

MEMORANDUM

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Ref: **Blessington Road Development Traffic Impact Study Addendum** File: **220049**

To address MTO's comments regarding site truck traffic impacts at the intersection of Blessington Road and Highway 37, we have re-assessed the ultimate 2035 total traffic conditions considering the increased truck percentages and to reflect the actual signal timing recently provided by MTO. The updated 2035 truck percentages are illustrated in Figure 15. A summary of the assessment is provided in Table 1. The corresponding worksheets are attached.

Table 1: INTERSECTION OPERATIONS - 2035 TOTAL TRAFFIC VOLUMES

INTERSECTION		CONTROL	AM PEAK HOUR			PM PEAK HOUR		
			Delay(s)	LOS	v/c	Delay(s)	LOS	v/c
Highway 37 & Blessington Rd / Cannifton Rd	all	signal	11.8	B		10.5	B	
	EB		20.2	C	0.12	21.5	C	0.33
	WB		22.6	C	0.44	21.0	C	0.23
	NBL		12.9	B	0.02	7.9	A	0.01
	NBT		6.3	A	0.19	9.8	A	0.56
	NBR		5.5	A	0.06	6.0	A	0.15
	SBL		6.6	A	0.00	11.5	B	0.03
	SBT		11.0	B	0.63	7.2	A	0.32
	SBR		5.4	A	0.05	5.3	A	0.02
Blessington Rd & main site access	NB	stop	10.8	B	0.01	11.4	B	0.03
	WBL	free	8.3	A	0.00	0	A	-

Despite the increase in truck percentages, both intersections will operate acceptably with an overall level of service B. Level of service C will be provided on the eastbound and westbound approaches of the intersection of Highway 37 with Blessington Road.

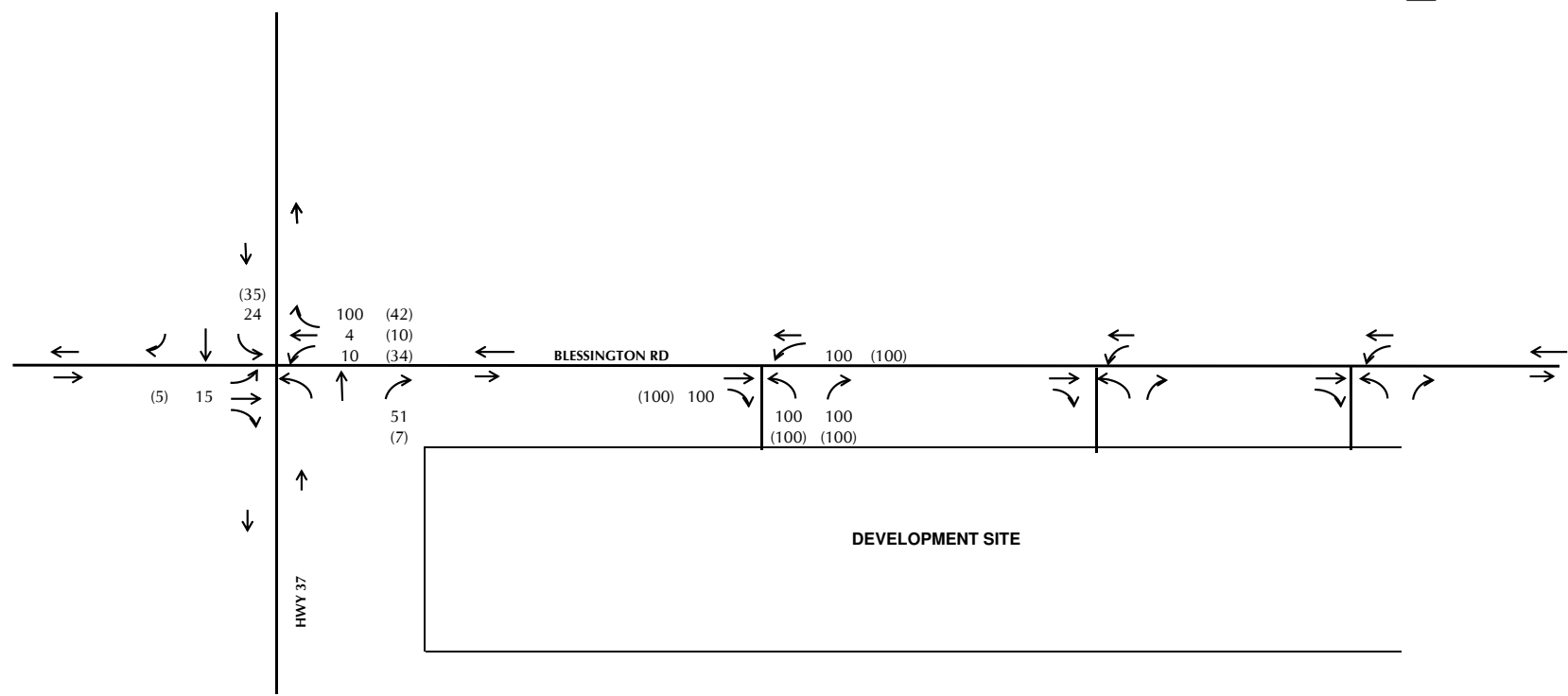
The 95th percentile queue lengths were also reviewed for the 2035 total conditions. The 95th percentile queues averaged from five SimTraffic runs are presented in Table 2. Each SimTraffic run was for duration of 60 minutes with 15 minutes of seeding time.

Table 2: 2035 95th PERCENTILE QUEUE LENGTHS & STORAGE LENGTHS

INTERSECTION	TURN LANE	95 th PERCENTILE QUEUE (m)		STORAGE LANE LENGTH (m)	
		AM	PM	EX./PROP.	RECOMMENDED
Highway 37 & Blessington Rd / Cannifton Rd	WB	35.5	27.0	120	As existing
	NBL	6.1	5.4	80	As existing
	NBR	13.9	17.4	70	As existing
	SBL	4.3	9.2	80	As existing
	SBR	9.8	5.6	80	As existing
Blessington Rd & main site access	NB	12.8	20.6	20	As proposed

As indicated in Table 2, all of the existing and proposed spaces can accommodate future 2035 queue lengths 95 percent of the time.

The re-assessment confirms that the existing intersection of Blessington Road with Highway 37 can accommodate the site traffic volumes and background general growth to the 2035 horizon. No improvements to the existing road and intersection geometry and controls and signal timing are required.



100 (100) AM (PM) Peak Hour





















Figure 15
Updated 2035 Truck Percentages
Blessington Road Development Traffic Impact Study
City of Belleville



HCM 2010 Signalized Intersection Summary

3: Hwy 37 & Connifton Rd/Blessington Rd

01/14/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	11	5	108	34	1	8	168	33	3	595	43
Future Volume (veh/h)	25	11	5	108	34	1	8	168	33	3	595	43
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1724	1900	1900	1741	1900	1900	1652	1258	1532	1792	1792
Adj Flow Rate, veh/h	27	12	5	117	37	1	9	183	36	3	647	47
Adj No. of Lanes	0	1	0	0	1	0	1	1	1	1	1	1
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
Percent Heavy Veh, %	10	15	0	10	4	100	0	15	51	24	6	6
Cap, veh/h	240	94	30	279	73	2	380	946	613	622	1027	873
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.57	0.57	0.57	0.57	0.57	0.57
Sat Flow, veh/h	811	555	175	988	430	9	762	1652	1070	952	1792	1524
Grp Volume(v), veh/h	44	0	0	155	0	0	9	183	36	3	647	47
Grp Sat Flow(s),veh/h/ln	1541	0	0	1427	0	0	762	1652	1070	952	1792	1524
Q Serve(g_s), s	0.0	0.0	0.0	4.3	0.0	0.0	0.5	3.0	0.8	0.1	13.6	0.8
Cycle Q Clear(g_c), s	1.3	0.0	0.0	5.6	0.0	0.0	14.1	3.0	0.8	3.1	13.6	0.8
Prop In Lane	0.61		0.11	0.75		0.01	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	363	0	0	353	0	0	380	946	613	622	1027	873
V/C Ratio(X)	0.12	0.00	0.00	0.44	0.00	0.00	0.02	0.19	0.06	0.00	0.63	0.05
Avail Cap(c_a), veh/h	815	0	0	804	0	0	380	946	613	622	1027	873
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	0.0	0.0	21.7	0.0	0.0	12.8	5.8	5.3	6.5	8.1	5.3
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.9	0.0	0.0	0.1	0.5	0.2	0.0	2.9	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.0	2.3	0.0	0.0	0.1	1.5	0.3	0.0	7.5	0.3
LnGrp Delay(d),s/veh	20.2	0.0	0.0	22.6	0.0	0.0	12.9	6.3	5.5	6.6	11.0	5.4
LnGrp LOS	C			C			B	A	A	A	B	A
Approach Vol, veh/h		44			155			228			697	
Approach Delay, s/veh		20.2			22.6			6.4			10.6	
Approach LOS		C			C			A			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.6		17.0		39.6		17.0				
Change Period (Y+Rc), s		* 7.2		7.4		* 7.2		7.4				
Max Green Setting (Gmax), s		* 32		28.0		* 32		28.0				
Max Q Clear Time (g_c+I1), s		16.1		3.3		15.6		7.6				
Green Ext Time (p_c), s		3.2		0.4		11.0		1.9				
Intersection Summary												
HCM 2010 Ctrl Delay				11.8								
HCM 2010 LOS				B								
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	32	14	1	131	5	0
Future Vol, veh/h	32	14	1	131	5	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	100	100	100	100	100	100
Mvmt Flow	35	15	1	142	5	0





















Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	50	0	187 43
Stage 1	-	-	-	-	43 -
Stage 2	-	-	-	-	144 -
Critical Hdwy	-	-	5.1	-	7.4 7.2
Critical Hdwy Stg 1	-	-	-	-	6.4 -
Critical Hdwy Stg 2	-	-	-	-	6.4 -
Follow-up Hdwy	-	-	3.1	-	4.4 4.2
Pot Cap-1 Maneuver	-	-	1105	-	623 806
Stage 1	-	-	-	-	778 -
Stage 2	-	-	-	-	691 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1105	-	622 806
Mov Cap-2 Maneuver	-	-	-	-	622 -
Stage 1	-	-	-	-	778 -
Stage 2	-	-	-	-	690 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	622	-	-	1105	-
HCM Lane V/C Ratio	0.009	-	-	0.001	-
HCM Control Delay (s)	10.8	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

HCM 2010 Signalized Intersection Summary
 3: Hwy 37 & Connifton Rd/Blessington Rd

01/14/2021

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	47	5	46	19	4	7	527	119	8	295	17
Future Volume (veh/h)	62	47	5	46	19	4	7	527	119	8	295	17
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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 Sat Flow, veh/h/ln	1900	1842	1900	1900	1488	1900	1624	1792	1776	1407	1743	1900
Adj Flow Rate, veh/h	67	51	5	50	21	4	8	573	129	9	321	18
Adj No. of Lanes	0	1	0	0	1	0	1	1	1	1	1	1
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
Percent Heavy Veh, %	2	5	0	34	10	42	17	6	7	35	9	0
Cap, veh/h	218	142	11	233	78	12	558	1027	865	336	999	925
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.57	0.57	0.57	0.57	0.57	0.57
Sat Flow, veh/h	708	839	66	749	460	68	904	1792	1509	560	1743	1615
Grp Volume(v), veh/h	123	0	0	75	0	0	8	573	129	9	321	18
Grp Sat Flow(s),veh/h/ln	1612	0	0	1277	0	0	904	1792	1509	560	1743	1615
Q Serve(g_s), s	1.0	0.0	0.0	0.0	0.0	0.0	0.3	11.3	2.3	0.6	5.5	0.3
Cycle Q Clear(g_c), s	3.6	0.0	0.0	2.6	0.0	0.0	5.7	11.3	2.3	11.9	5.5	0.3
Prop In Lane	0.54		0.04	0.67		0.05	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	371	0	0	322	0	0	558	1027	865	336	999	925
V/C Ratio(X)	0.33	0.00	0.00	0.23	0.00	0.00	0.01	0.56	0.15	0.03	0.32	0.02
Avail Cap(c_a), veh/h	872	0	0	704	0	0	558	1027	865	336	999	925
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.0	0.0	0.0	20.6	0.0	0.0	7.8	7.6	5.6	11.3	6.3	5.2
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.4	0.0	0.0	0.0	2.2	0.4	0.1	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	0.0	1.1	0.0	0.0	0.1	6.2	1.0	0.1	2.8	0.1
LnGrp Delay(d),s/veh	21.5	0.0	0.0	21.0	0.0	0.0	7.9	9.8	6.0	11.5	7.2	5.3
LnGrp LOS	C			C			A	A	A	B	A	A
Approach Vol, veh/h		123			75			710			348	
Approach Delay, s/veh		21.5			21.0			9.1			7.2	
Approach LOS		C			C			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.6		17.0		39.6		17.0				
Change Period (Y+Rc), s		* 7.2		7.4		* 7.2		7.4				
Max Green Setting (Gmax), s		* 32		28.0		* 32		28.0				
Max Q Clear Time (g_c+I1), s		13.3		5.6		13.9		4.6				
Green Ext Time (p_c), s		11.5		1.5		5.9		0.8				
Intersection Summary												
HCM 2010 Ctrl Delay			10.5									
HCM 2010 LOS			B									
Notes												

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	166	8	0	53	16	1
Future Vol, veh/h	166	8	0	53	16	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	100	100	100	100	100	100
Mvmt Flow	180	9	0	58	17	1

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	189	0	243
Stage 1	-	-	-	-	185
Stage 2	-	-	-	-	58
Critical Hdwy	-	-	5.1	-	7.4
Critical Hdwy Stg 1	-	-	-	-	6.4
Critical Hdwy Stg 2	-	-	-	-	6.4
Follow-up Hdwy	-	-	3.1	-	4.4
Pot Cap-1 Maneuver	-	-	963	-	574
Stage 1	-	-	-	-	658
Stage 2	-	-	-	-	764
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	963	-	574
Mov Cap-2 Maneuver	-	-	-	-	574
Stage 1	-	-	-	-	658
Stage 2	-	-	-	-	764

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	578	-	-	963	-
HCM Lane V/C Ratio	0.032	-	-	-	-
HCM Control Delay (s)	11.4	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection: 3: Hwy 37 & Connifton Rd/Blessington Rd

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	R	L	T	R
Maximum Queue (m)	21.5	43.6	8.6	27.2	18.2	8.4	82.5	14.3
Average Queue (m)	5.5	17.9	1.3	11.4	3.8	0.6	32.1	2.8
95th Queue (m)	15.1	35.5	6.1	23.5	13.9	4.3	60.0	9.8
Link Distance (m)	82.5	127.3		197.8			205.7	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0		70.0	70.0		70.0
Storage Blk Time (%)							0	
Queuing Penalty (veh)							0	

Intersection: 6: Main site access & Blessington Rd

Movement	WB	NB
Directions Served	LT	LR
Maximum Queue (m)	5.8	20.2
Average Queue (m)	0.2	2.5
95th Queue (m)	4.1	12.8
Link Distance (m)	282.2	92.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 3: Hwy 37 & Connifton Rd/Blessington Rd

Movement	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LTR	LTR	L	T	R	L	T	R
Maximum Queue (m)	32.2	33.3	9.5	66.4	26.5	13.8	42.9	8.4
Average Queue (m)	12.9	12.1	0.8	27.5	7.1	2.1	17.6	1.1
95th Queue (m)	25.4	27.0	5.4	51.9	17.4	9.2	34.4	5.6
Link Distance (m)	82.5	127.5		197.8			206.0	
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)			80.0		70.0	70.0		70.0
Storage Blk Time (%)				0				
Queuing Penalty (veh)				0				

Intersection: 6: Main site access & Blessington Rd

Movement	EB	NB
Directions Served	TR	LR
Maximum Queue (m)	3.0	21.7
Average Queue (m)	0.1	6.9
95th Queue (m)	2.1	20.6
Link Distance (m)	127.5	70.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0
