split (s)	36.0	36.0	36.0	36.0	36.0		33.0	74.0		41.0	41.0	
Total Split (%)	32.7%	32.7%	32.7%	32.7%	32.7%		30.0%	67.3%		37.3%	37.3%	
Maximum Green (s)	30.0	30.0	30.0	30.0	30.0		29.0	68.0		35.0	35.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		0.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
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	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0	7.0	

Lanes, Volumes, Timings
Adelaide Street & Windermere Road

Existing Traffic
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	17.0	17.0	17.0	17.0	17.0			17.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)	30.0	30.0	30.0	30.0	30.0		72.0	72.0		42.7	42.7	
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27		0.65	0.65		0.39	0.39	
v/c Ratio	0.86	0.04	0.61	0.03	0.04		0.89	0.58		0.10	0.73	
Control Delay	59.7	28.4	6.5	28.4	15.8		48.1	12.2		27.6	33.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	59.7	28.4	6.5	28.4	15.8		48.1	12.2		27.6	33.6	
LOS	E	C	A	C	B		D	B		C	C	
Approach Delay		28.1			20.9			21.0			33.5	
Approach LOS		C			C			C			C	
Queue Length 50th (m)	65.1	3.1	0.0	2.0	0.8		71.1	83.3		2.2	100.8	
Queue Length 95th (m)	#109.2	8.8	24.4	6.6	6.2		#120.0	102.3		7.4	128.3	
Internal Link Dist (m)		324.7			280.6			133.5			174.6	
Turn Bay Length (m)	100.0		100.0	40.0			150.0			55.0		
Base Capacity (vph)	408	547	807	407	496		550	2337		145	1368	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.80	0.04	0.60	0.03	0.04		0.81	0.58		0.10	0.73	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 26.1

Intersection LOS: C

Intersection Capacity Utilization 82.1%

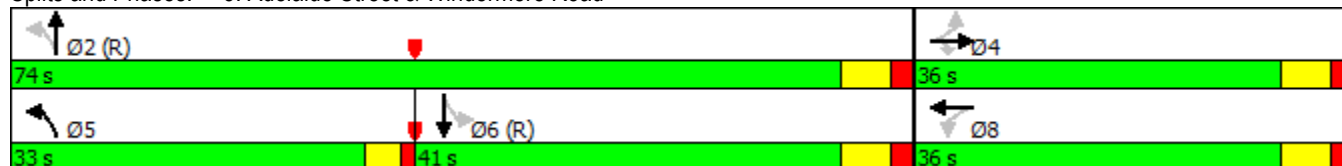
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Adelaide Street & Windermere Road



Lanes, Volumes, Timings
Adelaide Street & Windermere Road

2021 Background Traffic
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	2	452	2	16	9	391	543	19	11	1216	271
Future Volume (vph)	108	2	452	2	16	9	391	543	19	11	1216	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		100.0	40.0		0.0	150.0		0.0	55.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.944			0.995			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1778	0	1789	3561	0	1789	3482	0
Flt Permitted	0.740			0.757			0.063			0.421		
Satd. Flow (perm)	1394	1883	1601	1426	1778	0	119	3561	0	793	3482	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			358		10			7			30	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		348.7			304.6			157.5			198.6	
Travel Time (s)		20.9			18.3			9.5			11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	2	491	2	17	10	425	590	21	12	1322	295
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	2	491	2	27	0	425	611	0	12	1617	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)		4.8			4.8			4.8			4.8	
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
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0		11.0	30.0		30.0	30.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0		29.0	90.0		61.0	61.0	
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%		24.2%	75.0%		50.8%	50.8%	
Maximum Green (s)	24.0	24.0	24.0	24.0	24.0		25.0	84.0		55.0	55.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		0.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
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	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0	7.0	

Lanes, Volumes, Timings
Adelaide Street & Windermere Road

2021 Background Traffic
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	17.0	17.0	17.0	17.0	17.0			15.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)	20.0	20.0	20.0	20.0	20.0		92.0	92.0		61.1	61.1	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17		0.77	0.77		0.51	0.51	
v/c Ratio	0.50	0.01	0.87	0.01	0.09		0.92	0.22		0.03	0.90	
Control Delay	51.7	37.5	29.5	37.5	28.3		60.3	4.6		17.2	35.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	51.7	37.5	29.5	37.5	28.3		60.3	4.6		17.2	35.8	
LOS	D	D	C	D	C		E	A		B	D	
Approach Delay		33.8			29.0			27.5			35.6	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	25.0	0.4	31.1	0.4	3.4		79.3	18.9		1.5	187.3	
Queue Length 95th (m)	41.6	2.6	72.8	2.6	10.9		#149.0	29.3		4.9	#242.4	
Internal Link Dist (m)		324.7			280.6			133.5			174.6	
Turn Bay Length (m)	100.0		100.0	40.0			150.0			55.0		
Base Capacity (vph)	302	407	627	308	393		465	2731		403	1788	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.39	0.00	0.78	0.01	0.07		0.91	0.22		0.03	0.90	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 32.7

Intersection LOS: C

Intersection Capacity Utilization 88.6%

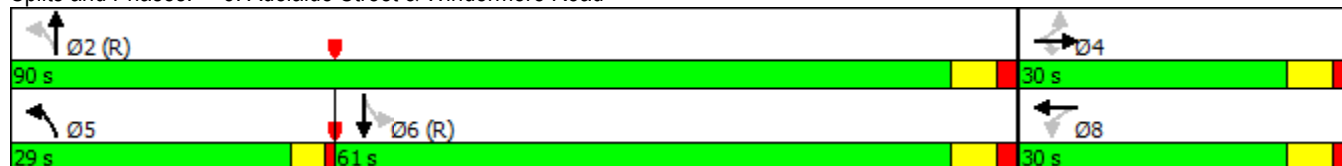
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Adelaide Street & Windermere Road



Lanes, Volumes, Timings
Adelaide Street & Windermere Road

2021 Background Traffic
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	329	19	483	13	6	15	446	1339	29	16	849	155
Future Volume (vph)	329	19	483	13	6	15	446	1339	29	16	849	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		100.0	40.0		0.0	150.0		0.0	55.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.896			0.997			0.977	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1688	0	1789	3568	0	1789	3496	0
Flt Permitted	0.742			0.744			0.095			0.176		
Satd. Flow (perm)	1398	1883	1601	1401	1688	0	179	3568	0	331	3496	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			494		16			4			21	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		348.7			304.6			157.5			198.6	
Travel Time (s)		20.9			18.3			9.5			11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	358	21	525	14	7	16	485	1455	32	17	923	168
Shared Lane Traffic (%)												
Lane Group Flow (vph)	358	21	525	14	23	0	485	1487	0	17	1091	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)		4.8			4.8			4.8			4.8	
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
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0		11.0	30.0		30.0	30.0	
Total Split (s)	36.0	36.0	36.0	36.0	36.0		32.0	74.0		42.0	42.0	
Total Split (%)	32.7%	32.7%	32.7%	32.7%	32.7%		29.1%	67.3%		38.2%	38.2%	
Maximum Green (s)	30.0	30.0	30.0	30.0	30.0		28.0	68.0		36.0	36.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		0.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
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	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0	7.0	

Lanes, Volumes, Timings
Adelaide Street & Windermere Road

2021 Background Traffic
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	17.0	17.0	17.0	17.0	17.0			17.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)	31.2	31.2	31.2	31.2	31.2		70.8	70.8		40.0	40.0	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.64	0.64		0.36	0.36	
v/c Ratio	0.91	0.04	0.65	0.04	0.05		0.96	0.65		0.14	0.85	
Control Delay	65.6	28.4	8.1	28.4	15.7		61.0	13.7		28.8	39.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	65.6	28.4	8.1	28.4	15.7		61.0	13.7		28.8	39.9	
LOS	E	C	A	C	B		E	B		C	D	
Approach Delay		31.3			20.5			25.4			39.7	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	73.2	3.2	4.8	2.2	1.1		85.0	96.0		2.5	113.8	
Queue Length 95th (m)	#124.8	9.1	34.5	6.9	7.0		#146.7	117.7		8.2	#152.0	
Internal Link Dist (m)		324.7			280.6			133.5			174.6	
Turn Bay Length (m)	100.0		100.0	40.0			150.0			55.0		
Base Capacity (vph)	406	547	816	407	502		524	2299		120	1284	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.88	0.04	0.64	0.03	0.05		0.93	0.65		0.14	0.85	

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 110

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 30.6

Intersection LOS: C

Intersection Capacity Utilization 88.0%

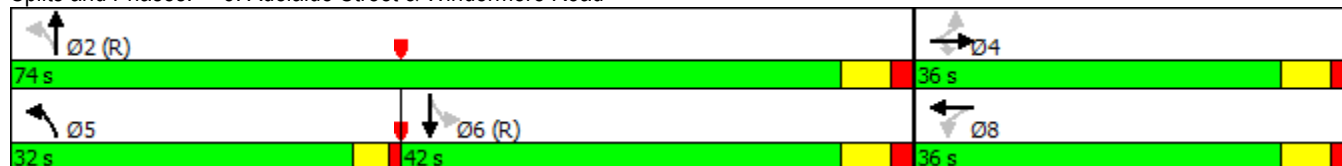
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Adelaide Street & Windermere Road



Lanes, Volumes, Timings
3: Adelaide Street & Windermere Road

2021 Total Traffic
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	8	452	3	22	12	400	556	20	42	1216	271
Future Volume (vph)	108	8	452	3	22	12	400	556	20	42	1216	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		100.0	40.0		0.0	150.0		0.0	55.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.947			0.995				0.973
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1784	0	1789	3561	0	1789	3482	0
Flt Permitted	0.733			0.752			0.064			0.414		
Satd. Flow (perm)	1381	1883	1601	1416	1784	0	121	3561	0	780	3482	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			370		13			8			30	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		348.7			55.1			82.3			198.6	
Travel Time (s)		20.9			3.3			4.9			11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	9	491	3	24	13	435	604	22	46	1322	295
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	9	491	3	37	0	435	626	0	46	1617	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)		4.8			4.8			4.8			4.8	
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
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0		11.0	30.0		30.0	30.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0		30.0	90.0		60.0	60.0	
Total Split (%)	25.0%	25.0%	25.0%	25.0%	25.0%		25.0%	75.0%		50.0%	50.0%	
Maximum Green (s)	24.0	24.0	24.0	24.0	24.0		26.0	84.0		54.0	54.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		0.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
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	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0	7.0	

Lanes, Volumes, Timings
3: Adelaide Street & Windermere Road

2021 Total Traffic
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0			16.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)	19.8	19.8	19.8	19.8	19.8		92.2	92.2		60.7	60.7	
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16		0.77	0.77		0.51	0.51	
v/c Ratio	0.51	0.03	0.86	0.01	0.12		0.91	0.23		0.12	0.91	
Control Delay	52.4	38.1	27.3	37.7	29.3		59.4	4.6		18.9	36.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	52.4	38.1	27.3	37.7	29.3		59.4	4.6		18.9	36.9	
LOS	D	D	C	D	C		E	A		B	D	
Approach Delay		32.2			29.9			27.1			36.4	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	25.3	1.8	27.8	0.6	4.8		79.5	18.4		6.0	190.5	
Queue Length 95th (m)	41.7	6.1	68.9	3.2	13.5		#150.7	30.0		13.4	#246.2	
Internal Link Dist (m)		324.7			31.1			58.3			174.6	
Turn Bay Length (m)	100.0		100.0	40.0			150.0			55.0		
Base Capacity (vph)	299	407	636	306	396		481	2737		394	1774	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.39	0.02	0.77	0.01	0.09		0.90	0.23		0.12	0.91	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

Intersection Signal Delay: 32.6

Intersection LOS: C

Intersection Capacity Utilization 88.6%

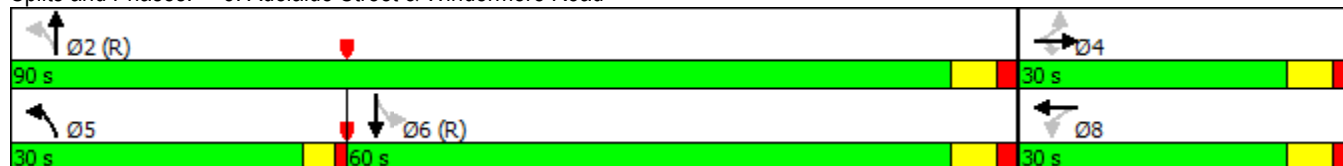
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Adelaide Street & Windermere Road



HCM Unsignalized Intersection Capacity Analysis

6: Site Access & Adelaide Street

2021 Total Traffic
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	24	975	17	0	1671
Future Volume (Veh/h)	0	24	975	17	0	1671
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	26	1060	18	0	1816
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	1674	539			1078	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1674	539			1078	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	95			100	
cM capacity (veh/h)	86	487			643	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	26	707	371	605	605	605
Volume Left	0	0	0	0	0	0
Volume Right	26	0	18	0	0	0
cSH	487	1700	1700	1700	1700	1700
Volume to Capacity	0.05	0.42	0.22	0.36	0.36	0.36
Queue Length 95th (m)	1.3	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	12.8	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	12.8	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			37.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: Site Access & Windermere Road

2021 Total Traffic
AM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	33	36	0	37	16	0
Future Volume (Veh/h)	33	36	0	37	16	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	39	0	40	17	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)	55					
pX, platoon unblocked			0.99		0.99	0.99
vC, conflicting volume			75		96	56
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			68		88	48
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		98	100
cM capacity (veh/h)			1526		908	1016
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	75	40	17			
Volume Left	0	0	17			
Volume Right	39	0	0			
cSH	1700	1526	908			
Volume to Capacity	0.04	0.00	0.02			
Queue Length 95th (m)	0.0	0.0	0.4			
Control Delay (s)	0.0	0.0	9.0			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization			13.9%	ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings

3: Adelaide Street & Windermere Road

2021 Total Traffic
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	329	24	483	27	11	29	454	1364	30	42	849	155
Future Volume (vph)	329	24	483	27	11	29	454	1364	30	42	849	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	100.0		100.0	40.0		0.0	150.0		0.0	55.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.891			0.997			0.977	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1789	1883	1601	1789	1678	0	1789	3568	0	1789	3496	0
Flt Permitted	0.728			0.740			0.087			0.171		
Satd. Flow (perm)	1371	1883	1601	1394	1678	0	164	3568	0	322	3496	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			494		32			4			19	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		348.7			55.1			82.3			198.6	
Travel Time (s)		20.9			3.3			4.9			11.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	358	26	525	29	12	32	493	1483	33	46	923	168
Shared Lane Traffic (%)												
Lane Group Flow (vph)	358	26	525	29	44	0	493	1516	0	46	1091	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)		4.8			4.8			4.8			4.8	
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
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	30.0	30.0		11.0	30.0		30.0	30.0	
Total Split (s)	39.0	39.0	39.0	39.0	39.0		35.0	81.0		46.0	46.0	
Total Split (%)	32.5%	32.5%	32.5%	32.5%	32.5%		29.2%	67.5%		38.3%	38.3%	
Maximum Green (s)	33.0	33.0	33.0	33.0	33.0		31.0	75.0		40.0	40.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		0.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
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	None		None	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0			7.0		7.0	7.0	

Lanes, Volumes, Timings
3: Adelaide Street & Windermere Road

2021 Total Traffic
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Flash Dont Walk (s)	16.0	16.0	16.0	16.0	16.0			16.0		13.0	13.0	
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	
Act Effect Green (s)	34.1	34.1	34.1	34.1	34.1		77.9	77.9		43.9	43.9	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28		0.65	0.65		0.37	0.37	
v/c Ratio	0.92	0.05	0.65	0.07	0.09		0.96	0.65		0.39	0.85	
Control Delay	71.4	31.0	8.3	31.5	14.5		65.4	14.7		42.1	42.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	71.4	31.0	8.3	31.5	14.5		65.4	14.7		42.1	42.3	
LOS	E	C	A	C	B		E	B		D	D	
Approach Delay		33.8			21.3			27.1			42.3	
Approach LOS		C			C			C			D	
Queue Length 50th (m)	80.8	4.4	5.3	5.0	2.0		97.3	108.0		8.2	124.4	
Queue Length 95th (m)	#134.8	11.3	35.9	12.3	10.7		#162.0	130.2		20.8	#156.1	
Internal Link Dist (m)		324.7			31.1			58.3			174.6	
Turn Bay Length (m)	100.0		100.0	40.0			150.0			55.0		
Base Capacity (vph)	399	549	816	406	512		526	2316		117	1289	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.90	0.05	0.64	0.07	0.09		0.94	0.65		0.39	0.85	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 32.7

Intersection LOS: C

Intersection Capacity Utilization 88.5%

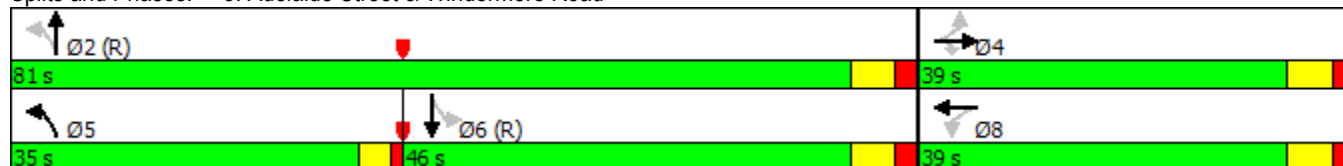
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Adelaide Street & Windermere Road



HCM Unsignalized Intersection Capacity Analysis

6: Site Access & Adelaide Street

2021 Total Traffic
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	38	1847	32	0	1358
Future Volume (Veh/h)	0	38	1847	32	0	1358
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	41	2008	35	0	1476
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh						
Upstream signal (m)						82
pX, platoon unblocked						
vC, conflicting volume	2518	1022			2043	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2518	1022			2043	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	82			100	
cM capacity (veh/h)	23	234			272	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	41	1339	704	492	492	492
Volume Left	0	0	0	0	0	0
Volume Right	41	0	35	0	0	0
cSH	234	1700	1700	1700	1700	1700
Volume to Capacity	0.18	0.79	0.41	0.29	0.29	0.29
Queue Length 95th (m)	4.7	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	23.7	0.0	0.0	0.0	0.0	0.0
Lane LOS	C					
Approach Delay (s)	23.7	0.0		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			62.1%		ICU Level of Service	B
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

10: Site Access & Windermere Road

2021 Total Traffic
PM Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	64	32	1	67	38	0
Future Volume (Veh/h)	64	32	1	67	38	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	35	1	73	41	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)	55					
pX, platoon unblocked			0.99		0.99	0.99
vC, conflicting volume			105		162	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			86		144	68
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1490		836	982
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	105	74	41			
Volume Left	0	1	41			
Volume Right	35	0	0			
cSH	1700	1490	836			
Volume to Capacity	0.06	0.00	0.05			
Queue Length 95th (m)	0.0	0.0	1.2			
Control Delay (s)	0.0	0.1	9.5			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.1	9.5			
Approach LOS			A			
Intersection Summary						
Average Delay			1.8			
Intersection Capacity Utilization			15.3%	ICU Level of Service		A
Analysis Period (min)			15			

City of London
Transportation Impact Assessment

CERTIFICATE OF OWNERSHIP

Development Name/Reference: York Developments, 1310 Adelaide Street

Company or Firm: BT Engineering Inc.

Original Submission or Addendum:

Original Report Name: 1310 Adelaide Street - Transportation Impact Study

I hereby certify that the attached document has been prepared accurately and to the best of my knowledge. The assumptions and analysis contained herein have been formulated using sound transportation planning and traffic operations methodologies.

Individual accepting corporate responsibility:

Name: Stephen Brook

Signature: S Brook

Project Manager (if different than above):

Name: _____

Other Individuals involved in the preparation of the assessment and can be contact regarding study content:

Name: Katherine Scott

Name: _____

Engineer's Stamp

