

17. ALTERNATIVE HAUL ROUTE 4

17.1 Quarry Trip Assignment and Distribution

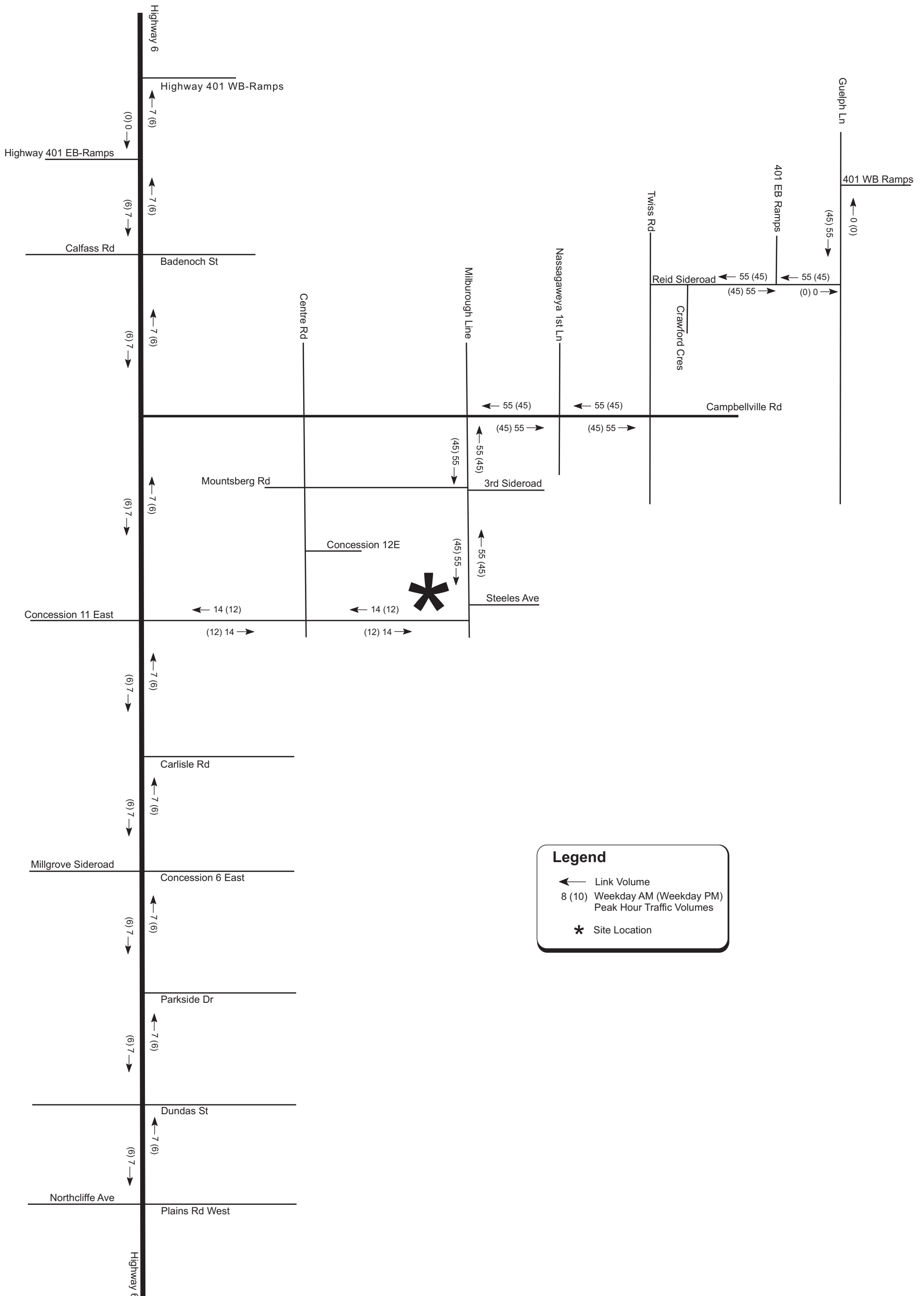
Alternative Haul Route 4 essentially combines Alternative Haul Routes 1 and 3. The trucks accessing the proposed quarry are assumed to use a combination of Concession 11 East, Highway 6, as well as Milborough Townline, Campbellville Road, Twiss Road, Reid Sideroad and Guelph Line north to access the quarry. The truck traffic volumes for this route are shown in **Exhibit 17-1**.

17.2 Assumed Road Network Alterations

For this alternative we have assumed the following intersection alterations:

Highway 6 / Concession 11 E	<ul style="list-style-type: none"> ▪ Signalization ▪ Exclusive westbound left-turn lane ▪ Exclusive westbound right-turn lane
Campbellville Road / Milborough Road	<ul style="list-style-type: none"> ▪ Exclusive westbound left-turn lane ▪ Exclusive northbound right-turn lane
Campbellville Road / Twiss Road	<ul style="list-style-type: none"> ▪ Exclusive eastbound left-turn lane ▪ Exclusive southbound right-turn lane
Guelph Line / Reid Sideroad	<ul style="list-style-type: none"> ▪ Exclusive southbound right-turn

The intersection lane configurations are also summarized in **Exhibit 17-2**.



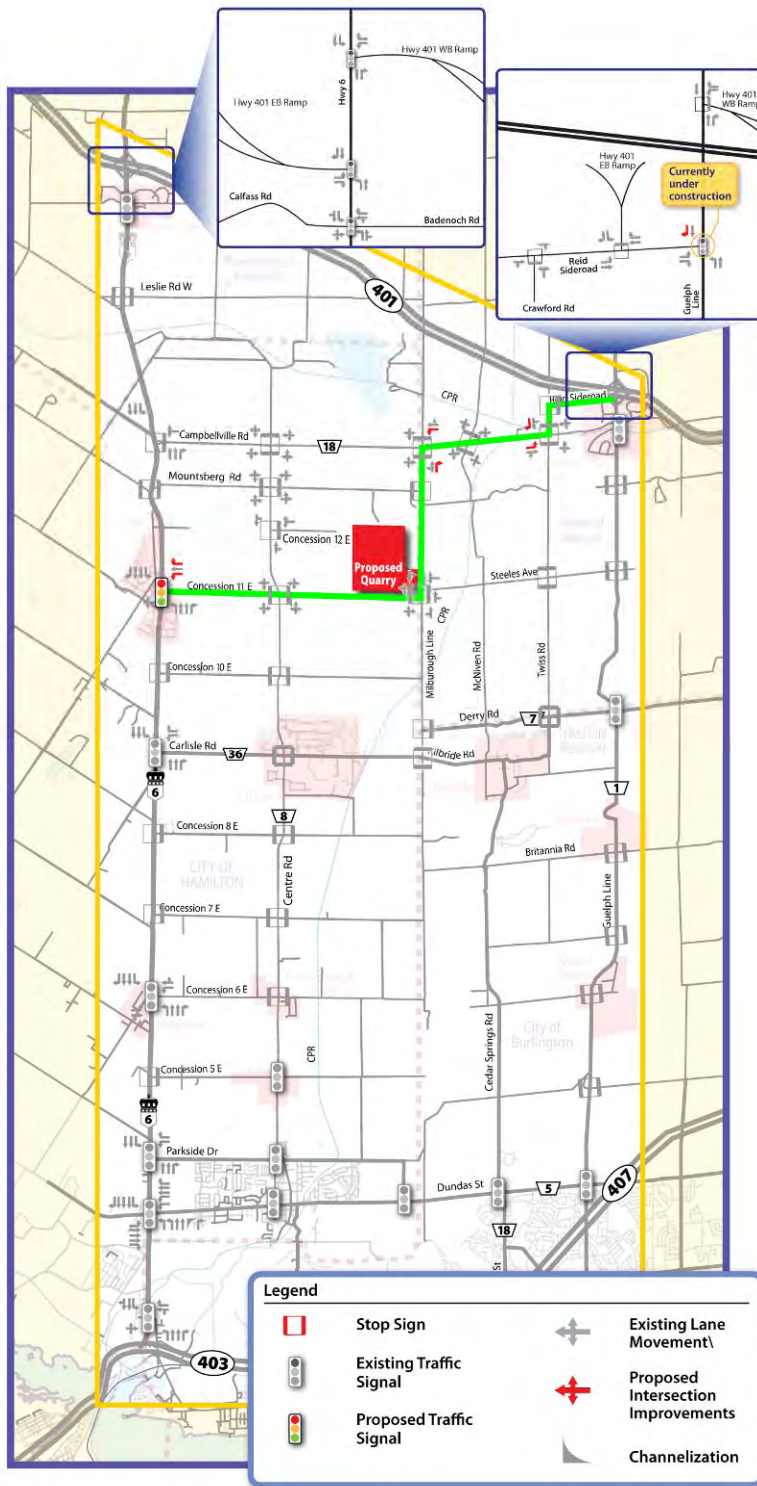


Exhibit 17-2: Alternative 4 Intersection Lane Configurations

17.3 Alternative Haul Route Total Future Conditions

17.3.1 Total Future Traffic Volumes

The site traffic volumes and the background traffic volumes were added together to create the total traffic average link volumes for Alternative 4, the 2021 total are shown in **Exhibit 17-3** and 2031 total are shown in **Exhibit 17-4**.

17.3.2 Analysis of Future Conditions

17.3.2.1 Level of Service Total Future Conditions – 2021

The intersection operations for the 2021 total traffic volumes at traffic signals are summarized in **Table 17-1**. Detailed summaries of the analyses can be found in **Appendix H**. The truck percentages were calculated to reflect the increase in trucks due to the proposed quarry. In order to calculate the truck percentages, the existing truck percentages were carried forward to the background traffic and then the site trucks were added. All intersection signal timings were optimized.

Table 17-1: Signalized Intersections - 2021 Total Traffic-Alternative 4

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Highway 401 WB Ramps				
Overall	A		B	
Westbound Left-turn	D	0.43	E	0.79
Westbound Right-turn	A	0.30	A	0.49
Northbound Through	A	0.52	A	0.39
Northbound Right-turn	A	0.64	A	0.60
Southbound Left-turn	A	0.33	A	0.36
Southbound Through	B	0.91	B	0.91
Highway 6 / Highway 401 EB Ramps				
Overall	F		F	
Eastbound Left-turn	F	0.97	D	0.48
Eastbound Right-turn	F	1.24	F	1.48
Northbound Left-turn	A	0.14	C	0.15
Northbound Through	F	1.23	E	1.07
Southbound Through	D	0.87	F	1.25
Southbound Right-turn	C	0.45	C	0.30

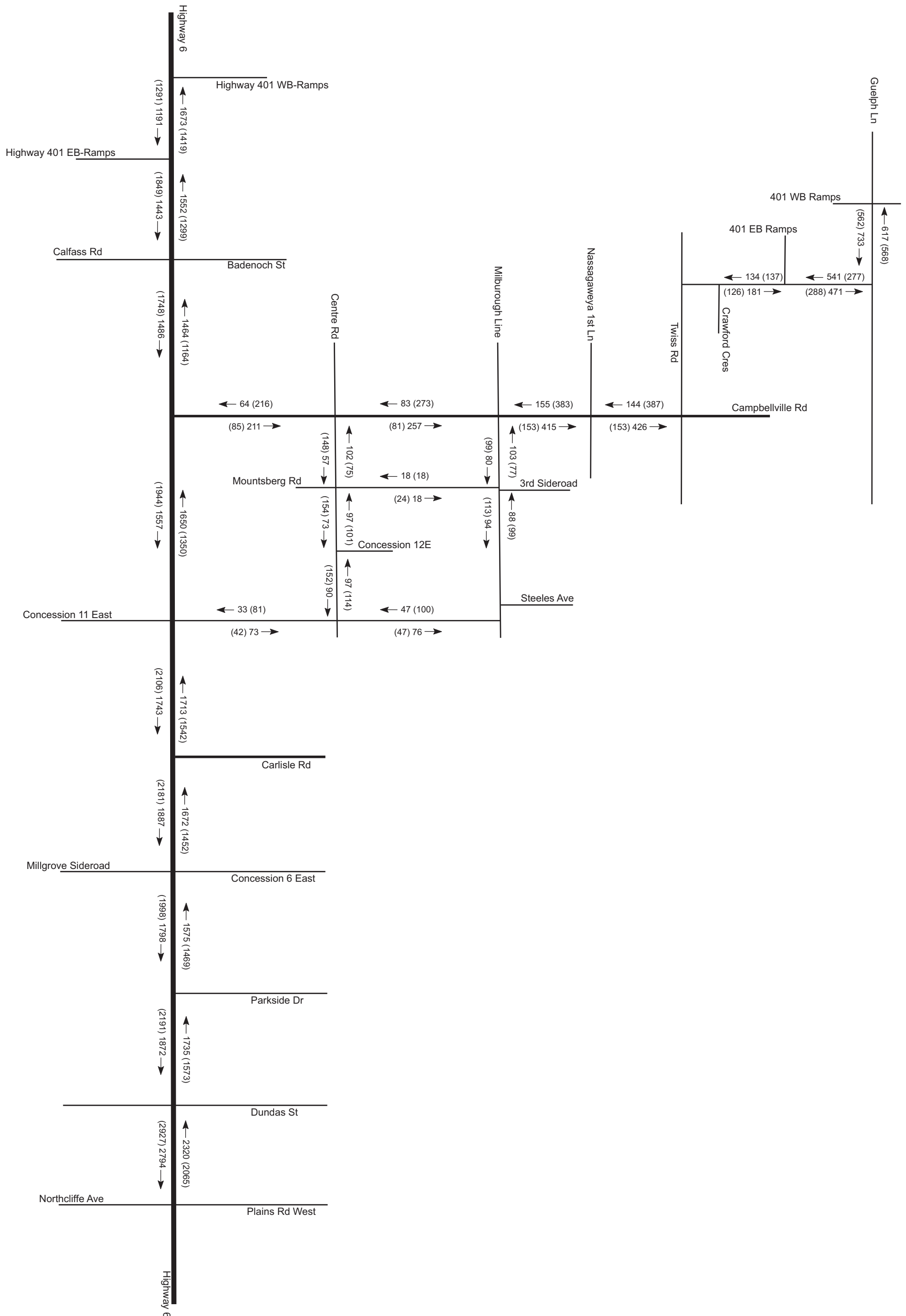
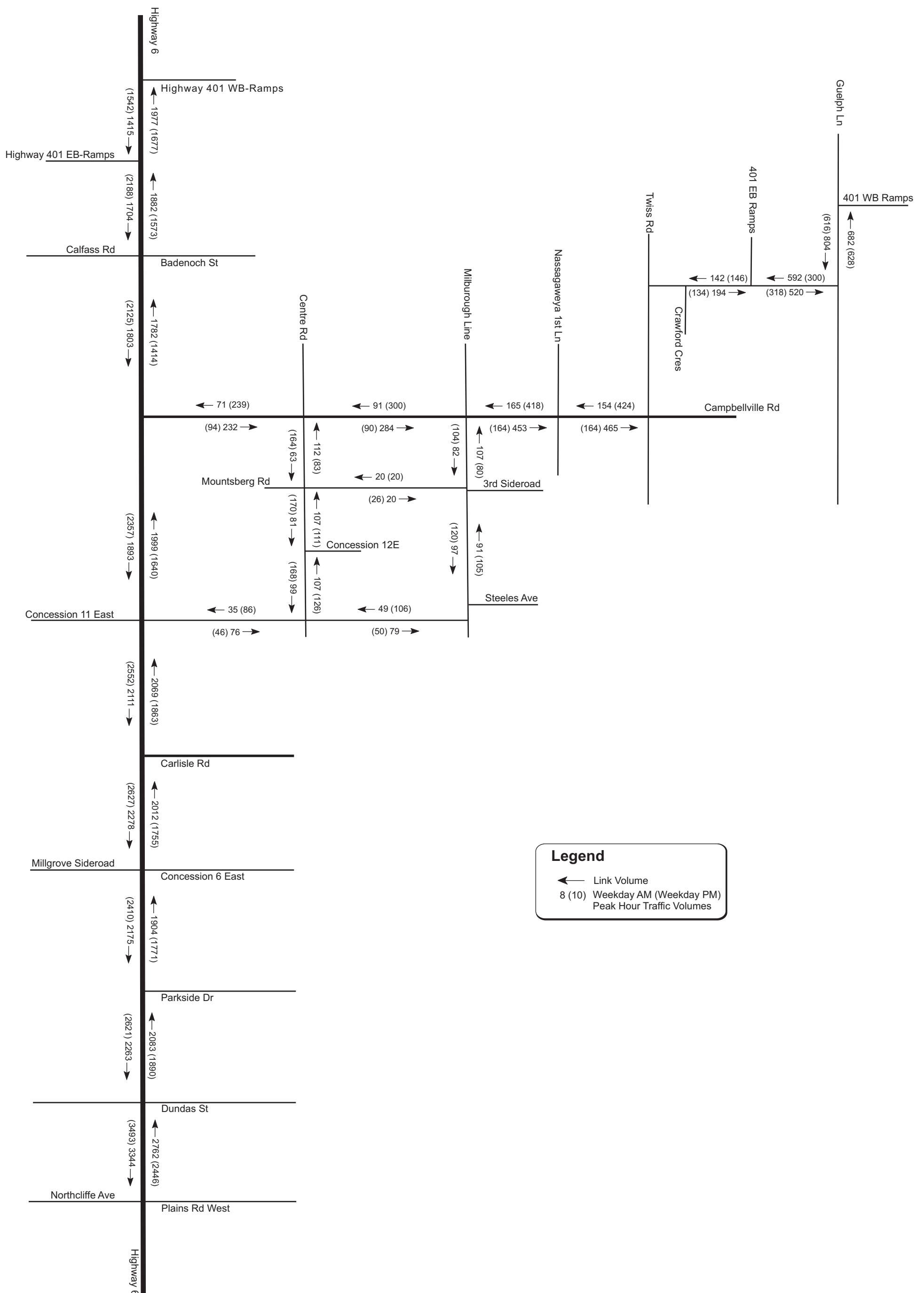


Exhibit 17-3

2021 Total Traffic Volumes - Alternative Haul Route 4



Legend

- ← Link Volume
- 8 (10) Weekday AM (Weekday PM) Peak Hour Traffic Volumes



Table 17-1: Continued

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Badenoch Street / Calfass Road				
Overall	E		F	
Eastbound Left-Through-Right	D	0.30	D	0.22
Westbound Left-Through	D	0.53	D	0.51
Westbound Right-turn	D	0.03	D	0.02
Northbound Left-turn	A	0.00	A	0.00
Northbound Through-Right	D	1.04	B	0.82
Southbound Left-turn	C	0.40	A	0.15
Southbound Through-Right	E	1.11	F	1.32
Highway 6 / Carlisle Road				
Overall	C		C	
Westbound Left-turn	C	0.72	D	0.83
Westbound Right-turn	C	0.30	C	0.28
Northbound Through	C	0.98	C	0.85
Northbound Right-turn	A	0.13	B	0.09
Southbound Left-turn	D	0.86	C	0.73
Southbound Through	B	0.83	C	1.00
Highway 6 / Concession 11E				
Overall	A		A	
Eastbound Left-Through-Right	C	0.24	D	0.31
Westbound Left-turn	C	0.17	D	0.41
Westbound Through	A	0.00	C	0.02
Westbound Right-turn	C	0.02	C	0.02
Northbound Left-turn	A	0.10	C	0.63
Northbound Through	A	0.65	A	0.58
Northbound Right-turn	A	0.04	A	0.03
Southbound Left-turn	A	0.15	A	0.08
Southbound Through	A	0.67	A	0.83
Southbound Right-turn	A	0.00	A	0.00
Reid Sideroad / Guelph Line				
Eastbound Left-turn	C	0.55	C	0.37
Eastbound Right-turn	C	0.21	C	0.13
Northbound Left-turn	A	0.02	A	0.01
Northbound Through	A	0.46	A	0.42
Southbound Through	A	0.21	A	0.24
Southbound Right-turn	A	0.38	A	0.22
Highway 6 / Concession 6E				
Overall	B		A	
Eastbound Left-turn	C	0.57	D	0.45
Eastbound Through-Right	C	0.20	C	0.09
Westbound Left-turn	C	0.23	D	0.51
Westbound Through-Right	C	0.13	C	0.26
Northbound Left-turn	A	0.01	A	0.09
Northbound Through	A	0.71	A	0.52
Northbound Right-turn	A	0.05	A	0.03
Southbound Left-turn	A	0.26	A	0.10
Southbound Through	B	0.86	A	0.81
Southbound Right-turn	A	0.05	A	0.07

Highway 6 / Parkside Drive				
Overall	B		D	
Westbound Left-turn	C	0.33	F	1.03
Westbound Right-turn	C	0.08	C	0.19
Northbound Through	B	0.80	D	0.97
Northbound Right-turn	A	0.11	B	0.08
Southbound Left-turn	D	0.84	F	1.03
Southbound Through	A	0.64	B	0.86
Highway 6 / Dundas Street				
Overall	E		F	
Eastbound Left-turn	F	0.94	F	0.89
Eastbound Through	D	0.58	C	0.35
Eastbound Right-turn	F	0.97	D	0.83
Westbound Left-turn	F	1.04	F	1.48
Westbound Through	D	0.53	D	0.86
Westbound Right-turn	D	0.07	C	0.13
Northbound Left-turn	F	1.03	F	1.33
Northbound Through	D	0.81	C	0.81
Northbound Right-turn	C	0.21	C	0.37
Southbound Left-turn	E	0.78	F	0.91
Southbound Through	F	1.07	F	1.14
Southbound Right-turn	C	0.13	C	0.17
Highway 6 / Northcliffe Avenue and Plains Road W				
Overall	F		F	
Eastbound Left-Through-Right	F	1.18	C	0.34
Westbound Left-Through	F	2.06	F	1.10
Westbound Right-turn	D	0.74	D	0.66
Northbound Left-turn	E	0.71	F	1.38
Northbound Through	F	1.17	E	1.06
Northbound Right-turn	A	0.06	B	0.12
Southbound Left-turn	F	1.10	F	1.06
Southbound Through-Right	F	1.48	F	1.56

LOS – Level of Service; v/c – volume-capacity ratio;

With the exception of Guelph Line / Reid Sideroad all intersections have individual movement volume to capacity ratios greater than 1.00. These congested movements are mainly attributed to the background traffic volumes.

The intersection operations for the 2021 total traffic volumes for unsignalized intersections are summarized in **Table 17-2**. Detailed summaries of the analyses can be found in **Appendix H**.

Table 17-2: Unsignalized Intersections - 2021 Total Traffic – Alternative 4

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Campbellville Road / Milburough Line				
Eastbound Left-Through-Right	A	0.00	A	0.00
Westbound Left-turn	A	0.09	A	0.08
Northbound Left-Through-Right	B	0.19	B	0.08
Southbound Left-Through-Right	C	0.07	B	0.04

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Campbellville Road / Nassagaweya 1st Line				
Eastbound Left-Through-Right	A	0.02	A	0.02
Westbound Left-Through-Right	A	0.01	A	0.01
Northbound Left-Through-Right	B	0.05	B	0.05
Southbound Left-Through-Right	B	0.13	B	0.13
Campbellville Road / Twiss Road				
Eastbound Left-turn	A	0.11	A	0.08
Westbound Left-Through-Right	A	0.00	A	0.01
Northbound Left-Through-Right	B	0.10	B	0.04
Southbound Left-Through	B	0.10	B	0.23
Southbound Right-turn	B	0.10	B	0.23
Reid Sideroad / Crawford Crescent				
Westbound Left-Through	A	0.01	A	0.01
Northbound Left-Right	A	0.02	B	0.04
Reid Sideroad / Highway 401 EB Ramp				
Eastbound Left-turn	B	0.20	A	0.08
Southbound Left-turn	F	1.08	C	0.42
Southbound Right-turn	A	0.02	A	0.01
Guelph Line / Highway 401 WB Ramps				
Westbound Left-turn	E	0.67	D	0.58
Westbound Right-turn	B	0.21	C	0.58
Mountsberg Road / Milborough Line				
Eastbound Left-Right	A	0.03	A	0.03
Northbound Left-Through	A	0.00	A	0.01
Concession 11E / Centre Road				
Eastbound Left-Through-Right	B	0.16	B	0.09
Westbound Left-Through-Right	B	0.10	B	0.20
Northbound Left-Through-Right	A	0.00	A	0.02
Southbound Left-Through-Right	A	0.01	A	0.00
3rd Sideroad / Milborough Townline				
Westbound Left-Right	B	0.01	A	0.02
Southbound Through-Left	A	0.00	A	0.00
Milborough Line / Site Driveway				
Eastbound Left-turn	B	0.08	B	0.07
Eastbound Right-turn	A	0.00	A	0.00
Northbound Left-turn	A	0.00	A	0.00
Concession 11E / Site Driveway				
Eastbound Left-turn	A	0.04	A	0.01
Southbound Left-turn	A	0.00	A	0.00
Southbound Right-turn	A	0.02	A	0.05

LOS – Level of Service; v/c – volume-capacity ratio;

The unsignalized intersections operate with a volume to capacity ratio of 0.67 or better during the AM and PM peak hours, with the exception of the southbound left-turn at Reid Sideroad / Highway 401 Eastbound Ramp which operates with a volume to capacity ratio of 1.08 in the AM peak hour.

17.3.2.2 Storage Total Future Conditions – 2021

The storage requirements at the intersections along Alternative Haul Route 4 were assessed based on Synchro 6 queue estimates. The available storage was compared to the 95th percentile queues for the weekday AM and PM peak hours. The results are summarized in **Table 17-3**. Detailed summaries of the analyses can be found in **Appendix H**.

Table 17-3: Intersection Queues - 2021 Total Traffic

		Weekday AM Peak Hour	Weekday PM Peak Hour
Intersection and Movements	Storage (m)	95th Queue (m)	95th Queue (m)
Highway 6 / Concession 11E			
Eastbound Left-Through-Right		15	16
Westbound Left-turn	30	9	15
Westbound Through		<7	<7
Westbound Right-turn	30	<7	<7
Northbound Left-turn	300	<7	23
Northbound Through		77	66
Northbound Right-Turn	30	<7	<7
Southbound Left-turn	275	<7	<7
Southbound Through		80	158
Southbound Right-turn	25	<7	<7
Campbellville Road / Milborough Town Line			
Eastbound Left-Through-Right		<7	<7
Westbound Left-turn	30	<7	<7
Westbound Through-Right		<7	<7
Northbound Left-Through		<7	<7
Northbound Right-turn	30	<7	<7
Southbound Left-Through-Right		<7	<7
Campbellville Road / Twiss Road			
Eastbound Left-turn	30	<7	<7
Eastbound Through-Right		<7	<7
Westbound Left-Through-Right		<7	<7
Northbound Left-Through-Right		<7	<7
Southbound Left-Through		<7	<7
Southbound Right-turn	30	<7	<7
Milborough TI / Site Driveway			
Eastbound Left-turn		<7	<7
Eastbound Right-turn		<7	<7
Northbound Left-turn	30	<7	<7
Northbound Through		<7	<7
Southbound Through		<7	<7
Southbound Right-turn	30	<7	<7
Concession 11E / Site Driveway			
Eastbound Left-turn	30	<7	<7
Eastbound Through		<7	<7
Westbound Through		<7	<7
Westbound Right-turn	30	<7	<7
Southbound Left-turn		<7	<7
Southbound Right-turn		<7	<7

The results of the queuing analysis for the intersections suggest that the storage provided at the various intersection movements is sufficient to accommodate the queues.

17.3.2.3 Recommendations Total Future Conditions – 2021

To accommodate the demands of traffic along Alternative Haul Route 4, new traffic signals are required at the intersection of Highway 6 / Concession 11 E. The analysis suggests these signals can operate effectively with an 80 second cycle length during both AM and PM peak hours.

17.3.2.4 Level of Service Total Future Conditions – 2031

The intersection operations for the 2031 total traffic volumes at traffic signals are summarized in **Table 17-4**. Detailed summaries of the analyses can be found in **Appendix H**. All intersection signal timings were optimized.

Table 17-4: Signalized Intersections - 2031 Total Traffic – Alternative 4

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Highway 401 WB Ramps				
Overall	C		C	
Westbound Left-turn	D	0.48	E	0.89
Westbound Right-turn	A	0.34	A	0.54
Northbound Through	A	0.63	A	0.47
Northbound Right-turn	A	0.70	A	0.66
Southbound Left-turn	A	0.45	A	0.46
Southbound Through	E	1.11	E	1.11
Highway 6 / Highway 401 EB Ramps				
Overall	F		F	
Eastbound Left-turn	F	0.97	D	0.54
Eastbound Right-turn	F	1.48	F	1.73
Northbound Left-turn	B	0.19	C	0.18
Northbound Through	F	1.52	F	1.30
Southbound Through	E	1.01	F	1.44
Southbound Right-turn	C	0.50	C	0.39
Highway 6 / Badenoch Street / Calfass Road				
Overall	F		F	
Eastbound Left-Through-Right	D	0.33	D	0.23
Westbound Left-Through	D	0.52	D	0.54
Westbound Right-turn	D	0.04	D	0.02
Northbound Left-turn	A	0.00	A	0.00
Northbound Through-Right	F	1.27	C	0.99
Southbound Left-turn	C	0.44	B	0.45
Southbound Through-Right	F	1.36	F	1.61

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Carlisle Road				
Overall	C		F	
Westbound Left-turn	F	1.03	D	0.86
Westbound Right-turn	D	0.47	C	0.29
Northbound Through	D	0.98	E	1.10
Northbound Right-turn	A	0.14	B	0.10
Southbound Left-turn	F	1.00	D	0.72
Southbound Through	B	0.87	F	1.25
Highway 6 / Concession 11E				
Overall	A		C	
Eastbound Left-Through-Right	D	0.35	D	0.36
Westbound Left-turn	C	0.19	D	0.43
Westbound Through	A	0.00	C	0.03
Westbound Right-turn	C	0.12	C	0.12
Northbound Left-turn	A	0.21	D	0.72
Northbound Through	A	0.79	A	0.71
Northbound Right-turn	A	0.04	A	0.03
Southbound Left-turn	B	0.28	A	0.14
Southbound Through	A	0.81	C	1.01
Southbound Right-turn	A	0.00	A	0.00
Guelph Line / Reid Sideroad				
Overall	B		A	
Eastbound Left-turn	C	0.58	C	0.40
Eastbound Right-turn	C	0.23	C	0.15
Northbound Left-turn	A	0.02	A	0.01
Northbound Through	A	0.52	A	0.47
Southbound Through	A	0.24	A	0.26
Southbound Right-turn	A	0.41	A	0.24
Highway 6 / Concession 6E				
Overall	C		C	
Eastbound Left-turn	D	0.65	C	0.42
Eastbound Through-Right	C	0.23	C	0.11
Westbound Left-turn	D	0.26	C	0.46
Westbound Through-Right	C	0.18	C	0.34
Northbound Left-turn	A	0.01	A	0.10
Northbound Through	B	0.84	A	0.66
Northbound Right-turn	A	0.05	A	0.04
Southbound Left-turn	C	0.53	A	0.17
Southbound Through	D	1.02	C	1.02
Southbound Right-turn	A	0.06	A	0.07
Highway 6 / Parkside Drive				
Overall	C		E	
Westbound Left-turn	C	0.35	F	1.19
Westbound Right-turn	C	0.09	C	0.32
Northbound Through	D	1.02	F	1.12
Northbound Right-turn	A	0.12	B	0.09
Southbound Left-turn	D	0.82	F	1.24
Southbound Through	A	0.78	D	1.02

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Dundas Street				
Overall	F		F	
Eastbound Left-turn	F	1.30	F	1.50
Eastbound Through	D	0.64	C	0.38
Eastbound Right-turn	F	1.18	E	0.95
Westbound Left-turn	F	1.33	F	1.82
Westbound Through	D	0.56	D	0.85
Westbound Right-turn	D	0.08	C	0.19
Northbound Left-turn	F	1.35	F	1.75
Northbound Through	D	0.93	D	0.99
Northbound Right-turn	C	0.26	C	0.54
Southbound Left-turn	F	0.91	F	0.98
Southbound Through	F	1.19	F	1.31
Southbound Right-turn	C	0.15	C	0.20
Highway 6 / Northcliffe Avenue and Plains Road W				
Overall	F		F	
Eastbound Left-Through-Right	F	1.19	C	0.40
Westbound Left-Through	F	1.97	F	1.21
Westbound Right-turn	D	0.76	E	0.95
Northbound Left-turn	F	0.79	F	1.71
Northbound Through	F	1.50	F	1.18
Northbound Right-turn	B	0.07	B	0.14
Southbound Left-turn	F	1.23	F	1.80
Southbound Through-Right	F	1.89	F	1.90

LOS – Level of Service; v/c – volume-capacity ratio;

With the exception of Guelph Line / Reid Sideroad all of the intersections have individual volume to capacity ratios greater than 1.0. The deficiencies in the total operations are mainly attributed to the background traffic volumes.

The intersection operations for the 2031 unsignalized intersections scenario are summarized in **Table 17-5**. Detailed summaries of the analyses can be found in **Appendix H**.

Table 17-5: Unsignalized Intersections – 2031 Total Traffic - Alternative 4

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Campbellville Road / Milborough Line				
Eastbound Left-Through-Right	A	0.00	A	0.00
Westbound Left-Through-Right	A	0.10	A	0.08
Northbound Left-Through-Right	B	0.20	B	0.09
Southbound Left-Through-Right	C	0.08	C	0.04
Campbellville Road / Nassagaweya 1st Line				
Eastbound Left-Through-Right	A	0.03	A	0.02
Westbound Left-Through-Right	A	0.01	A	0.01
Northbound Left-Through-Right	B	0.06	B	0.06
Southbound Left-Through-Right	C	0.15	B	0.15

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Campbellville Road / Twiss Road				
Eastbound Left-Through-Right	A	0.12	A	0.08
Westbound Left-Through-Right	A	0.00	A	0.02
Northbound Left-Through-Right	B	0.11	C	0.06
Southbound Left-Through-Right	B	0.10	B	0.25
Reid Sideroad / Crawford Crescent				
Westbound Left-Through	A	0.01	A	0.01
Northbound Left-Right	A	0.02	B	0.04
Reid Sideroad / Highway 401 EB Ramp				
Eastbound Left-turn	B	0.23	A	0.09
Southbound Left-turn	F	1.29	C	0.48
Southbound Right-turn	A	0.03	A	0.01
Guelph Line / Highway 401 WB Ramps				
Westbound Left-turn	F	0.82	D	0.69
Westbound Right-turn	B	0.24	C	0.66
Mountsberg Road / Milborough Line				
Eastbound Left-Right	A	0.04	A	0.03
Northbound Left-Through	A	0.00	A	0.01
Concession 11E / Centre Road				
Eastbound Left-Through-Right	B	0.17	B	0.10
Westbound Left-Through-Right	B	0.11	B	0.22
Northbound Left-Through-Right	A	0.00	A	0.03
Southbound Left-Through-Right	A	0.01	A	0.00
Milborough Line / 3rd Sideroad				
Westbound Left-Right	B	0.02	B	0.01
Southbound Left-Through	A	0.00	A	0.00
Milborough Line / Site Driveway				
Eastbound Left-turn	B	0.08	B	0.08
Eastbound Right-turn	A	0.00	A	0.00
Northbound Left-turn	A	0.00	A	0.00
Concession 11E / Site Driveway				
Eastbound Left-turn	A	0.04	A	0.01
Southbound Left-turn	A	0.00	A	0.00
Southbound Right-turn	A	0.02	A	0.05

LOS – Level of Service; v/c – volume-capacity ratio;

The unsignalized operations operate with a volume to capacity ratio of 0.82 or better during the AM and PM peak hour, with the exception of the southbound left-turn at Reid Sideroad / Highway 401 Eastbound Ramp which operates with a volume to capacity ratio of 1.29 in the AM peak hour.

17.3.2.5 Storage Total Future Conditions – 2031

The storage requirements for the intersections along Alternative Haul Route 4 were assessed based on Synchro 6 queue estimates. The available storage was compared to the 95th percentile queues for the weekday AM and PM peak hours. The results are summarized in **Table 17-6**. Detailed summaries of the analyses can be found in **Appendix H**.

Table 17-6: Intersection Queues - 2031 Total Traffic

		Weekday AM Peak Hour	Weekday PM Peak Hour
Intersection and Movements	Storage (m)	95th Queue (m)	95th Queue (m)
Highway 6 / Concession 11E			
Eastbound Left-Through-Right		18	18
Westbound Left-turn	30	10	15
Westbound Through		<7	<7
Westbound Right-turn	30	8	8
Northbound Left-turn	300	<7	26
Northbound Through		131	106
Northbound Right-Turn	30	<7	<7
Southbound Left-turn	275	<7	<7
Southbound Through		139	292
Southbound Right-turn	25	<7	<7
Campbellville Road / Milborough Town Line			
Eastbound Left-Through-Right		<7	<7
Westbound Left-turn	30	<7	<7
Westbound Through-Right		<7	<7
Northbound Left-Through		<7	<7
Northbound Right-turn	30	<7	<7
Southbound Left-Through-Right		<7	<7
Campbellville Road / Twiss Road			
Eastbound Left-turn	30	<7	<7
Eastbound Through-Right		<7	<7
Westbound Left-Through-Right		<7	<7
Northbound Left-Through-Right		<7	<7
Southbound Left-Through		<7	8
Southbound Right-turn	30	<7	8
Milborough TI / Site Driveway			
Eastbound Left-turn		<7	<7
Eastbound Right-turn		<7	<7
Northbound Left-turn	30	<7	<7
Northbound Through		<7	<7
Southbound Through		<7	<7
Southbound Right-turn	30	<7	<7
Concession 11E / Site Driveway			
Eastbound Left-turn	30	<7	<7
Eastbound Through		<7	<7
Westbound Through		<7	<7
Westbound Right-turn	30	<7	<7
Southbound Left-turn		<7	<7
Southbound Right-turn		<7	<7

The results of the queuing analysis for the intersections suggest that the storage provided at the various intersection movements is sufficient to accommodate the queues.

Recommendations Total Future Conditions – 2031

To accommodate traffic along Alternative Haul Route 4, new traffic signals are recommended at the intersection of Highway 6 / Concession 11 E. The analysis suggests these signals will operate effectively with an 80 second cycle length during both AM and PM peak hours.

18. ALTERNATIVE HAUL ROUTE 5

18.1 Quarry Trip Assignment and Distribution

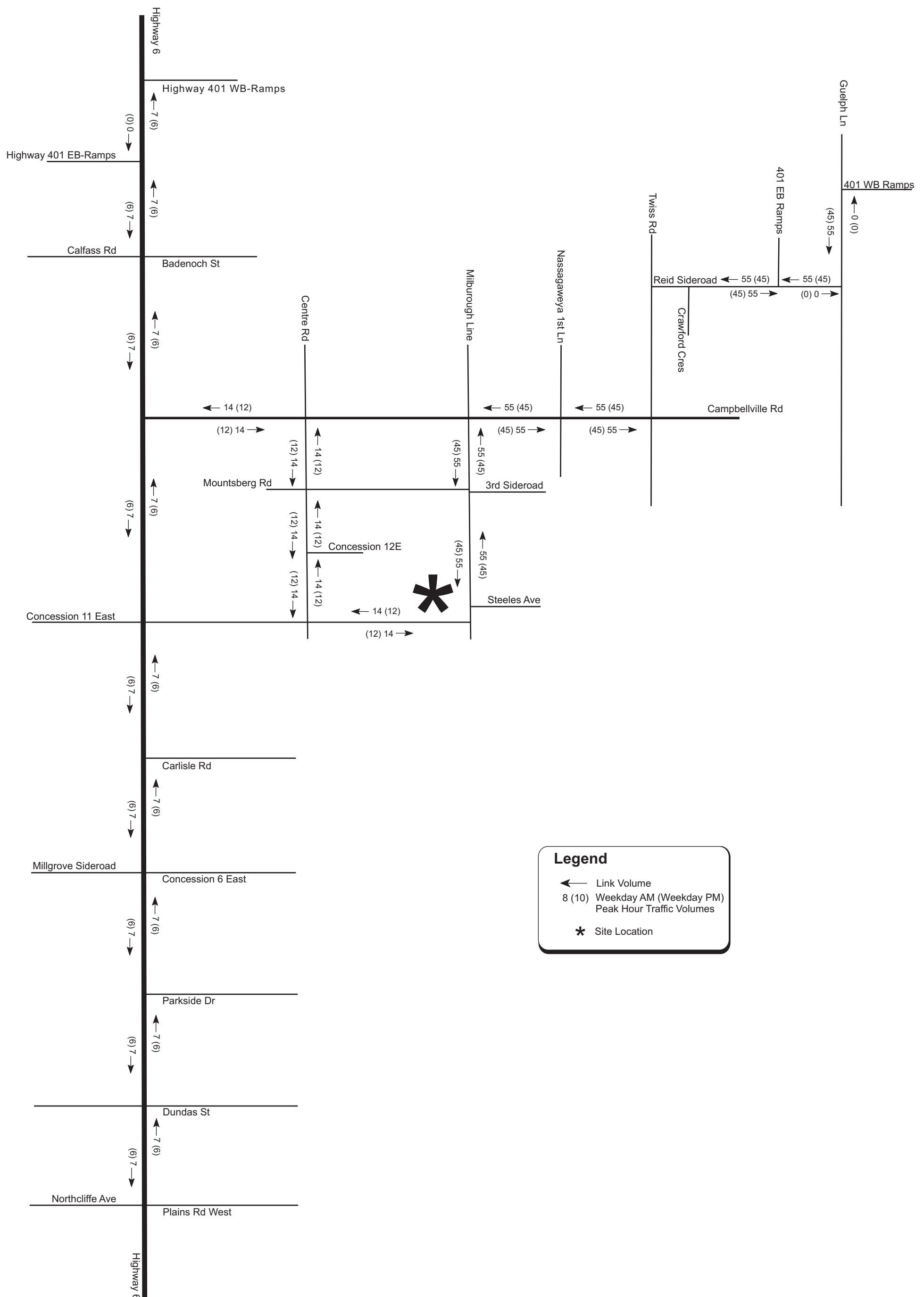
Alternative Haul Route 5 essentially combines Alternatives 2 and 3. The trucks servicing the proposed quarry are assumed to use either Concession 11 East, Centre Road, Campbellville Road, and Highway 6 or Milborough Townline, Campbellville Road, Twiss Road, Reid Sideroad and Guelph Line north as access to the quarry. The truck traffic volumes for this route are shown in **Exhibit 18-1**.

18.2 Assumed Road Network Alterations

For this alternative we have assumed the following intersection alterations:

Highway 6 / Campbellville Road	<ul style="list-style-type: none"> ▪ Signalization ▪ Exclusive westbound right-turn lane
Campbellville Road / Centre Road	<ul style="list-style-type: none"> ▪ Exclusive eastbound right-turn lane ▪ Exclusive northbound left-turn lane
Concession 11 E / Centre Road	<ul style="list-style-type: none"> ▪ Exclusive southbound left-turn ▪ Exclusive westbound right-turn
Campbellville Road / Milborough Road	<ul style="list-style-type: none"> ▪ Exclusive westbound left-turn lane ▪ Exclusive northbound right-turn lane
Campbellville Road / Twiss Road	<ul style="list-style-type: none"> ▪ Exclusive eastbound left-turn lane ▪ Exclusive southbound right-turn lane
Guelph Line / Reid Sideroad	<ul style="list-style-type: none"> ▪ Exclusive southbound right-turn

The intersection lane configurations are also summarized in **Exhibit 18-2**.



Legend

- ← Link Volume
- 8 (10) Weekday AM (Weekday PM) Peak Hour Traffic Volumes
- * Site Location



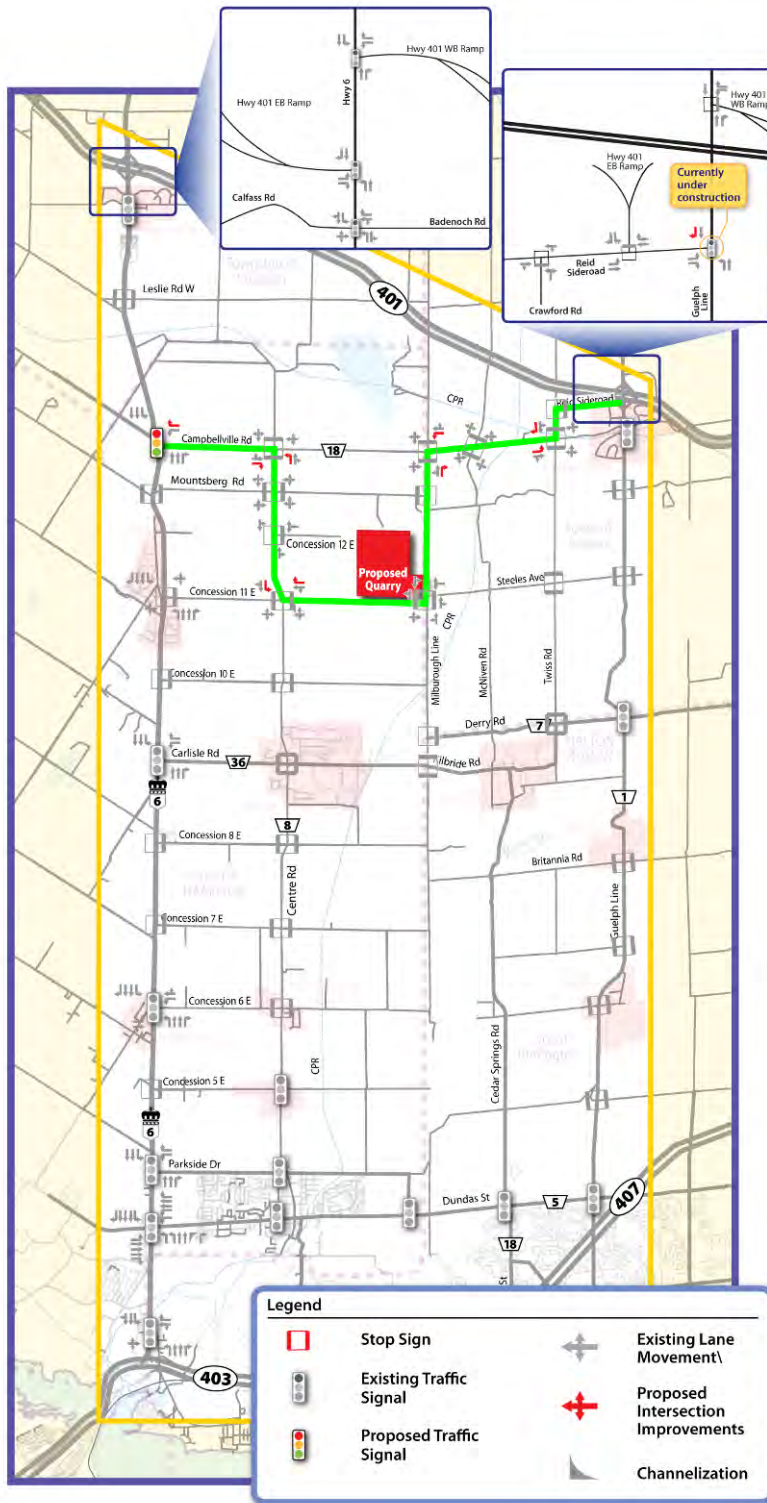


Exhibit 18-2: Alternative 5 Intersection Lane Configurations

18.3 Alternative Haul Route Total Future Conditions

18.3.1 Total Future Traffic Volumes

The site traffic volumes and the background traffic volumes were added together to create the total traffic average link volumes for Alternative 5, the 2021 total are shown in **Exhibit 18-3** and 2031 total are shown in **Exhibit 18-4**.

18.3.2 Analysis of Future Conditions

18.3.2.1 Level of Service Total Future Conditions – 2021

The intersection operations for the 2021 total traffic at signalized intersections are summarized in **Table 18-1**. Detailed summaries of the analyses can be found in **Appendix I**. The truck percentages were calculated to reflect the increase in trucks due to the quarry. In order to calculate the truck percentages, the existing truck percentages were carried forward to the background traffic and then the site trucks were added. All intersection signal timings were optimized.

Table 18-1: Signalized Intersections - 2021 Total Traffic - Alternative 5

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Highway 401 WB Ramps				
Overall	A		B	
Westbound Left-turn	D	0.43	E	0.79
Westbound Right-turn	A	0.30	A	0.49
Northbound Through	A	0.52	A	0.39
Northbound Right-turn	A	0.64	A	0.60
Southbound Left-turn	A	0.33	A	0.36
Southbound Through	B	0.91	B	0.91
Highway 6 / Highway 401 EB Ramps				
Overall	F		F	
Eastbound Left-turn	F	0.97	D	0.48
Eastbound Right-turn	F	1.24	F	1.48
Northbound Left-turn	A	0.14	C	0.15
Northbound Through	F	1.23	E	1.07
Southbound Through	D	0.87	F	1.25
Southbound Right-turn	C	0.45	C	0.30

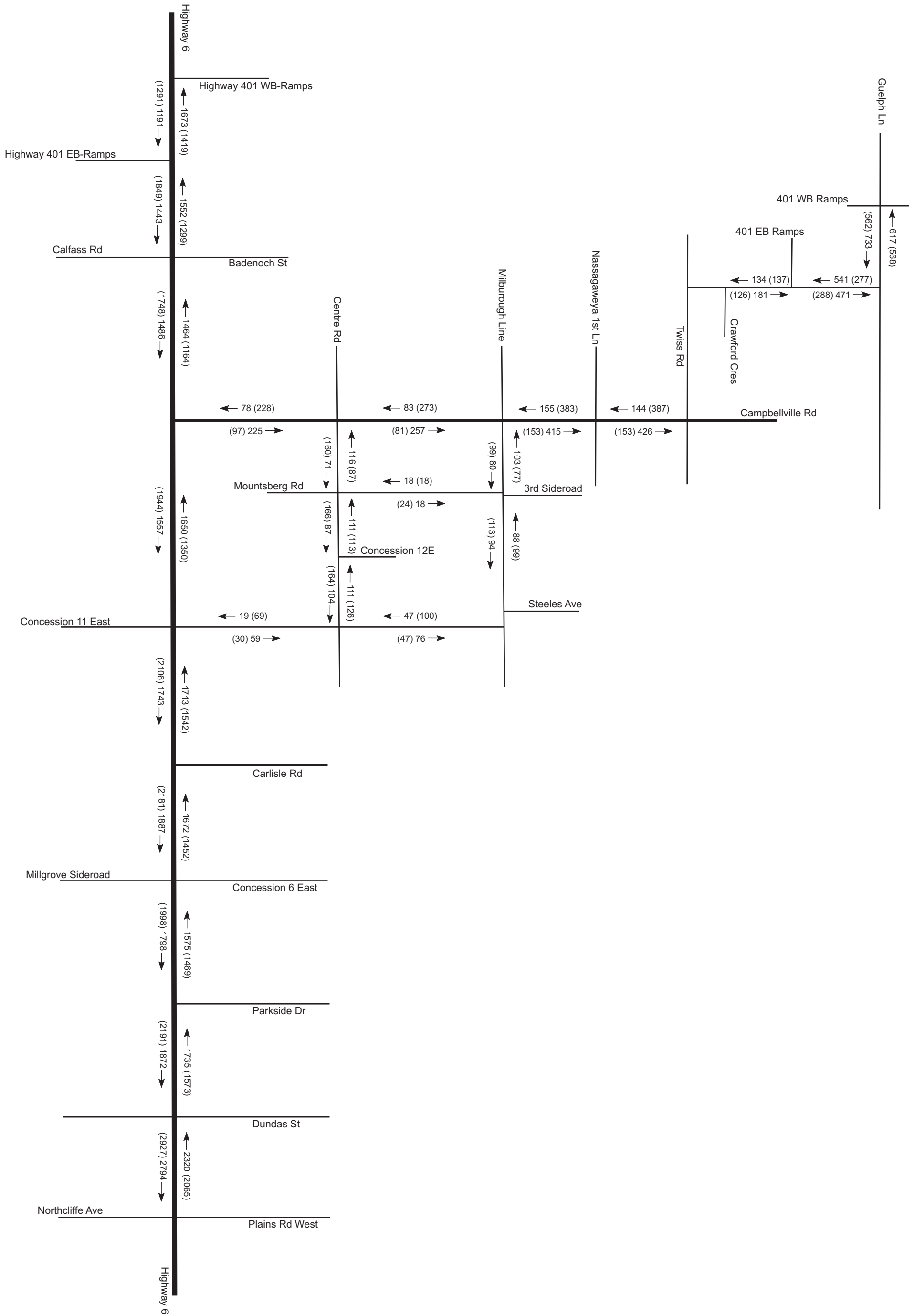


Exhibit 18-3

2021 Total Traffic Volumes - Alternative Haul Route 5

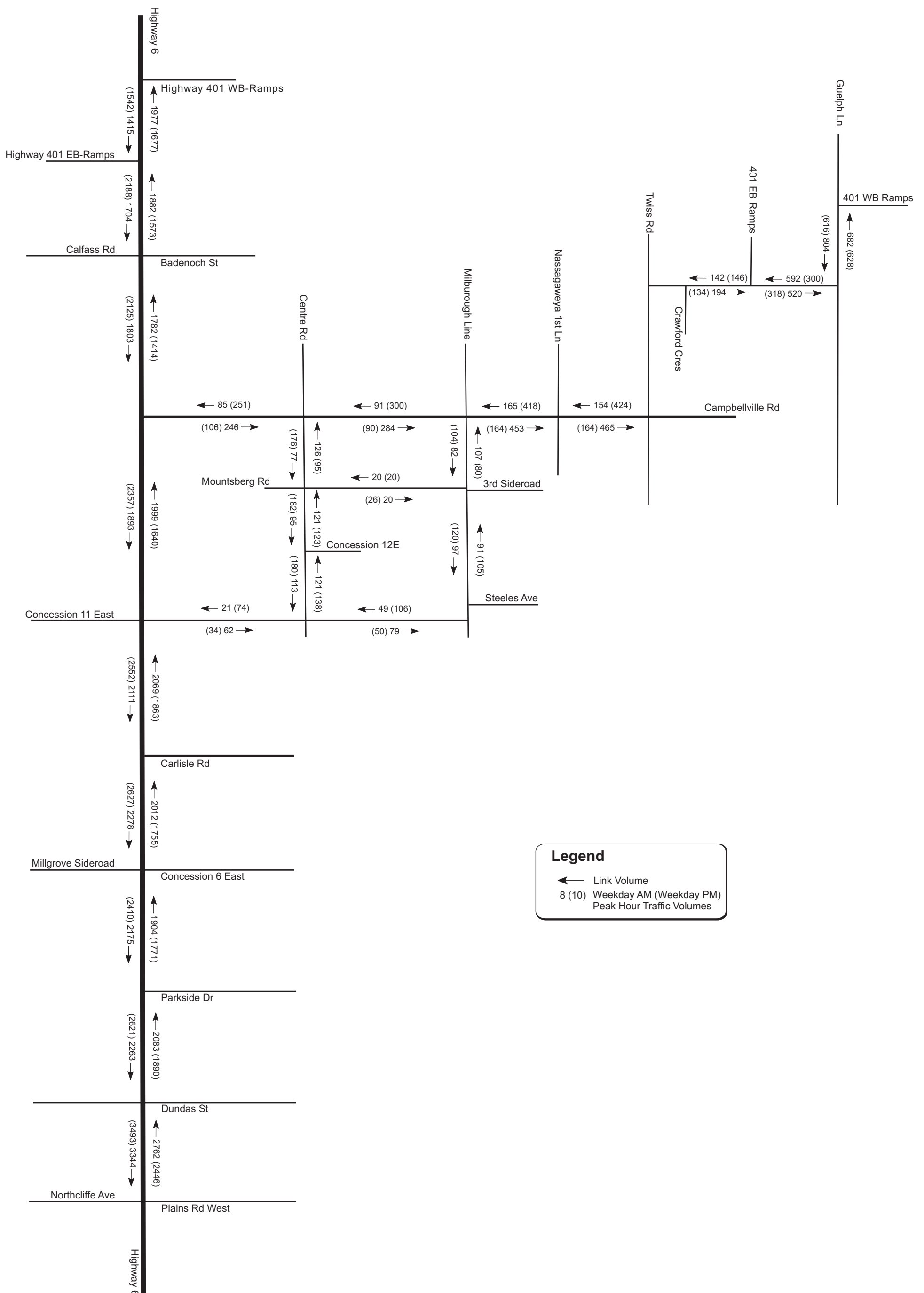


Table 18-1: Continued

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Badenoch Street / Calfass Road				
Overall	E		F	
Eastbound Left-Through-Right	D	0.30	D	0.22
Westbound Left-Through	D	0.53	D	0.51
Westbound Right-turn	D	0.03	D	0.02
Northbound Left-turn	A	0.00	A	0.00
Northbound Through-Right	D	1.04	B	0.82
Southbound Left-turn	C	0.40	A	0.15
Southbound Through-Right	E	1.11	F	1.32
Highway 6 / Carlisle Road				
Overall	C		C	
Westbound Left-turn	C	0.72	D	0.83
Westbound Right-turn	C	0.30	C	0.28
Northbound Through	C	0.98	C	0.85
Northbound Right-turn	A	0.13	B	0.09
Southbound Left-turn	D	0.86	C	0.73
Southbound Through	B	0.83	C	1.00
Highway 6 / Campbellville Road				
Overall	A		B	
Westbound Left-turn	D	0.32	D	0.69
Westbound Right-turn	D	0.03	C	0.02
Northbound Through	A	0.64	A	0.55
Northbound Right-turn	A	0.13	A	0.05
Southbound Left-turn	A	0.29	A	0.20
Southbound Through	A	0.66	B	0.73
Guelph Line / Reid Sideroad				
Overall	B		A	
Eastbound Left-turn	C	0.55	C	0.37
Eastbound Right-turn	C	0.21	C	0.13
Northbound Left-turn	A	0.02	A	0.01
Northbound Through	A	0.46	A	0.42
Southbound Through	A	0.21	A	0.24
Southbound Right-turn	A	0.38	A	0.22
Highway 6 / Concession 6E				
Overall	B		A	
Eastbound Left-turn	C	0.57	D	0.45
Eastbound Through-Right	C	0.20	C	0.09
Westbound Left-turn	C	0.23	D	0.51
Westbound Through-Right	C	0.13	C	0.26
Northbound Left-turn	A	0.01	A	0.09
Northbound Through	A	0.71	A	0.52
Northbound Right-turn	A	0.05	A	0.03
Southbound Left-turn	A	0.26	A	0.10
Southbound Through	B	0.86	A	0.81
Southbound Right-turn	A	0.05	A	0.07

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Parkside Drive				
Overall	B		D	
Westbound Left-turn	C	0.33	F	1.03
Westbound Right-turn	C	0.08	C	0.19
Northbound Through	B	0.80	D	0.97
Northbound Right-turn	A	0.11	B	0.08
Southbound Left-turn	D	0.84	F	1.03
Southbound Through	A	0.64	B	0.86
Highway 6 / Dundas Street				
Overall	E		F	
Eastbound Left-turn	F	0.94	F	0.89
Eastbound Through	D	0.58	C	0.35
Eastbound Right-turn	F	0.97	D	0.83
Westbound Left-turn	F	1.04	F	1.48
Westbound Through	D	0.53	D	0.86
Westbound Right-turn	D	0.07	C	0.13
Northbound Left-turn	F	1.03	F	1.33
Northbound Through	D	0.81	C	0.81
Northbound Right-turn	C	0.21	C	0.37
Southbound Left-turn	E	0.78	F	0.91
Southbound Through	F	1.07	F	1.14
Southbound Right-turn	C	0.13	C	0.17
Highway 6 / Northcliffe Avenue and Plains Road W				
Overall	F		F	
Eastbound Left-Through-Right	F	1.14	C	0.34
Westbound Left-Through	F	1.86	F	1.10
Westbound Right-turn	D	0.72	D	0.66
Northbound Left-turn	E	0.71	F	1.38
Northbound Through	F	1.19	E	1.06
Northbound Right-turn	B	0.06	B	0.12
Southbound Left-turn	F	1.10	F	1.06
Southbound Through-Right	F	1.50	F	1.56

LOS – Level of Service; v/c – volume-capacity ratio;

With the exception of Guelph Line / Reid Sideroad all intersections have individual movement volume to capacity ratios greater than 1.0. The deficiencies in the total operations are mainly attributed to the general growth in the background traffic volumes.

The intersection operations for the 2021 total traffic volumes for unsignalized intersections are summarized in

Table 18-2. Detailed summaries of the analyses can be found in **Appendix I.**

Table 18-2: Unsignalized Intersections - 2021 Total Traffic - Alternative 5

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Concession 11E / Highway 6				
Eastbound Left-Through-Right	F	0.57	F	1.45
Westbound Left-Through-Right	F	1.80	F	Err
Northbound Left-turn	C	0.05	D	0.25
Southbound Left-turn	B	0.03	B	0.01
Campbellville Road / Centre Road				
Eastbound Left-Through	A	0.00	A	0.00
Westbound Left-Through-Right	A	0.03	A	0.06
Northbound Left-turn	B	0.07	C	0.08
Northbound Through-Right	B	0.18	B	0.11
Southbound Left-Through-Right	B	0.11	B	0.14
Campbellville Road / Milborough Line				
Eastbound Left-Through-Right	A	0.00	A	0.00
Westbound Left-turn	A	0.09	A	0.08
Northbound Left-Through	B	0.19	B	0.08
Northbound Right-turn	B	0.19	B	0.08
Southbound Left-Through-Right	C	0.07	B	0.04
Campbellville Road / Nassagaweya 1st Line				
Eastbound Left-Through-Right	A	0.02	A	0.02
Westbound Left-Through-Right	A	0.01	A	0.01
Northbound Left-Through-Right	B	0.05	B	0.05
Southbound Left-Through-Right	B	0.13	B	0.13
Campbellville Road / Twiss Road				
Eastbound Left-turn	A	0.11	A	0.08
Westbound Left-Through-Right	A	0.00	A	0.01
Northbound Left-Through-Right	B	0.10	C	0.04
Southbound Through-left	B	0.10	B	0.23
Southbound Right-turn	B	0.10	B	0.23
Reid Sideroad / Crawford Crescent				
Westbound Left-Through	A	0.01	A	0.01
Northbound Left-Right	A	0.02	B	0.04
Reid Sideroad / Highway 401 EB Ramp				
Eastbound Left-turn	B	0.20	A	0.08
Southbound Left-turn	F	1.08	C	0.42
Southbound Right-turn	A	0.02	A	0.01
Guelph Line / Highway 401 WB Ramps				
Westbound Left-turn	E	0.67	D	0.58
Westbound Right-turn	B	0.21	C	0.58
Mountsberg Road / Centre Road				
Eastbound Left-Through-Right	A	0.03	B	0.02
Westbound Left-Through-Right	B	0.04	B	0.02
Northbound Left-Through-Right	A	0.00	A	0.01
Southbound Left-Through-Right	A	0.00	A	0.01
Mountsberg Road / Milborough Line				
Eastbound Left-Right	A	0.03	A	0.03
Northbound Left-Through	A	0.00	A	0.01

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Centre Road / Concession 12E				
Westbound Left-Right	A	0.04	B	0.01
Southbound Left-Through	A	0.00	A	0.01
Concession 11E / Centre Road				
Eastbound Left-Through-Right	B	0.13	B	0.06
Westbound Left-Through-Right	B	0.06	B	0.17
Northbound Left-Through-Right	A	0.00	A	0.02
Southbound Left-Through-Right	A	0.02	A	0.02
Milborough Line / 3rd Sideroad				
Westbound Left-Right	A	0.01	A	0.01
Southbound Left-Through	A	0.00	A	0.00
Milborough Line / Site Driveway				
Eastbound Left-turn	B	0.08	B	0.07
Eastbound Right-turn	A	0.00	A	0.00
Northbound Left-turn	A	0.00	A	0.00
Concession 11E / Site Driveway				
Eastbound Left-turn	A	0.04	A	0.01
Southbound Left-turn	A	0.00	A	0.00
Southbound Right-turn	A	0.02	A	0.05

LOS – Level of Service; v/c – volume-capacity ratio;

The unsignalized operations operate with a volume to capacity ratio of 0.72 or better during the AM and PM peak hour, with the exception of the southbound left-turn at Reid Sideroad / Highway 410 Eastbound Ramp which operates with a volume to capacity ratio of 1.11 in the AM peak hour.

18.3.2.2 Storage Total Future Conditions – 2021

The storage requirements along the Alternative Haul Route 5 were assessed based on Synchro 6 queue estimates. The available storage was compared to the 95th percentile queues for the weekday AM and PM peak hours. The results are summarized in **Table 18-3**. Detailed summaries of the analyses can be found in **Appendix I**.

Table 18-3: Intersection Queues - 2021 Total Traffic

Intersection and Movements	Storage (m)	Weekday AM Peak Hour	Weekday PM Peak Hour
		95 th Queue (m)	95 th Queue (m)
Highway 6 / Campbellville Road			
Westbound Left-turn	30	19	56
Westbound Right-turn		8	<7
Northbound Through		78	76
Northbound Right-Turn	95	<7	<7
Southbound Left-turn	90	14	8
Southbound Through		80	127

		Weekday AM Peak Hour	Weekday PM Peak Hour
Intersection and Movements	Storage (m)	95th Queue (m)	95th Queue (m)
Campbellville Road / Centre Road			
Eastbound Left-Through		<7	<7
Eastbound Right-turn	30	<7	<7
Westbound Left-Through-Right		<7	<7
Northbound Left-turn	30	<7	<7
Northbound Through-Right		<7	<7
Southbound Left-Through-Right		<7	<7
Campbellville Road / Milborough Town Line			
Eastbound Left-Through-Right		<7	<7
Westbound Left-turn	30	<7	<7
Westbound Through-Right		<7	<7
Northbound Left-Through		<7	<7
Northbound Right-turn	30	<7	<7
Southbound Left-Through-Right		<7	<7
Campbellville Road / Twiss Road			
Eastbound Left-turn	30	<7	<7
Eastbound Through-Right		<7	<7
Westbound Left-Through-Right		<7	<7
Northbound Left-Through-Right		<7	<7
Southbound Left-Through		<7	<7
Southbound Right-turn	30	<7	<7
Milborough TI / Site Driveway			
Eastbound Left-turn		<7	<7
Eastbound Right-turn		<7	<7
Northbound Left-turn	30	<7	<7
Northbound Through		<7	<7
Southbound Through		<7	<7
Southbound Right-turn	30	<7	<7
Concession 11E / Site Driveway			
Eastbound Left-turn	30	<7	<7
Eastbound Through		<7	<7
Westbound Through		<7	<7
Westbound Right-turn	30	<7	<7
Southbound Left-turn		<7	<7
Southbound Right-turn		<7	<7

The results of the queuing analysis for the intersections suggest that the storage provided at the various intersection movements is sufficient to accommodate the queues except the westbound left-turn lane at Highway 6 and Campbellville Road should be increased to 60 metres.

18.3.2.3 Recommendations Total Future Conditions – 2021

In order to accommodate traffic along Alternative Haul Route 5, new traffic signals at the intersection of Highway 6 / Campbellville are recommended. The analysis suggests that these signals will operate effectively with a 90 second cycle length during both the AM and PM peak hours.

18.3.2.4 Level of Service Total Future Conditions – 2031

The intersection operations for the 2031 total traffic volumes at traffic signals are summarized in **Table 18-4**. Detailed summaries of the analyses can be found in **Appendix I**.

Table 18-4: Signalized Intersections - 2031 Total Traffic - Alternative 5

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Highway 401 WB Ramps				
Overall	C		C	
Westbound Left-turn	D	0.48	E	0.89
Westbound Right-turn	A	0.34	A	0.54
Northbound Through	A	0.63	A	0.47
Northbound Right-turn	A	0.70	A	0.66
Southbound Left-turn	A	0.45	A	0.46
Southbound Through	E	1.11	E	1.11
Highway 6 / Highway 401 EB Ramps				
Overall	F		F	
Eastbound Left-turn	F	0.97	D	0.54
Eastbound Right-turn	F	1.48	F	1.73
Northbound Left-turn	B	0.19	C	0.18
Northbound Through	F	1.52	F	1.30
Southbound Through	E	1.01	F	1.44
Southbound Right-turn	C	0.50	C	0.39
Highway 6 / Badenoch Street / Calfass Road				
Overall	F		F	
Eastbound Left-Through-Right	D	0.33	D	0.23
Westbound Left-Through	D	0.52	D	0.54
Westbound Right-turn	D	0.04	D	0.02
Northbound Left-turn	A	0.00	A	0.00
Northbound Through-Right	F	1.27	C	0.99
Southbound Left-turn	C	0.44	B	0.45
Southbound Through-Right	F	1.36	F	1.61
Highway 6 / Carlisle Road				
Overall	C		F	
Westbound Left-turn	F	1.03	D	0.86
Westbound Right-turn	D	0.47	C	0.29
Northbound Through	D	0.98	E	1.10
Northbound Right-turn	A	0.14	B	0.10
Southbound Left-turn	F	1.00	D	0.72
Southbound Through	B	0.87	F	1.25
Highway 6 / Campbellville				
Overall	A		B	
Westbound Left-turn	D	0.34	D	0.71
Westbound Right-turn	D	0.18	C	0.03
Northbound Through	A	0.78	A	0.68
Northbound Right-turn	A	0.15	A	0.05
Southbound Left-turn	C	0.53	B	0.34
Southbound Through	A	0.80	B	0.90

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Guelph Line / Reid Sideroad				
Overall	B		A	
Eastbound Left-turn	C	0.58	C	0.40
Eastbound Right-turn	C	0.23	C	0.15
Northbound Left-turn	A	0.02	A	0.01
Northbound Through	A	0.52	A	0.47
Southbound Through	A	0.24	A	0.26
Southbound Right-turn	A	0.41	A	0.24
Highway 6 / Concession 6E				
Overall	C		C	
Eastbound Left-turn	D	0.65	C	0.42
Eastbound Through-Right	C	0.23	C	0.11
Westbound Left-turn	D	0.26	C	0.46
Westbound Through-Right	C	0.18	C	0.34
Northbound Left-turn	A	0.01	A	0.10
Northbound Through	B	0.84	A	0.66
Northbound Right-turn	A	0.05	A	0.04
Southbound Left-turn	C	0.53	A	0.17
Southbound Through	D	1.02	C	1.02
Southbound Right-turn	A	0.06	A	0.07
Highway 6 / Parkside Drive				
Overall	C		E	
Westbound Left-turn	C	0.35	F	1.19
Westbound Right-turn	C	0.09	C	0.32
Northbound Through	D	1.02	F	1.12
Northbound Right-turn	A	0.12	B	0.09
Southbound Left-turn	D	0.82	F	1.24
Southbound Through	A	0.78	D	1.02
Highway 6 / Dundas Street				
Overall	F		F	
Eastbound Left-turn	F	1.30	F	1.50
Eastbound Through	D	0.64	C	0.38
Eastbound Right-turn	F	1.18	E	0.95
Westbound Left-turn	F	1.33	F	1.82
Westbound Through	D	0.56	D	0.85
Westbound Right-turn	D	0.08	C	0.19
Northbound Left-turn	F	1.35	F	1.75
Northbound Through	D	0.93	D	0.99
Northbound Right-turn	C	0.26	C	0.54
Southbound Left-turn	F	0.91	F	0.98
Southbound Through	F	1.19	F	1.31
Southbound Right-turn	C	0.15	C	0.20

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Highway 6 / Northcliffe Avenue and Plains Road W				
Overall	F		F	
Eastbound Left-Through-Right	F	1.19	C	0.40
Westbound Left-Through	F	1.97	F	1.21
Westbound Right-turn	D	0.76	E	0.95
Northbound Left-turn	F	0.79	F	1.71
Northbound Through	F	1.50	F	1.18
Northbound Right-turn	B	0.07	B	0.14
Southbound Left-turn	F	1.23	F	1.80
Southbound Through-Right	F	1.89	F	1.90

LOS – Level of Service; v/c – volume-capacity ratio;

With the exception of Guelph Line / Reid Sideroad all of the intersections have individual volume to capacity ratios greater than 1.0. The deficiencies in the total operations are mainly attributed to the general growth in background traffic volumes.

The intersection operations for the 2031 total traffic volumes for unsignalized intersections are summarized in **Table 18-5**. Detailed summaries of the analyses can be found in **Appendix I**.

Table 18-5: Unsignalized Intersections - 2031 Total Traffic - Alternative 5

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Concession 11E / Highway 6				
Eastbound Left-Through-Right	F	1.56	F	8.59
Westbound Left-Through-Right	F	Err	F	Err
Northbound Left-turn	C	0.08	E	0.44
Southbound Left-through	C	0.05	C	0.02
Campbellville Road / Centre Road				
Eastbound Left-Through	A	0.00	A	0.00
Westbound Left-Through-Right	A	0.03	A	0.07
Northbound Left-turn	C	0.08	C	0.10
Northbound Through-right	B	0.21	B	0.13
Southbound Left-Through-Right	B	0.13	C	0.17
Campbellville Road / Milborough Line				
Eastbound Left-Through-Right	A	0.00	A	0.00
Westbound Left-Through-Right	A	0.10	A	0.08
Northbound Left-Through-Right	B	0.20	B	0.09
Southbound Left-Through-Right	C	0.08	C	0.04
Campbellville Road / Nassagaweya 1st Line				
Eastbound Left-Through-Right	A	0.03	A	0.02
Westbound Left-Through-Right	A	0.01	A	0.01
Northbound Left-Through-Right	B	0.06	B	0.06
Southbound Left-Through-Right	C	0.15	B	0.15

Intersection and Movements	Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c
Campbellville Road / Twiss Road				
Eastbound Left-Through-Right	A	0.12	A	0.08
Westbound Left-Through-Right	A	0.00	A	0.02
Northbound Left-Through-Right	B	0.11	C	0.06
Southbound Left-Through-Right	B	0.10	B	0.25
Reid Sideroad / Crawford Crescent				
Westbound Left-Through	A	0.01	A	0.01
Northbound Left-Right	A	0.02	B	0.04
Reid Sideroad / Highway 401 EB Ramp				
Eastbound Left-turn	B	0.23	A	0.09
Southbound Left-turn	F	1.29	C	0.48
Southbound Right-turn	A	0.03	A	0.01
Guelph Line / Highway 401 WB Ramps				
Westbound Left-turn	F	0.82	D	0.69
Westbound Right-turn	B	0.24	C	0.66
Mountsberg Road / Centre Road				
Eastbound Left-Through-Right	A	0.03	B	0.02
Westbound Left-Through-Right	B	0.05	B	0.02
Northbound Left-Through-Right	A	0.00	A	0.01
Southbound Left-Through-Right	A	0.00	A	0.01
Mountsberg Road / Milborough Line				
Eastbound Left-Right	A	0.04	A	0.03
Northbound Left-Through	A	0.00	A	0.01
Centre Road / Concession 12E				
Westbound Left-Right	B	0.05	B	0.02
Southbound Left-Through	A	0.00	A	0.01
Concession 11E / Centre Road				
Eastbound Left-Through-Right	B	0.14	B	0.07
Westbound Left-Through-Right	B	0.07	B	0.19
Northbound Left-Through-Right	A	0.00	A	0.03
Southbound Left-Through-Right	A	0.02	A	0.02
Milborough Line / 3rd Sideroad				
Westbound Left-Right	B	0.02	B	0.01
Southbound Left-Through	A	0.00	A	0.00
Milborough Line / Site Driveway				
Eastbound Left-turn	B	0.08	B	0.08
Eastbound Right-turn	A	0.00	A	0.00
Northbound Left-Through	A	0.00	A	0.00
Concession 11E / Site Driveway				
Eastbound Left-turn	A	0.04	A	0.01
Southbound Left-turn	A	0.00	A	0.00
Southbound Right-turn	A	0.02	A	0.05

LOS – Level of Service; v/c – volume-capacity ratio;

The unsignalized intersections operate with a volume to capacity ratio of 0.82 or better during the AM and PM peak hour, with the exception of the southbound left-turn at Reid Sideroad / Highway 410 Eastbound Ramp which operates with a volume to capacity ratio of 1.29 in the AM peak hour.

18.3.2.5 Storage Total Future Conditions – 2031

The storage requirements along Alternative Haul Route 5 were assessed based on Synchro 6 queue estimates. The available storage was compared to the 95th percentile queues for the weekday AM and PM peak hours. The results are summarized in **Table 18-6**. Detailed summaries of the analyses can be found in **Appendix I**.

Table 18-6: Intersection Queues - 2031 Total Traffic

		Weekday AM Peak Hour	Weekday PM Peak Hour
Intersection and Movements	Storage (m)	95th Queue (m)	95th Queue (m)
Highway 6 / Campbellville Road			
Westbound Left-turn	30	20	61
Westbound Right-turn		12	8
Northbound Through		126	111
Northbound Right-Turn	95	<7	<7
Southbound Left-turn	90	23	15
Southbound Through		132	236
Campbellville Road / Centre Road			
Eastbound Left-Through		<7	<7
Eastbound Right-turn	30	<7	<7
Westbound Left-Through-Right		<7	<7
Northbound Left-turn	30	<7	<7
Northbound Through-Right		<7	<7
Southbound Left-Through-Right		<7	<7
Campbellville Road / Milborough Town Line			
Eastbound Left-Through-Right		<7	<7
Westbound Left-turn	30	<7	<7
Westbound Through-Right		<7	<7
Northbound Left-Through		<7	<7
Northbound Right-turn	30	<7	<7
Southbound Left-Through-Right		<7	<7
Campbellville Road / Twiss Road			
Eastbound Left-turn	30	<7	<7
Eastbound Through-Right		<7	<7
Westbound Left-Through-Right		<7	<7
Northbound Left-Through-Right		<7	<7
Southbound Left-Through		<7	8
Southbound Right-turn	30	<7	8
Milborough TI / Site Driveway			
Eastbound Left-turn		<7	<7
Eastbound West-turn		<7	<7
Northbound Left-turn	30	<7	<7
Northbound Through		<7	<7
Southbound Through		<7	<7
Southbound Right-turn	30	<7	<7
Concession 11E / Site Driveway			
Eastbound Left-turn	30	<7	<7
Eastbound Through		<7	<7
Westbound Through		<7	<7
Westbound Right-turn	30	<7	<7
Southbound Left-turn		<7	<7
Southbound Right-turn		<7	<7

The results of the queuing analysis for the intersections suggest that the storage provided at the various intersection movements is sufficient to accommodate the queues except that the westbound left-turn lane at Highway 6 and Campbellville Road should be increased to 65 metres.

18.3.2.6 Recommendations Total Future Conditions – 2021

In order to accommodate traffic along Alternative Haul Route 5, new traffic signals at the intersection of Highway 6 / Campbellville Road are recommended. The analysis suggests that these signals will operate effectively with a 90 second cycle length during both the AM and PM peak hours.

19. CRITERION AND INDICATORS

19.1 Change in Road Level of Service

Where appropriate, the findings of this traffic analysis have been applied to the Criteria and Indicators used to evaluate the alternative haul routes. The performance indicators include change in road level of service/congestion for both signalized and unsignalized intersections, change in access levels for road users, effects on other roadways as a result of traffic diversion, and potential for delay to quarry trucks at level rail crossings.

19.1.1 Change in Road Level of Service / Congestion

The performance indicator for level of service/congestion is conveyed by the delay associated with each alternative haul route. Synchro was used to estimate the average delay at each intersection.

The average delay for both the AM and PM peak is summarized in **Table 19-1** and is based on the Synchro model results for each intersection. The data are further categorized by unsignalized and signalized intersections. The total average delay is an average of all the intersections identified on the respective alternative haul route.

Table 19-1: Average Delay of Each Intersection by Alternative Haul Route

	Intersection	Route 1	Route 2	Route 3	Route 4	Route 5
Unsignalized Intersections	Campbellville / Highway 6	0.0		0.0	0.0	
	Concession 11E / Highway 6					
	Campbellville / Centre		1.4			0.2
	Campbellville / Milborough			2.1	1.7	1.7
	Campbellville / Nassagaweya			0.0	0.0	0.0
	Campbellville / Twiss			1.4	1.0	1.0
	Reid / Crawford			0.0	0.0	0.0
	Reid / 401 EB Ramp			27.7	24.1	24.1
	401 WB Ramp / Guelph			3.9	3.5	3.5
	Mountsberg / Centre		0.0			0.0
	Mountsberg / Milborough			0.0	0.0	0.0
	Concession 12E / Centre		0.0			0.0
	Concession 11E / Centre	4.3	2.7		1.6	1.2
	Concession 11E / Milborough					
	3rd Sideroad / Milborough			0.0	0.0	0.0
	Steeles / Milborough					
	Average Delay per intersection		2.1	1.0	3.9	3.2
Total Delay		4.3	4.1	35.0	31.8	31.6

	Intersection	Route 1	Route 2	Route 3	Route 4	Route 5
Signalized Intersections	401 WB / Highway 6	9.2	9.2	1.5	0.0	0.0
	401 EB / Highway 6	10.3	10.3	0.0	1.6	1.6
	Badenoch / Highway 6	29.6	29.6	1.6	4.5	4.5
	Campbellville / Highway 6		13.4			0.7
	Conc 11 / Highway 6	11.8			3.9	
	Carlise / Highway 6	2.5	2.5	1.4	2.2	2.2
	Conc 6 / Highway 6	2.1	2.1	1.0	1.9	1.9
	Parkside / Highway 6	0.1	0.1	1.7	0.0	0.0
	Dundas / Highway 6	1.4	1.4	1.0	1.2	1.2
	Northcliffe / Highway 6	3.9	3.9	2.9	3.5	3.5
	Reid Side Road / Guelph Line	0.0	0.0	0.0	0.0	0.0
	Average Delay per intersection	7.1	7.2	1.2	1.9	1.5
	Total Delay	70.7	72.4	11.0	18.6	15.4
	Average Delay of all intersections	6.2	5.5	2.6	2.5	2.1
	Total Delay of all intersections	75.0	76.4	45.9	50.4	47.0

The highest average delay occurs for Alternative Haul Route 2 with a total average delay of 76.4 seconds.

The change in road level of service/congestion was also measured through the average change in the volume to capacity ratio. These data are summarized in **Table 19-2**. The unsignalized Synchro summary sheets do not contain an average volume to capacity ratio, therefore only the signalized intersections are included in this summary.

Table 19-2: Average Change in Volume to Capacity Ratio at Signalized Intersections for Each Alternative Haul Route

	Intersection	Route 1	Route 2	Route 3	Route 4	Route 5
Signalized Intersections	401 WB / Highway 6	0.08	0.08	0.00	0.00	0.00
	401 EB / Highway 6	0.08	0.08	0.00	0.05	0.05
	Badenoch / Highway 6	0.07	0.07	0.01	0.02	0.02
	Campbellville / Highway 6		0.12			0.02
	Conc 11 / Highway 6	0.11			0.04	
	Carlies / Highway 6	0.00	0.00	0.00	0.00	0.00
	Conc 6 / Highway 6	0.02	0.02	0.00	0.00	0.00
	Parkside / Highway 6	0.02	0.02	0.01	0.02	0.02
	Dundas / Highway 6	0.01	0.01	0.01	0.01	0.01
	Northcliffe / Highway 6	0.01	0.01	0.01	0.01	0.01
	Reid Side Road / Guelph Line			0.04	0.03	0.03
	Average change in v/c per intersection	0.04	0.05	0.01	0.02	0.01

The largest change in volume to capacity ratio is Alternative Haul Route 2 with an average change of 0.05.

19.1.2 Change in Access Levels for Road Users

The change in access levels for road users considers the difference in average delay for side street traffic in future horizon years with and without quarry truck traffic. The delays are summarized in **Table 19-3** and are based on the Synchro model results. The table shows the increase in delay in seconds for side street traffic for each intersection by haul route alternative for the 2031 horizon year.

Table 19-3: Average Change of Delay for Side Street Traffic for each Alternative Haul Route

Link	Side St	Route 1		Route 2		Route 3		Route 4		Route 5	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Campbellville	Centre			6.6	14.0					4.4	10.2
Campbellville	Milborough					8.6	10.1	8.3	9.9	8.3	9.9
Concession 11	Twiss										
Centre Road	Centre	-0.2	-0.3								
	Campbellville			3.8	4.1					3.1	3.6
	Concession 11			0.0	0.0						
Milborough	Campbellville					1.4	0.8	1.1	0.6	1.1	0.6
Twiss	Campbellville					0.6	0.9	0.4	1.8	0.4	1.8
Reid	Crawford					0.5	1.1	0.4	0.8	0.4	0.8

19.1.3 Effects on Other Roadways as a Result of Traffic Diversion

Another performance indicator considers the effects on other roadways as a result of traffic diverting away from the alternative haul route as a result of the increase in truck traffic. However, there is no appreciable traffic diversion anticipated as a result of quarry operations because of the low total traffic volumes with no significant increase in congestion levels expected.

19.1.4 Potential for Delay to Quarry Trucks at Level Rail Crossings

There are two level rail crossings that may cause delay to traffic; one is on Campbellville Road west of Twiss Road and the other is on Twiss Road just north of Campbellville Road. This performance indicator quantifies the rail truck exposure at each crossing based on the daily number of trains and the daily number of quarry trucks (i.e. the increase in traffic) in one direction.

The data for the Campbellville Road rail crossing was obtained during a survey conducted on July 16, 2007. The data for the Twiss Road rail crossing was obtained during surveys on November 7, 2007 and July 16, 2008. To be conservative, the November 7, 2007 survey data was used in the analysis because of the higher frequency of trains observed that day.

The daily number of trains and the percent chance of being delayed at each crossing are shown in **Table 19-4**.

Table 19-4: Potential for delay at level rail crossings for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Daily Number of Trains	(no crossings)	(no crossings)	22 at Twiss Crossing 4 at Campbellville Crossing	22 at Twiss Crossing 4 at Campbellville Crossing	22 at Twiss Crossing 4 at Campbellville Crossing
Percent Chance of Being Delayed	0%	0%	5.2% at Twiss Crossing 2.9% at Campbellville Crossing	5.2% at Twiss Crossing 2.9% at Campbellville Crossing	5.2% at Twiss Crossing 2.9% at Campbellville Crossing

While there were only 14 trains per day were observed at the Twiss Road crossing, the value 22 was used for the analysis to be conservative because that is the number of times the train crossing gates were observed to be closed.

Alternative Haul Routes 1 and 2 provide the best results for this performance indicator because there are no rail crossings while the other alternative haul routes are equally affected.

19.2 Potential for Change in Road Safety Level

The following indicators when assessed collectively provide an impression of the potential for a change in the level of safety on the surrounding road network.

19.2.1 Potential for Increase in Collision Frequency and Severity

To quantify this potential indicator, a safety index was calculated. This index was derived from operational performance functions. Operational performance functions are mathematical models derived through statistical analysis that relate the number of collisions to the traffic volumes for different types of roads and intersections.

To obtain the potential for an increase in collision frequency, future traffic volumes for both horizon years (2021 and 2031) with and without the quarry were used in combination with the operational performance functions. The resulting values were then adjusted to account for the severity of collisions. The difference in adjusted values was then expressed as a percentage and used to quantitatively represent this performance indicator. The results are shown in **Table 19-5**.

Table 19-5 - Safety Index by Alternative Haul Route

Safety Index based on MTO Model						
Route	Safety Index					
	Without Quarry 2021	With Quarry 2021	Percent Increase by Route	Without Quarry 2031	With Quarry 2031	Percent Increase by Route
No Query			0.0%			0.0%
Alternative 1	1459.2	1483.9	1.7%	1759.3	1783.8	1.4%
Alternative 2	1476.1	1501.0	1.7%	1777.8	1802.5	1.4%
Alternative 3	1481.3	1495.9	1.0%	1783.5	1798.0	0.8%
Alternative 4	1487.7	1504.7	1.1%	1790.6	1807.4	0.9%
Alternative 5	1504.6	1521.8	1.1%	1809.1	1826.2	0.9%

Based on the calculated safety index, Alternative Haul Route 3 offers the lowest potential increase in collisions for both horizon years.

19.2.2 Number of Access Points along the Haul Route

An access point is any residential, business, or community/recreational driveway that connects to a haul route link. The quantities (and definitions of these features) are provided in the **Social-Economic and Business Impact Report** completed by Gartner Lee Ltd (2008). For the analysis and evaluation of this performance indicator, the number of access points along each haul route was summed together, as shown in **Table 19-6**.

Table 19-6: Number of Access Points for each Alternative Haul Route

Number of Access Points	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Residential	349	366	318	392	409
Community	12	16	20	21	25
Business	155	154	158	164	163
Total	516	536	496	577	597

As shown in the table, alternative haul route 3 passes the fewest number of access points.

19.2.3 Number of Intersections along the Haul Route

An intersection is defined as any side street that intersects with a haul route link. The quantity of intersections for each alternative was determined visually using Google Earth. **Table 19-7** shows the total number of intersections that was used as the input for the analysis.

Table 19-7: Number of Intersections for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Number of Intersections	41	44	47	52	55

Each intersection along each haul route will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. For example, the number of trucks that would travel along Highway 6 in Alternative Haul Route 1 is much higher than the number of trucks that would re-enter the study area and travel Highway 6 via Highway 401 in Alternative Haul Route 3. **Table 19-8** shows the number of quarry trucks that are estimated to travel each link in one direction for each alternative haul route.

Table 19-8: Number of Quarry Trucks for One Direction by Link for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Highway 6 (Campbellville to Hwy 401)	485	485	30	55	55
Highway 6 (Conc. 11E to Campbellville)	485	85	30	55	60
Highway 6 (Conc. 11E to Hwy 403)	85	85	30	60	60
Conc. 11E (Hwy 6 to Centre)	570	-	-	115	-
Conc. 11E (Centre to Milborough)	570	570	-	115	115
Centre Road	-	570	-	-	115
Campbellville (Hwy 6 to Centre)	-	570	-	-	115
Campbellville (Milborough to Twiss)	-	-	570	455	455
Milborough Line	-	-	570	455	455
Twiss Road	-	-	570	455	455
Reid Sideroad	-	-	570	455	455

To achieve a truck exposure index the following equation was applied:

$$\text{Truck Exposure Index} = \sum_{\text{Link}} \text{No. Intersections} * \text{No. Quarry Trucks}$$

The calculated intersection truck exposure indices are shown in **Table 19-9**.

Table 19-9: Intersection Truck Exposure Indices for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Intersection Truck Exposure Index	10,710	11,220	6,540	7,680	7,925

Alternative Haul Route 3 is the haul route with the lowest truck exposure index.

19.2.4 Truck-Rail Exposure Index at Level Rail Crossings

There are two level rail crossings along the alternative haul routes; one on Campbellville Road west of Twiss Road and the other on Twiss Road just north of Campbellville Road.

The daily number of trains at each crossing is shown in **Table 19-4** and the source of the data is described in **Section 19.1.4**.

The truck-rail exposure index quantifies the potential for a train to conflict with quarry trucks. Each rail crossing along the alternative haul routes will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. **Table 19-8** shows the number of quarry trucks that are estimated to travel each link in one direction for each Alternative Haul Route. To achieve a truck-rail exposure index the following equation was applied:

$$\text{Truck-Rail Exposure Index} = \text{Daily No. Quarry Trucks (in one direction)} * \text{Daily No. Trains}$$

The calculated truck-rail exposure indices are shown in **Table 19-10**.

Table 19-10: Truck-Rail Exposure Index for each Rail Crossing and each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Truck-Rail Exposure Index	No crossings	No crossings	12,540 at Twiss Crossing	10,010 at Twiss Crossing	10,010 at Twiss Crossing
			2,280 at Campbellville Crossing	1,820 at Campbellville Crossing	1,820 at Campbellville Crossing

As shown in the table, Alternatives 1 and 2 are not impacted by rail crossings.

19.2.5 Driveway Exposure Index

A driveway is any residential, business, or community driveway that connects to a haul route link. This definition is consistent with **Section 19.2.2**. The total number of driveways for each alternative haul route is shown in **Table 19-6**.

The driveway exposure index quantifies the potential for vehicles leaving or entering a driveway to conflict with a quarry truck. Each driveway along the haul routes will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. For example, the number of trucks that would travel along Highway 6 in Alternative 1 is much greater than the number of trucks that would re-enter the study area and travel Highway 6 via Highway 401 in Alternative 3. **Table 19-8** above shows the number of quarry trucks that are estimated to travel each link in one direction for each Alternative Haul Route. To achieve a driveway truck exposure index the following equation was applied.

$$\text{Driveway Exposure Index} = \sum_{\text{Link}} \text{No. Driveways} * \text{No. Quarry Trucks (in one direction)}$$

The calculated driveway truck exposure indices are shown in **Table 19-11**.

Table 19-11: Driveway Truck Exposure Indices for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Driveway Truck Exposure Index	136,345	141,745	46,820	62,505	64,880

Of the five alternative haul routes, Alternative Haul Route 3 has the lowest driveway truck exposure index.

19.2.6 Number of Existing Sections with Limited Sight Lines and/or Steep Grades on Non-Provincial Highways

An assessment of the existing vertical profiles and sight distances was conducted for each Alternative Haul Route link on non-provincial highways. The intersections were analyzed separately as discussed in **Section 19.2.7**. The total number of locations with a limited stopping sight distance along each alternative was identified. The analysis was conducted as per the methodology discussed in **Section 10.3.2**.

The stopping sight distance adjusted for large trucks was analyzed for the site accesses and the Preferred Alternative Haul Route as discussed in **Sections 10.3.1, 10.3.4 and 19.3.3**. The number of section locations with a steep grade was determined using the methodology discussed in **Section 10.4**.

The total number of locations along each Alternative Haul Route that has a limited sight distance along with the number that has a steep grade is shown in **Table 19-12**.

Table 19-12: Quantity of Existing Section Locations with a Limited Sight Distance and/or Steep Grade for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Number of existing section locations with a limited sight distance and/or steep grade	9	21	12	24	36

Of the five alternative haul routes, Alternative Haul Route 1 has the fewest number of section locations with a limited sight distance or a steep grade.

Table 19-13 shows the approximate locations along each road section where the existing stopping sight distance is less than the required sight distance for passenger vehicles. Any non-provincial road section not shown in the table can be assumed to have no locations with a limited sight distance.

Table 19-13: Existing Section Locations with a Limited Sight Distance

Applicable Alternatives	Approximate Location of Limited Sight Distance	Direction
1, 2, 4 & 5	Concession 11E from Centre Street to Milborough Line	
	860m East of Centre Street	EB
	935 m East of Centre Street	WB
	1025 M East of Centre Street	EB
	1025 M East of Centre Street	WB
	1170m East of Centre Street	WB
	1190m East of Centre Street	WB
	1570m East of Centre Street	EB
	2350m East of Centre Street	EB
	2435m East of Centre Street	WB
2 & 5	Campbellville Road Hwy 6 to Centre Street	
	480m East of Hwy 6	EB
	620m East of Hwy 6	WB
	1480m East of Hwy.6	WB
	1760m East of Hwy.6	EB
	2090m East of Hwy 6	EB
3, 4 & 5	Campbellville Road Milborough Line to Twiss Road	
	400m East of Milborough Line	WB
	320m East of CPR Crossing	WB
	320m East of CPR Crossing	EB
3, 4 & 5	Milborough Line from Campbellville Road to Concession 11 E	
	150m South of Mountsberg Road	NB
	150m South of Mountsberg Road	SB
	200 m South of Mountsberg Road	NB
	200 m South of Mountsberg Road	SB
	400 m South of Mountsberg Road	NB
	400 m South of Mountsberg Road	SB
	910m North of Conc.Road 11E	NB
	910m North of Conc.Road 11E	SB
	4 & 5	Milborough Line from Campbellville Road to Concession 11 E
270m North of Conc. Road 11E		SB
260m North of Conc. Road 11E		NB
2 & 5	Centre Street from Campbellville Road to Concession 11E	
	280m South of Campbellville Road	SB
	340m South of Campbellville Road	NB
	590m South of Concession Road 12 E	SB
	260m North of Concession Road 11 E	SB
	200m North of Concession Road 11 E	NB
	720m North of Concession Road 11E	NB

19.2.7 Number of Intersections with Limited Sight Lines and/or Steep Grades on Non-Provincial Highways

Given that intersections are subject to specific design standards, the number of intersections on non-provincial roads along the alternative haul routes that exhibit limited sight lines and/or steep grades was also identified.

The number of intersections with a limited sight line was determined using the methodologies described in **Section 10.3.3**. The number of intersections with a steep grade was determined using the methodologies described in **Section 10.4**.

The number of intersections with a limited sight distance and/or steep grades is shown in **Table 19-14**.

Table 19-14: Quantity of Intersections with a Limited Sight Lines and/or Steep Grade for each Alternative Haul Route

	Number of intersections with limited sight lines and/or steep grades	Location of Intersection
Alternative 1	1	<ul style="list-style-type: none"> ▪ Centre Street and Concession Road 11 E
Alternative 2	3	<ul style="list-style-type: none"> ▪ Centre Street and Concession Road 11 E ▪ Centre Street and Campbellville Road ▪ Concession Road 12 and Centre Road
Alternative 3	3	<ul style="list-style-type: none"> ▪ Millborough Line and Campbellville Road ▪ Campbellville Road and 1st Line Road/McVivien Road ▪ Mountsberg Road and Millborough Line
Alternative 4	4	<ul style="list-style-type: none"> ▪ Millborough Line and Campbellville Road ▪ Mountsberg Road and Millborough Line ▪ Centre Street and Concession Road 11 E ▪ Centre Street and Campbellville Road
Alternative 5	6	<ul style="list-style-type: none"> ▪ Centre Street and Concession Road 11 E ▪ Centre Street and Campbellville Road ▪ Millborough Line and Campbellville Road ▪ Campbellville and 1st Line Road/McVivien Road ▪ Concession Road 12 and Centre Road ▪ Mountsberg Road and Millborough Line

Alternative Haul Route 1 has the fewest number of intersections with a limited sight line and/or steep grade.

19.2.8 School Bus Route Lengths (Km) along the Haul Route

To calculate the total school bus route length in kilometres for each alternative haul route it was important to understand how many school bus kilometres were travelled on an average day. To calculate this value the following equation was applied.

School bus route length =

$$\sum_{Link} \text{Frequency of school daily bus trips in both directions} * \text{Length of the route link}$$

The school bus route locations and frequency, illustrated in **Exhibit 3-8**, were provided by the Hamilton-Wentworth District School Board, the Hamilton-Wentworth Catholic School Board, the Hamilton District School Board, and the Halton Catholic District School Board. The total school bus route lengths for each alternative haul route are shown in **Table 19-15**.

Table 19-15: School Bus Route Length for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
School Bus Route Length (km)	196	228	206	244	276

Since it is desirable to minimize the exposure of school buses and quarry trucks a truck exposure index was calculated as part of the analysis.

Each of school bus routes along the haul routes will be exposed to quarry truck traffic; however, the degree of the exposure varies by alternative. In order to account for this, a truck exposure index was calculated for comparative evaluation. For example, the number of trucks that would travel along Highway 6 in Alternative Haul Route 1 is much greater than the number of trucks that would re-enter the study area and travel Highway 6 via Highway 401 in Alternative Haul Route 3. **Table 19-8** shows the number of quarry trucks that are estimated to travel each link in one direction for each alternative haul route.

To achieve a truck exposure index the following equation was applied.

$$\text{Truck Exposure Index} = \sum_{Link} \text{No. school bus km} * \text{No. Quarry Trucks in one direction}$$

The calculated school bus exposure indices are shown in **Table 19-16**.

Table 19-16: School Bus Truck Exposure Index for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
School Bus Truck Exposure Index	46,467	57,067	32,052	35,558	39,302

While Alternative Haul Route 1 has fewer school bus kilometres, Alternative Haul Route 3 has the lowest school bus truck exposure index.

19.2.9 Conflict with Agricultural Vehicles And Equipment

The potential for conflict with agricultural vehicles and equipment will vary according to the concentration of cash crop, cattle and other livestock facilities identified as active along the route alternatives. The occurrence of such facilities ranges from a low level of 0 in Alternative Haul Route 3 to moderate levels of 6 for Alternative Haul Routes 1 and 4 to the highest levels, at 10, for Alternative Haul Routes 2 and 5. A qualitative description of low, medium, or high was assigned to each alternative as deemed appropriate by the agrologist.

19.3 Change in Road Function

A change in road function refers to a change in the use of the roadway. Although sometimes it is necessary to change the function of the roadway to mitigate for traffic and safety impacts it is often desirable to minimize the extent of the change. The following indicators, when assessed collectively, provide an impression of the potential for a change in the road function.

19.3.1 Increase in Traffic

The performance indicator entitled increase in traffic conveys the maximum traffic increase that would be experienced along a portion of the alternative haul route expressed as a daily volume. **Table 19-17** provides the 2031 Background Traffic for each link and Site Trips (including both quarry truck traffic and employee traffic) for each alternative. The majority of the increase in traffic will comprise heavy trucks.

Table 19-17: ADT Maximum Volume excluding Highway 6

Location	2031 Background	Site Trips				
		Alt #1	Alt #2	Alt #3	Alt #4	Alt #5
Campbellville (btwn Hwy 6 & Centre)	3591	0	1140	0	0	230
Campbellville (btwn Centre & Milborough)	4395	0	0	0	0	0
Campbellville (btwn Milborough & Twiss)	5353	10	10	1150	920	920
Twiss (north of Campbellville)	2271	10	10	1150	920	920
Reid (east of Twiss)	2965	10	10	1150	920	920
Conc 11 (btwn Hwy 6 & Centre)	980	1308	168	168	398	168
Conc 11 (btwn Centre & Milborough)	786	1308	1308	168	398	398
Centre (btwn Campbellville & Mountsberg)	2391	0	1140	0	0	230
Centre (btwn Conc 12 E & Conc 11 E)	2534	0	1140	0	0	230
Milborough (btwn Mountsberg & Conc 11)	920	10	10	1150	920	920
Max Site Traffic Increase (excluding Hwy 6)		1308	1308	1150	920	920

The increase in traffic is also presented as an average increase over the alternative haul route using the following equation with the results provided in **Table 19-18**.

$$AveragePercentIncrease = \frac{\sum_{Links} \left(\frac{\sum Link_{TotalTraffic} - \sum Link_{Background}}{\sum Link_{Background}} \right)}{\#ofLinks}$$

Table 19-18: Percent Increase in Volume

Location	Site Percentage				
	Alt #1	Alt #2	Alt #3	Alt #4	Alt #5
Campbellville (btwn Hwy 6 & Centre)		31.75%			6.40%
Campbellville (btwn Centre & Milborough)					
Campbellville (btwn Milborough & Twiss)	0.19%	0.19%	21.48%	17.19%	17.19%
Twiss (north of Campbellville)	0.44%	0.44%	50.64%	40.51%	40.51%
Reid (east of Twiss)	0.34%	0.34%	38.79%	31.03%	31.03%
Conc 11 (btwn Hwy 6 & Centre)	133.47%	17.14%	17.14%	40.61%	17.14%
Conc 11 (btwn Centre & Milborough)	166.41%	166.41%	21.37%	50.64%	50.64%
Centre (btwn Campbellville & Mountsberg)		47.68%			9.62%
Centre (btwn Conc 12 E & Conc 11 E)		44.99%			9.08%
Milborough (btwn Mountsberg & Conc 11)	1.09%	1.09%	125.00%	100.00%	100.00%
Max Site Traffic Average Percent (excluding Highway 6)	50.3%	34.4%	45.7%	46.7%	31.3%

19.3.2 Required Change in Road Classification

The change in road classification was assessed qualitatively and assigned a rank between low and high. Based on the official plans of the respective municipalities, none of the roads for any of the alternatives require a change in classification. As a result a base ranking of low was given to all of the haul route alternatives. However, along Concession 11 between Centre Street and Highway 6 and Milborough Line between Concession 11 and Campbellville Road it was acknowledged that there would be a more obvious shift in the environment from residential to mixed traffic. A low-medium rank was applied if these links were included in the respective alternative haul route configuration.

19.3.3 Road Widening Required

Road widening can impact the function of the road. In order to accommodate cyclists and bring the existing roads up to current standards all of the haul route links will require widening of the pavement surface with the exception of Highway 6. The difference between existing and proposed pavement widths is used in the comparative analysis. To be conservative, the analysis is based on rural cross-sectional designs that do not in all cases fit in the existing right-of-way. (However, there are corresponding urban design options that would fit in the existing right-of-way because they require slightly less widening.)

The existing pavement widths vary from 6.2 m to 7.0 m, the proposed pavement widths vary from 10.5 to 12.5 m, and the required widening varies from 0.65 m to 3.15 m. To compare

the quantity of road widening required for each alternative haul route, the following calculation was completed to estimate the total area of additional pavement:

$$\text{Area of Addition Pavement} = \sum_{\text{Link}} \text{Length} * \sum_{\text{Link}} (\text{Proposed} - \text{Existing Pavement Width})$$

The total area of additional pavement is shown in **Table 19-19**.

Table 19-19: Area of Required Pavement Widening for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Area of Required Pavement Widening (sq. metres)	28,678	42,016	43,212	68,110	80,308

As shown in **Table 19-19**, Alternative Haul Route 1 has the lowest area of required pavement widening.

19.4 Potential for Conflicts with Cyclists

19.4.1 Length of Route Coinciding With Designated or Suggested Bike Routes

The City of Hamilton and the Region of Halton have identified several of the roads that comprise the haul routes as designated or cautionary bike routes. Based on the Hamilton Bike Routes, Trails and Parks Map (March 2008) and the 2006 Cycling Halton Map the length of the bike routes was summed for each alternative haul route for the analysis, as shown in **Table 19-20**.

Table 19-20: Length of Bike Routes for each Alternative Haul Route

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Length of Bike Routes (km)	2.5	3.3	6.1	8.6	9.4

Of the five alternative haul routes, Alternative 1 has the lowest length of designated or cautionary bike route.

19.4.2 Length of Route without Adequate Shoulders for Cyclists

The presence of the adequate shoulders provides a safety buffer for cyclists. Currently there are little to no shoulders on the existing roads; however, if the proposed cross-section changes are implemented all of the designated cycling routes would have adequate shoulders.

19.5 Potential for Conflicts with Pedestrians

19.5.1 Number of Schools along the Route

The haul routes were selected to avoid routes that would pass by schools and therefore there are no schools along any of the proposed haul routes.

19.5.2 Number of Parks and Community Institutions excluding Highway 6

There are several parks and community institutions within the study area as inventoried through various field visits. To quantify this performance indicator the number of features along each haul route was summed. The features along Highway 6 were excluded to recognize the more sensitive nature of the park facilities along the local routes in respect of the proposed quarry. The names of the actual community features were listed for reference as part of the analysis. This information is shown in **Table 19-21**.

Table 19-21: Quantity and Names of Park and Community Institutions for each Alternative Haul Route

	Quantity of Parks and Community Institutions	Name of Park and Community Institution
Alternative 1	1	<ul style="list-style-type: none"> ▪ Lawson Park
Alternative 2	4	<ul style="list-style-type: none"> ▪ Lawson Park ▪ Memorial Park ▪ Mountsberg Community Centre ▪ Mountsberg Baptist Church and Cemetery
Alternative 3	2	<ul style="list-style-type: none"> ▪ Campbellville New Ball Park ▪ Campbellville Emergency Response Centre
Alternative 4	3	<ul style="list-style-type: none"> ▪ Lawson Park ▪ Campbellville New Ball Park ▪ Campbellville Emergency Response Centre
Alternative 5	6	<ul style="list-style-type: none"> ▪ Lawson Park ▪ Memorial Park ▪ Mountsberg Community Centre (Historic School House) ▪ Mountsberg Baptist Church and Cemetery ▪ Campbellville New Ball Park ▪ Campbellville Emergency Response Centre

Alternative Haul Route 1 passes the fewest number of parks and community institutions.

19.5.3 Length of Route without Adequate Shoulders/Sidewalks for Pedestrians

The presence of the adequate shoulders provides a safety buffer for pedestrians when sidewalks are not present. Currently there are little to no shoulders on the existing roads; however, if the proposed cross-section changes are implemented all of the haul routes would have adequate shoulders.

20. PREFERRED HAUL ROUTE ALTERNATIVE

20.1 Description of the Preferred Haul Route

The haul route evaluation which considers a comprehensive list of evaluation criteria and indicators shows that Alternative Haul Route 3 is the preferred haul route. However, the evaluation also shows that Alternative Haul Route 1 is also a viable haul route.

As illustrated in **Exhibit 20-1** for the preferred alternative, all quarry truck traffic destined for Highway 401 would travel north on Milborough Line, then east on Campbellville Road, north on Twiss Road, and east on Reid Sideroad to the east or westbound Highway 401 on-ramp.

Truck traffic destined for Highway 403 or QEW east would first travel to the Highway 401 eastbound on-ramp and from here, take one of several alternatives to reach the destination including the 407 ETR south to Highway 403 or Highway 6 south to Highway 403.

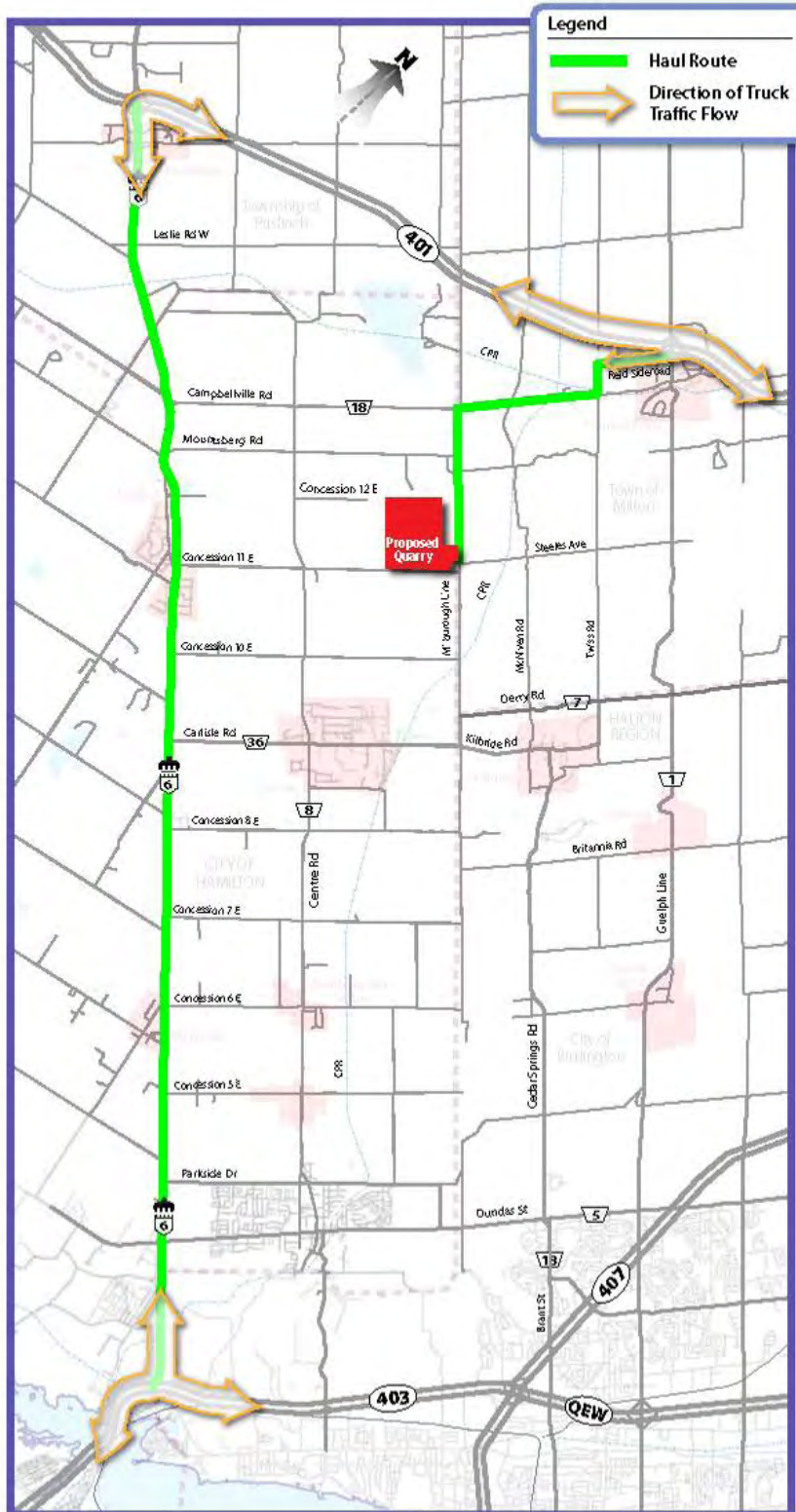


Exhibit 20-1: Preferred Alternative Haul Route

20.2 Site Access

The proposed site access is a stop controlled T-intersection located on the west side of Milborough Line, approximately 530 m north of Concession 11E. The access would consist of two 4.5 m lanes as shown in **Exhibit 20-2**. It is recommended that trucks be prohibited from entering the site from the south and from exiting the site and traveling southbound on Milborough Line. This prohibition would be incorporated into the access design using geometric design, concrete curb and gutter on the south edge of the driveway, and raised medians strategically located on Milborough Line and the site access driveway.

The existing vertical profile for Milborough Line will support truck movements and the required sight lines near this access. The design vehicles used for the geometric design of the site accesses are discussed in **Section 10.1** and the methodology for the site distance analysis is discussed in **Section 10.3.1**.



Exhibit 20-2: Recommended Site Access

20.3 Recommended Road Alterations

This section highlights the recommended road alterations and mitigation measures based on the results of the traffic operational and safety analysis for the preferred haul route alternative. It is recommended that the alterations are implemented for the start of quarry operations. The approximate locations of the recommended road alterations and road policies are illustrated in **Exhibit 20-3**. Although under Alternative Haul Route 3 there are some quarry trucks expected to use Highway 6 between Highway 401 and Highway 403, there are no road alterations required along this section because the relative volume increase is very low and this Highway is currently a viable transportation corridor which can accommodate significant truck traffic in a safe, rapid and efficient manner.

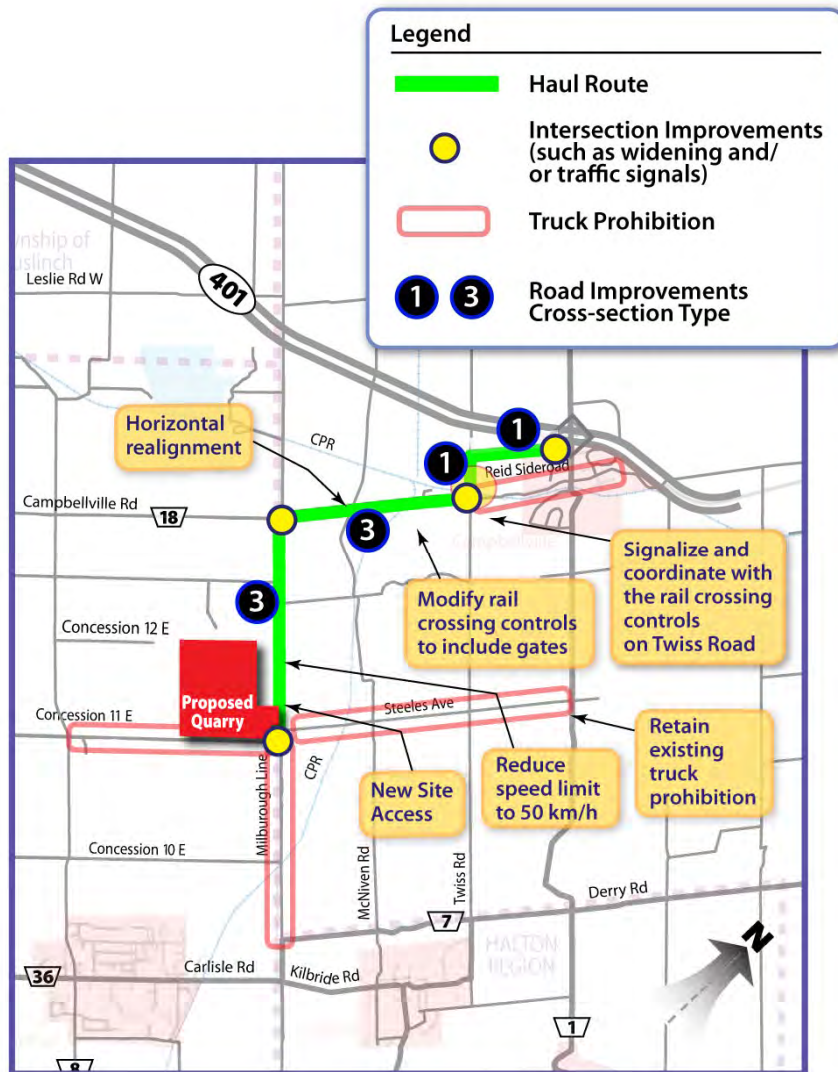


Exhibit 20-3: Summary of Recommend Road Alterations

20.3.1 Intersection Alterations

The following intersection alterations are recommended to assist in maintaining smooth and safe traffic operations:

- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Milborough Line.
- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Twiss Road.
- Construction of a northbound channelized right-turn lane at Campbellville Road and Milborough Line with a truck acceleration lane on the east leg.
- Construction of a southbound channelized right-turn lane at Campbellville Road and Twiss Road with a truck acceleration lane on the west leg.

The recommended turning lane alterations at Campbellville Road and Milborough Line and at Campbellville Road and Twiss Road are illustrated in Exhibit 20-4 and **Exhibit 20-5** respectively.

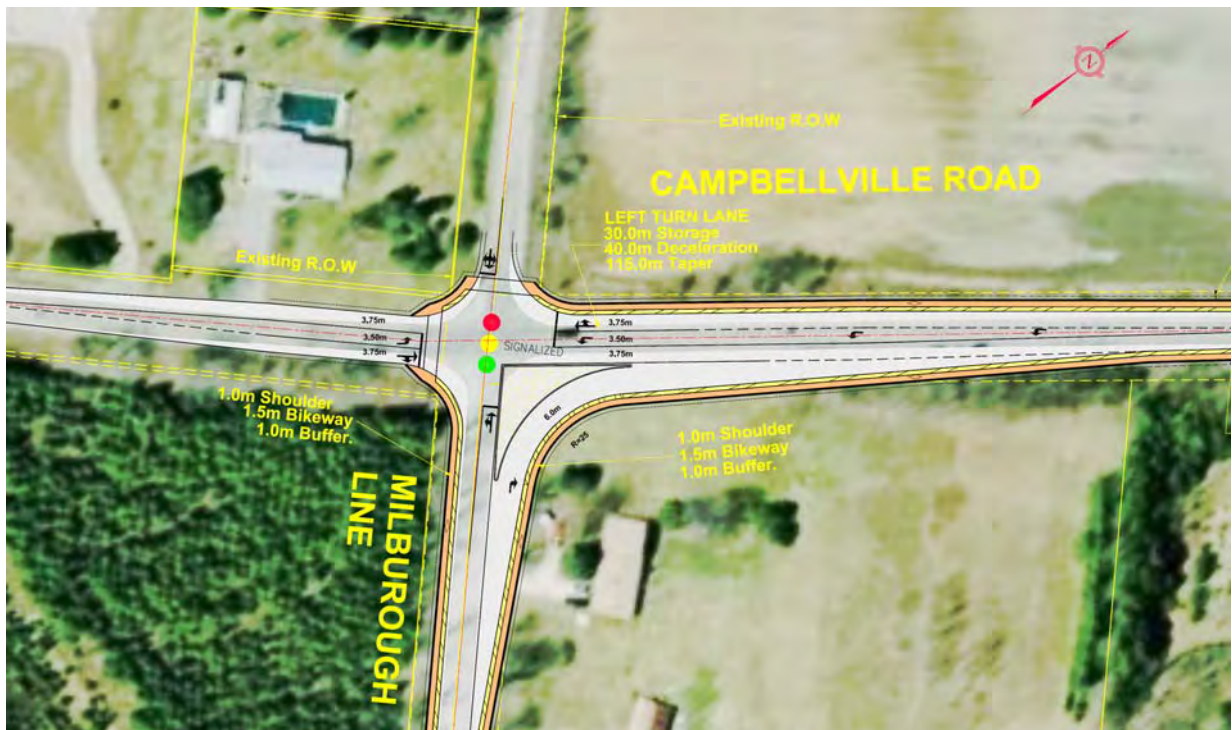


Exhibit 20-4: Intersection Alterations at Campbellville Road and Milborough Line



Exhibit 20-5: Intersection Alterations at Campbellville Road and Twiss Road

20.3.2 Profiles

It is recommended that the existing substandard curves on Campbellville Road be removed to improve the horizontal alignment, as shown in **Exhibit 20-6**.



Exhibit 20-6: Horizontal Alignment Alteration on Campbellville Road

The vertical profile along the Preliminary Preferred Haul Route was analyzed with respect to the stopping sight distance adjusted for trucks. It was determined that as long as the recommended speed limit policy is implemented the existing vertical profile supports large truck movement. However, the need for vertical profile alterations should be analyzed as part of the Environmental Assessment.

20.3.3 Traffic Controls

The following traffic control alterations are recommended to assist in maintaining smooth and safe traffic operations:

- Signalization of the Campbellville Road and Milborough Intersection (Exhibit 20-4)
- Signalization of the Campbellville Road and Twiss Intersection (**Exhibit 20-5**)
- Signalization of the Reid Sideroad / Highway 401 EB Ramp Intersection
- Coordinate the traffic signals at Campbellville Road and Twiss Road with the signal controls at the rail crossing on Twiss Road

All of the intersections where signals are recommended meet the signal warrant requirement. The analysis of the future total conditions with the above mitigation measures implemented determined that in 2021 and 2031 the proposed signalized intersections will all operate at an overall level of service of 'B' or better.

In addition to intersection alterations, it is recommended that the speed limit on Milborough Line be reduced to 50 km/h.

20.3.4 Railway Crossings

As illustrated in **Exhibit 20-7**, it is recommended that the Campbellville Road railway crossing be improved by modifying the rail crossing controls to include lights and gates.



Exhibit 20-7: Railway Crossing Alteration on Campbellville Road

20.3.5 Cross-Sections

This alternative was assessed on the basis that the roads would be upgraded to eliminate any load restrictions and the cross-sections (illustrated in Exhibit 20-4 and **Exhibit 20-5**) would be constructed.

It is recommended that the Preliminary Preferred Haul Route road sections along Twiss Road and Reid Sideroad be upgraded to Cross-section Type 1 to ensure the most current design standards are met (**Exhibit 20-8**).

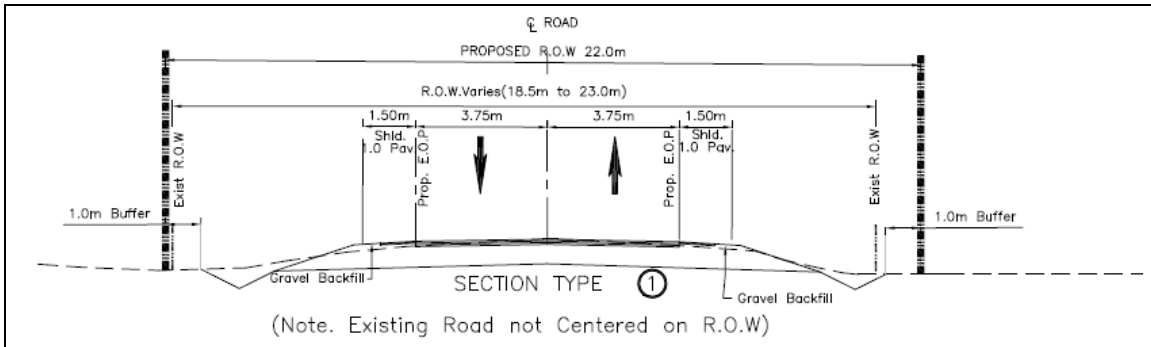


Exhibit 20-8: Recommended Cross-section Type 1

The road along Milbrough Line and Campbellville Road would be upgraded to Cross-section Type 3 to improve the safety of the roadway for cyclists by providing a separated bike lane (**Exhibit 20-9**).

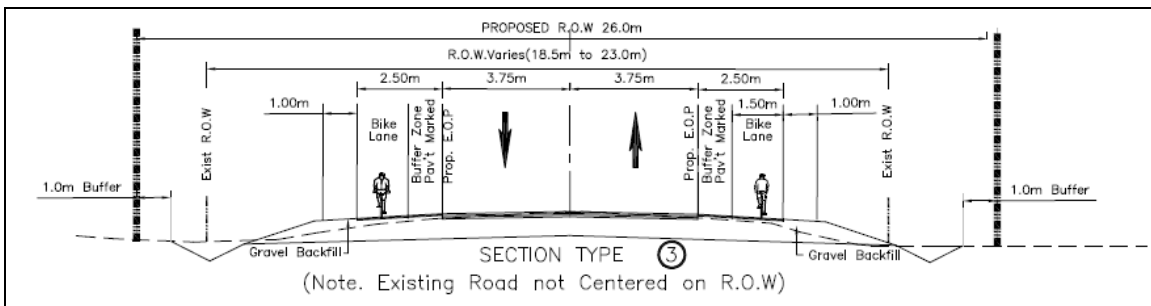


Exhibit 20-9: Recommended Cross-section Type 3

20.4 Road Signs

It is recommended that truck route signs be installed along the preferred haul route to support the road design features and other truck control policies intended to ensure the quarry trucks travel only along the preferred haul route.

The approximate location and text of the recommended signs are shown in **Table 20-1** and **Exhibit 20-10**.

Table 20-1: Location and Text of the Recommended Truck Signs

Location	Sign Text
At site driveway and Milborough Line (outbound)	Trucks Use Milborough Line North
Milborough Line (northbound) at Campbellville Road	Trucks Use Campbellville Road East
Campbellville Road (eastbound) at Twiss Road	Trucks Use Twiss Road North
Reid Sideroad (eastbound) east of Twiss Road	Trucks Use Hwy 401 or Guelph Line North
Reid Sideroad (eastbound) at Guelph Line	Trucks Use Guelph Line North

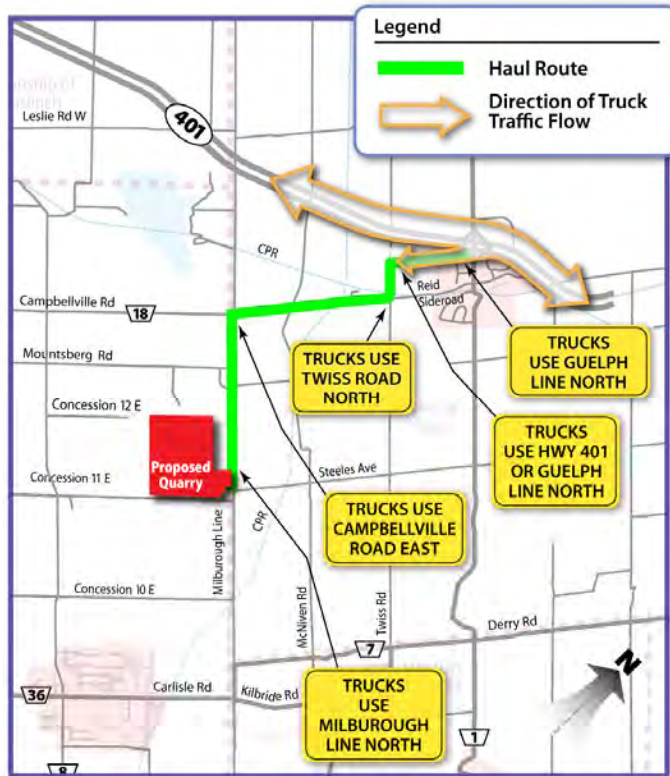


Exhibit 20-10: Recommended Road Signs along the Preferred Haul Route

20.5 Total Future Level of Service Analysis with Recommended Alterations in Place

20.5.1 Level of Service Background and Total Future Conditions – 2021

The intersection operations for the road network for 2021 are summarized in the following sections. **Table 20-2** summarizes the operations for the signalized intersections for 2021 background and total traffic.

Table 20-2: 2021 Background Traffic and 2021 Total Traffic - Signalized Intersection

Intersection and Movements	2021 Background Traffic				2021 Total Traffic			
	Weekday AM Peak Hour		Weekday PM Peak Hour		Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c
Guelph Line / Reid Sideroad								
Overall	B		B		B		A	
Eastbound Left-turn	C	0.57	C	0.37	C	0.58	C	0.41
Eastbound Right-turn	C	0.21	C	0.13	C	0.21	C	0.13
Northbound Left-turn	A	0.04	A	0.02	A	0.02	A	0.01
Northbound Through	A	0.45	A	0.42	A	0.47	A	0.43
Southbound Through-Right	A	0.58	A	0.44				
Southbound Through					A	0.22	A	0.24
Southbound Right-turn					A	0.39	A	0.23

The analysis shows that the signalized intersection of Guelph Line and Reid Sideroad will continue to operate with sufficient capacity in 2021 with quarry truck traffic.

The operations for the 2021 background and total traffic volumes at unsignalized intersections are summarized in **Table 20-3**.

Table 20-3: 2021 Background Traffic and 2021 Total Traffic - Unsignalized Intersections

Intersection and Movements	2021 Background Traffic				2021 Total Traffic			
	Weekday AM Peak Hour		Weekday PM Peak Hour		Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c
Campbellville Road / Milborough Line								
Eastbound Left-Through-Right	-	0	-	-	A	0.00	A	0.00
Westbound Left-Through-Right	A	0.01	A	0.03				
Westbound Left-turn					A	0.11	A	0.09
Northbound Left-Through-Right	B	0.08	B	0.04				
Northbound Left-Through					B	0.22	B	0.10
Northbound Right-turn					A	0.00	A	0.00
Southbound Left-Through-Right	B	0.05	B	0.03	C	0.07	C	0.04

Intersection and Movements	2021 Background Traffic				2021 Total Traffic			
	Weekday AM Peak Hour		Weekday PM Peak Hour		Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c
Campbellville Road / Nassagaweya 1st Line								
Eastbound Left-Through-Right	A	0.02	A	0.02	A	0.02	A	0.02
Westbound Left-Through-Right	A	0	A	0.01	A	0.01	A	0.01
Northbound Left-Through-Right	B	0.05	B	0.05	B	0.05	B	0.06
Southbound Left-Through-Right	B	0.11	B	0.11	C	0.14	B	0.13
Campbellville Road / Twiss Road								
Eastbound Left-Through-Right	A	0.05	A	0.02				
Eastbound Left-turn					A	0.12	A	0.09
Westbound Left-Through-Right	A	0	A	0.02	A	0.00	A	0.01
Northbound Left-Through-Right	B	0.08	B	0.03	B	0.10	C	0.05
Southbound Left-Through-Right	B	0.04	B	0.2				
Southbound Left-Through					B	0.12	B	0.25
Southbound Right-turn					B	0.12	B	0.25
Reid Sideroad / Crawford Crescent								
Westbound Left-Through	A	0.01	A	0.01	A	0.01	A	0.01
Northbound Left-Right	A	0.02	A	0.03	A	0.02	B	0.04
Reid Sideroad / Highway 401 EB Ramp								
Eastbound Left-turn	A	0.1	A	0.03	B	0.21	A	0.09
Southbound Left-turn	D	0.75	B	0.33	F	1.14	C	0.43
Southbound Right-turn	A	0.02	A	0.01	A	0.05	A	0.02
Guelph Line / Highway 401 WB Ramps								
Westbound Left-turn	D	0.41	C	0.43	E	0.69	D	0.59
Westbound Right-turn	B	0.21	C	0.58	B	0.21	C	0.58
Mountsberg Road / Milborough Line								
Eastbound Left-Right	A	0.03	A	0.02	A	0.03	A	0.03
Northbound Left-Through	A	0	A	0.01	A	0	A	0.01
Milborough Line / 3rd Sideroad								
Westbound Left-Right	A	0.01	A	0.01	B	0.02	B	0.01
Southbound Left-Through	A	0	-	-	A	0	-	-
Milborough Line/ Site Driveway								
Eastbound Left-turn	-	-	-	-	B	0.12	B	0.10
Eastbound Right-turn	-	-	-	-	A	0.01	A	0.04
Northbound Left-turn					A	0.02	A	0.00

The analysis shows that in the year 2021, if an intersection movement has a volume to capacity ratio less than 1.0 in the Background Condition it remains below 1.0 in Total Traffic Condition, with the exception of one movement. During the AM peak hour the volume to capacity ratio for the southbound left-turn at Reid Sideroad and the Highway 401 EB Ramp increases from 0.75 in the Background Condition to 1.14 in the Total Traffic Condition.

20.5.2 Level of Service Background and Total Future Conditions – 2031

The intersection operations analysis for the road network for 2031 background and total traffic volume conditions are summarized in the following tables:

- **Table 20-4** – 2031 Signalized Intersections
- **Table 20-5** – 2031 Unsignalized Intersections

Table 20-4: 2031 Background Traffic and 2031 Total Traffic - Signalized Intersections

Intersection and Movements	2031 Background Traffic				2031 Total Traffic			
	Weekday AM Peak Hour		Weekday PM Peak Hour		Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c
Guelph Line / Reid Sideroad								
Overall	B		B		B		A	
Eastbound Left-turn	C	0.62	C	0.41	C	0.58	C	0.41
Eastbound Right-turn	C	0.23	C	0.15	C	0.21	C	0.13
Northbound Left-turn	A	0.05	A	0.02	A	0.02	A	0.01
Northbound Through	A	0.50	A	0.46	A	0.47	A	0.43
Southbound Through-Right	B	0.65	A	0.48				
Southbound Through					A	0.22	A	0.24
Southbound Right-turn					A	0.39	A	0.23

The analysis shows that the signalized intersection of Guelph Line and Reid Sideroad will continue to operate with sufficient capacity in 2031 with quarry truck traffic.

Table 20-5: 2031 Background Traffic and 2031 Total Traffic - Unsignalized Intersections

Intersection and Movements	2031 Background Traffic				2031 Total Traffic			
	Weekday AM Peak Hour		Weekday PM Peak Hour		Weekday AM Peak Hour		Weekday PM Peak Hour	
	LOS	v/c	LOS	v/c	LOS	v/c	LOS	v/c
Campbellville Road / Milborough Line								
Eastbound Left-Through-Right	-	0.00	-	0.00	-	0	-	0
Westbound Left-Through-Right	A	0.01	A	0.03				
Westbound Left-turn					A	0.12	A	0.09
Northbound Left-Through-Right	B	0.09	B	0.04				
Northbound Left-Through					B	0.24	B	0.10
Northbound Right-turn					B	0.24	B	0.10
Southbound Left-Through-Right	B	0.06	B	0.03	C	0.09	C	0.04

Intersection and Movements	2031 Background Traffic				2031 Total Traffic			
	Weekday AM Peak Hour		Weekday PM Peak Hour		Weekday AM Peak Hour		Weekday PM Peak Hour	
Campbellville Road / Nassagaweya 1st Line								
Eastbound Left-Through-Right	A	0.03	A	0.02	A	0.03	A	0.02
Westbound Left-Through-Right	A	0.01	A	0.01	A	0.01	A	0.01
Northbound Left-Through-Right	B	0.06	B	0.06	B	0.07	B	0.06
Southbound Left-Through-Right	B	0.13	B	0.13	C	0.16	B	0.16
Campbellville Road / Twiss Road								
Eastbound Left-Through-Right	A	0.06	A	0.02				
Eastbound Left-turn					A	0.13	A	0.10
Westbound Left-Through-Right	A	0	A	0.02	A	0.00	A	0.02
Northbound Left-Through-Right	B	0.09	B	0.05	C	0.12	C	0.06
Southbound Left-Through-Right	B	0.05	B	0.24				
Southbound Left-Through					B	0.12	B	0.27
Southbound Right-turn					B	0.12	B	0.27
Reid Sideroad / Crawford Crescent								
Westbound Left-Through	A	0.01	A	0.01	A	0.01	A	0.01
Northbound Left-Right	A	0.02	B	0.04	A	0.02	B	0.05
Reid Sideroad / Highway 401 EB Ramp								
Eastbound Left-turn	A	0.12	A	0.03	B	0.24	A	0.09
Eastbound Left-turn	E	0.89	B	0.37	F	1.36	C	0.49
Southbound Left-turn	A	0.02	A	0.01	A	0.05	A	0.02
Southbound Right-turn								
Guelph Line / Highway 401 WB Ramps								
Westbound Left-turn	D	0.52	C	0.52	F	0.85	E	0.7
Westbound Right-turn	B	0.24	C	0.67	B	0.24	C	0.66
Mountsberg Road / Milborough Line								
Eastbound Left-Right	A	0.03	A	0.03	A	0.04	A	0.03
Northbound Left-Through	A	0	A	0.01	A	0	A	0.01
Milborough Line / 3rd Sideroad								
Westbound Left-Right	A	0.01	A	0.01	B	0.02	B	0.01
Southbound Left-Through	A	0	-	-	A	0	-	-
Milborough Line/ Site Driveway								
Eastbound Left-turn					B	0.12	B	0.10
Eastbound Right-turn	-	-	-	-	A	0.01	A	0.04
Northbound Left-turn	-	-	-	-	A	0.03	A	0.00

The analysis of unsignalized intersections shows that in the year 2031, if an intersection movement has a volume to capacity ratio less than 1.0 in the background condition, it remains below 1.0 in Total Traffic Condition, with the exception of the southbound left-turn at Reid Sideroad and the Highway 401 EB Ramp. During the AM peak hour the ratio increases from 0.89 in the Background Condition to 1.36 in the Total Traffic Condition.

20.5.3 Queues at Rail Crossings

iTRANS conducted train surveys on Wednesday July 16th, 2008. There were two locations surveyed, the crossing on Twiss Road just north of Campbellville Road and the crossing on Campbellville Road west of Twiss Road. The train crossing on Campbellville Road did not have any trains during the AM and PM peak hours.

Based on the survey results and with projected 2031 total traffic volumes we have calculated the anticipated queue at the rail crossing, summarized in **Table 20-6**.

Table 20-6: 2031 Total Traffic Train Crossing Queue

Intersection and Movement	Queue (m)	
	AM Peak Hour	PM Peak Hour*
Twiss Rd / CP Rail Crossing		
Northbound	63	-
Southbound	43	-

*No trains observed during peak hour

The survey recorded the time the warning lights started and the time the warning lights stopped. From this we were able to calculate the delay to the vehicles. Based on an even arrival rate for future vehicles we calculated the anticipated peak hour queue length at the rail crossing. The queue length was calculated using passenger car equivalents for trucks.

21. SUMMARY OF MAJOR CONCLUSIONS AND RECOMMENDATIONS

The transportation analysis supports Alternative Haul Route 3 being identified as the Preferred Haul Route Alternative.

To ensure smooth and safe traffic operations are maintained effectively along the preferred haul route, it is recommended that the following road alterations be implemented:

- Upgrade of the road cross sections to incorporate up to date engineering standards, wider travelling lanes, and a designated cycling lane in both directions.
- Signalization of the Campbellville Road and Milborough Line Intersection
- Signalization of the Campbellville Road and Twiss Road Intersection
- Signalization of the Reid Sideroad / Highway 401 EB Ramp Intersection
- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Milborough Line
- Construction of eastbound and westbound exclusive left-turn lanes at Campbellville Road and Twiss Road
- Construction of a northbound channelized right-turn lane at Campbellville Road and Milborough Line with a truck acceleration lane on the east leg
- Construction of a southbound channelized right-turn lane at Campbellville Road and Twiss Road with a truck acceleration lane on the west leg

Other suggested mitigation measures include:

- Coordinate the traffic signals at Campbellville Road and Twiss Road with the signal controls at the rail crossing on Twiss Road
- Horizontal realignment on Campbellville Road to remove the existing substandard curves
- Modify rail crossing controls on Campbellville Road to include lights and gates
- Reduce speed limit on Milborough Line to 50 km/h

With the addition of quarry truck traffic and the recommended road alterations in place, the preferred haul route can operate safely and efficiently. This is supported by the traffic analysis that considers the 2021 and 2031 horizon years for both signalized and unsignalized intersections.



Appendix A

City of Hamilton

Terms of Reference

Mountsberg Quarry Haul Route Evaluation

April 2006

1.0 Introduction

The Lowndes Holdings Corp. has proposed to develop a Dolostone Quarry in the City of Hamilton at a location between Centre Rd and Milborough Line, north of Concession 11. **Figure 1** shows the location of the proposed quarry and the recommended study area for the haul route evaluation.

A concern associated with the project is the large volume of heavy truck traffic that would be generated by the quarry and the impact of traffic movement on traffic safety, social features and the natural environment along the haul route(s). In response to the Lowndes Holdings application for an amendment to the City of Hamilton Official Plan/Zoning By-law, the City is requesting that an evaluation be undertaken to select the preferred mode/routes to transport the aggregate material from the proposed quarry site.

The municipalities of Hamilton, Halton, Burlington and Milton are requesting that the evaluation to be completed be consistent with the requirements of the *Ontario Environmental Assessment Act* and its regulations (if applicable). Should there be a need to improve roadways to support the project (if the application receives *Planning Act* and *Aggregate Resource Act* approvals), a Class EA for these improvements will likely need to be undertaken (the MEA Municipal Class EA and/or the MTO Class EA for Provincial Highways). This haul route evaluation would serve to support the preferred alternative as part of possible future EAs to fulfill Ontario EA Act requirements and possibly the *Canadian Environmental Assessment Act*.

The activities that are to be undertaken in conducting the haul route assessment and comparative evaluation include:

- Define Study Parameter Assumptions;
- Identify and Evaluate Alternative Solutions;
- Identify Reasonable Alternative Routes within the study area giving consideration to applicable plans and policies including municipal official plans, the Greenbelt Plan and the Niagara Escarpment Plan;
- Identify and describe any needed improvements to the alternative routes to support projected truck volumes;
- Describe Baseline Environmental, Socio-cultural, Economic and Transportation Conditions;
- Develop the Evaluation Approach;
- Assess & Evaluate the Alternative Routes (considering the identified needed improvements);
- Select the Preferred Route(s);
- Describe Effects for the Preferred Route(s);
- Identify Potential Road Improvement Needs;

- Identify financial implications and proponent (Lowndes Holdings) and municipal responsibilities (short and long term);
- Prepare Draft and Final Evaluation Reports;
- Public Consultation (e.g. meetings/workshops (4)) and;
- Agency Consultation with but not limited to the following agencies (identified as the Agency Review Group):
 - The Municipalities of Hamilton, Halton, Burlington and Milton;
 - The Ministry of Transportation;
 - The Ministry of Natural Resources;
 - Halton Conservation;
 - The Niagara Escarpment Commission; and
 - Other agencies identified by the proponent

This Terms of Reference is to be considered as the minimum expectation for conducting this study and that the applicable municipalities reserve the right to request reasonable additions to the study should results warrant the need for additional or more detailed investigations.

2.0 Define Study Parameter Assumptions

Key assumptions regarding the project that are to be defined include but are not limited to:

- Assumed in-service date;
- Sizes of the trucks to be used;
- Volume of truck traffic to be generated;
- Location of truck queuing area(s);
- The distribution of truck traffic volumes among the potential haul routes (if more than one haul route is to be utilized);
- A description as to how truck volumes and truck tonnages might vary over the life of the project and by hours of the day, days of the week, and time of the year;
- Destinations of the material;
- Trucking base origins;
- Hours of facility operation, etc;
- How the use of routes would be regulated/enforced; and
- Horizon year and intervals required for analysis (20 yrs in 10 year increments).

The assessment should also identify Best Practices for both design/construction and operation activities with respect to aggregate transportation of similar operations in Ontario and other jurisdictions.

Should a Class EA be required for possible future road upgrades to the preferred haul route(s), these parameters would serve to support the rationale for the road improvements.

The selection of the proposed haul route is to consider potential quarry expansion plans.

3.0 Review of Alternative Solutions

To satisfy the Class EA requirement to consider “alternatives to” the undertaking, the proponent should identify and evaluate alternative solutions to transport the quarried material from the site. This may include road-based options; rail based options; or a combination thereof.

4.0 Identify Alternative Routes Within the Study Area

The reasonable alternative routes to be considered are to be identified and described. A map/air photo showing these routes is to be provided. As the future market area for aggregates is uncertain, the study area/alternative routes are to extend from the proposed quarry site to the entrance points of Ontario “400” series highways in all directions. If the proponent can rationalize/demonstrate why some travel directions from the quarry would not be used, or that the volume of truck traffic would be so low throughout the entire life of the facility so as to not result in any appreciable negative effects, then routes in these directions would not need to be assessed.

If more than one haul route is required for the quarry operation, or if return and exit trips are to be by separate routes then it is expected that several sets of alternatives routes would be generated (and evaluated) with each set having the same end point (i.e. a provincial “400” series Highway).

The identified alternative routes are to be presented to the agencies and public for review and comment prior to their assessment and evaluation. It is expected that agencies will be provided with the opportunity to review all materials in draft prior to public release.

5.0 Describe Baseline Conditions

A description of baseline conditions for all of the alternative routes is to be provided. As much of the information as possible should be presented on mapping/air photos using GIS or a reasonable alternative (ArcGIS preferred). A description of the following environmental components is to be provided:

- Aquatic Environment;
- Terrestrial environment including ESAs and other sensitive areas/features;
- Surface Water Features;
- Existing and Proposed Land Uses;
- Land use plans and designations including municipal official plans, the Green Belt Plan and the Niagara Escarpment Plan;

- Social Environment (residences, community features, recreation facilities, community function and character, school bus routes, emergency vehicle access, etc.);
- Air quality conditions;
- Noise levels;
- Economic Environment (location and type of business enterprises);
- Agriculture;
- Recreational uses (trail crossings, cycling uses, walking etc);
- Cultural resources (built heritage, cultural landscape, archaeology);
- Road characterization (roadway classification, right-of-way widths, level of service (current and projected), weight restrictions, number of lanes, pavement structure, intersection configuration, road alignment (vertical and horizontal), reduced load designations, posted speed, truck route designation, watercourse crossings, culvert types, rail crossings, steep grades, visibility etc.);
- Traffic Volumes; and
- 5 yr vehicle collision history by link/intersection including wildlife.

Baseline conditions need to be determined for the “future no build” scenario. The description of the baseline conditions will be used as the basis from which to assess the potential for change as a result of the use and possible improvement to the alternative options being considered.

6.0 Develop the Evaluation Approach

The evaluation of the identified alternative routes is to be conducted in a systematic, comprehensive and traceable manner consistent with the *Ontario Environmental Assessment Act*. The evaluation is to be based on a set of evaluation criteria and indicators. As an example, a basic list of assessment/evaluation criteria is provided in **Table 1**. It is noted that several of the example criteria may not apply, nevertheless they should be considered at the onset of the study. The data to be collected on the basis of the criteria is expected to be a mix on quantitative and qualitative data. The criteria and their relative importance are to be confirmed through agency and public consultation prior to their application.

The effects assessment is to consider the potential increase in truck volumes, as a result of quarry activity, over the anticipated future background traffic volumes for each alternative route. As well, the assessment of the alternative routes is to consider any needed improvements to the routes to support the projected increase in truck volumes.

Once developed, the assessment and comparative evaluation approach is to be submitted to the Agency Review Group for their review and comment.

7.0 Assess Effects of the Alternative Routes

Prior to the assessment of the alternatives, road improvements that are needed to support the existing uses and proposed use of each alternative route are to be identified (e.g. road widenings, resurfacing, turning lanes, new crossings/grade separations, paved shoulders, signals, etc.) and considered in the effects analysis/route comparison. There may be a need for additional supporting studies (e.g. geotechnical investigations, cost analysis) to establish road improvement needs.

For each set of alternative routes, the routes are to be assessed and a description of potential effects provided based on the selected assessment/evaluation criteria. The data is to be presented in a matrix format that describes the potential for effect for each indicator/alternative.

8.0 Comparatively Evaluate and Recommend the Preferred Route(s)

On the basis of the collected data/assessment of effects for each of the alternative routes, the alternatives are to be comparatively evaluated. The preference would be to use qualitative evaluation method, to be supported by a quantitative evaluation method if the data type supports one. In comparing the alternatives, the relative importance of the criteria is to be considered.

For each set of alternatives, the advantages and disadvantages of the alternatives are to be compared and considered in the rationalization of the preferred route(s).

The recommended preferred route(s) and the method by which this preference is achieved is to be presented to the agencies and then the public prior to its confirmation.

Table 1 – Example Evaluation Criteria

Table 1 – Example Evaluation Criteria	
Criteria	Indicators
Aquatic Environment/Surface Water	
Potential for disturbance to aquatic habitat	Number, character and sensitivity of watercourses crossed. Likelihood of increased runoff effects on these watercourses.
Potential for removal of aquatic habitat from road improvements (e.g. culvert extensions)	Number of watercourse culverts/structures that could require extension to accommodate road improvements. Magnitude of removal effects. Sensitivity of habitat affected.
Terrestrial Environment	
Potential for disturbance to natural habitat	Number/length and character of sensitive habitats that the haul routes pass by. Effects on vegetation from increased run-off from new road works, dust, emissions, etc..
Potential for removal of natural habitat from road improvements	Area, character and sensitivity of vegetation to be removed due to required road improvements. Potential effects on wildlife as a result of habitat removal.
Potential for increased wildlife kills	Presence of wildlife corridors that the routes pass through. Likelihood of increased wildlife kills as a result of increased truck traffic volumes.
Existing and Planned Land Uses	
Potential for disruption effects to sensitive planned land uses	Number, character of planned development areas. Sensitivity of planned development to increased truck traffic.
Potential for removal of planned land uses from road improvements	Area and importance of planned land use removed from road improvements.
Conformity with applicable plans and policies	Degree of conformity with official plans, the Greenbelt Plan and the Niagara Escarpment Plan.
Social Environment	
Potential for disruption to residents	Number and proximity of residences potentially affected by truck traffic.
	Effects on the character of communities.
	Effects on community function.
	Number of residences expected to experience a > 5 dbA increase in noise levels over future baseline conditions for any given hour and a description of the magnitude of change.
	Potential for health risks

Table 1 – Example Evaluation Criteria

Criteria	Indicators
Potential for disruption to users of recreation facilities, community features and institutions	Number, proximity, character/sensitivity and level of use of recreation facilities, community features and institutions potentially affected by truck traffic.
Potential for displacement/removal of residents & residential property from road improvements	Number and area of residences/residential property required (distinguish between partial and full removals).
Potential for removal of recreation, community features & institutions	Number, area and character of recreation, community features (including trails, bicycle routes, parks and open space) & institutional properties required (distinguish between partial and full removals).
Economic Environment	
Potential for disruption to business enterprises	Number, character/sensitivity, and proximity of businesses potentially affected by truck traffic.
Potential for removal of business enterprises and/ or property	Number, area, and character/sensitivity of businesses and business properties required (distinguish between partial and full removals)
Potential for affect on property values	Projected change in property values as a result of roadway use by quarry trucks.
Potential for effect on agricultural operations	Number of farms along the haul route potentially disrupted by truck traffic.
	Number, area and productivity/value of cropland removed for road improvements.
	Number and area of farm properties required for road improvements.
Cultural Resources	
Potential for disturbance to built heritage features	Number and character of built heritage features potentially affected by truck traffic
	Number of heritage properties removed from road improvements (distinguish between partial and full removals)
Potential for effects on archaeological resources	Potential for effects on archaeological resources as a result of road improvements (as reflected through archaeological potential)
Transportation	
Change in road service level	Change in road level of service/congestion
	Change in access levels for road users
	Effects on other roadways as a result of traffic diversion
Potential for change in road safety level	Potential for increase in collision frequency and severity
	Number of access points and intersections along the haul route
	Presence of other potential safety issues along the haul route (e.g. limited sight lines, steep grades, school bus routes, movement of agricultural vehicles and equipment)
Potential for impact on alternative transportation modes.	Potential for conflicts with other modes of transport along the haul route

Table 1 – Example Evaluation Criteria

Criteria	Indicators
Cost	
Estimated infrastructure costs	Estimated cost for all required road and other infrastructure improvements.
	Potential for additional costs to the municipality(s) (e.g. impacts to municipal maintenance operations)

9.0 Describe Effects and Mitigation for the Preferred Route(s)

For the preferred haul route(s), provide a description of the potential effects that are expected to occur from the anticipated truck traffic volumes. This description of effects is to be based on the evaluation criteria plus other more detailed criteria if appropriate. Assess overall acceptability of the route and the effects of increased tuck traffic on the quality of life for the affected individuals/communities. The proponent is to demonstrate that the effects of the preferred alternative (with the proposed truck volumes) can be considered as being “reasonable” and “acceptable”.

Any property requirements to support the preferred haul route(s) are to be described.

Mitigation measures to avoid or minimize effects, as input to the design phase also need to be described. Also, the method to regulate/enforce the use of the prescribed route(s) by all trucks associated with the quarry is to be described.

10.0 Prepare Draft and Final Evaluation Reports

A table of contents of the report is to be prepared and circulated to the municipalities of Hamilton, Halton, Burlington and Milton.

A draft report is to be prepared that describes the evaluation process, which is to be circulated to the affected municipalities (Hamilton, Halton, Burlington & Milton), other agencies and the public for review and comment. The report is to be finalized considering the comments received on the draft report.

11.0 Public and Agency Consultation

It is expected that there will be several consultation opportunities with stakeholders throughout the evaluation process. At a minimum, the study is to involve the following consultation activities:

- Involve agencies through the CART agency advisory process. Applicable agencies that are not part of CART are also to be involved. (The full complement of reviewing agencies is to be known as the Agency Review Group.)
- Initial public notice in local newspapers announcing the initiation of the study and where more information can be obtained; Residents, business owners and property owners within 100 m of the alternative haul routes are to receive the notice directly through mail out/drop-off.
- A meeting with the Agency Review Group to review the study approach/process, evaluation criteria, level of study detail, etc.
- Public notifications in local newspapers announcing the PICs/workshops two weeks and one week in advance of the events. Stakeholders along the alternative haul routes are also to receive a drop-off notice of the events in advance.
- Four public consultation events (with presentations) are to be held:
 - #1 - to introduce the project, to identify how the public would like to be involved and to identify initial public concerns and issues;
 - #2 - to present the draft alternative routes and the evaluation approach
 - #3 - a public workshop that allows the opportunity to provide input on the evaluation criteria, the relative importance of the criteria and the evaluation approach;
 - #4 - to present the draft results of the comparative evaluation/ effects assessment;
- A meeting with the Agency Review Group to review the draft study findings; and
- The circulation of the draft report for public and agency review and comments (providing at least 30 days for the review of this report).

We expect that the proponent would consult with the Ministry of Transportation on issues relating to provincial highways. In addition to the agencies listed under section 1, other agencies to be involved/consulted include the County of Wellington, Township of Puslinch and CP/CN Rail. It is requested that written acknowledgement be obtained from these agencies regarding their interest and/or concerns with the project.

It is expected that the proponent will be responsive to the issues and concerns of the agencies throughout the study period.

All consultation related materials including meeting minutes and comments received and responses are to be provided throughout the study process.

An initial fifty (50) hard copies and 50 CDs of the draft report are to be made available to the agencies as part of the 30-day review period. The same number of hard copies and CDs will be required of the Final Report.

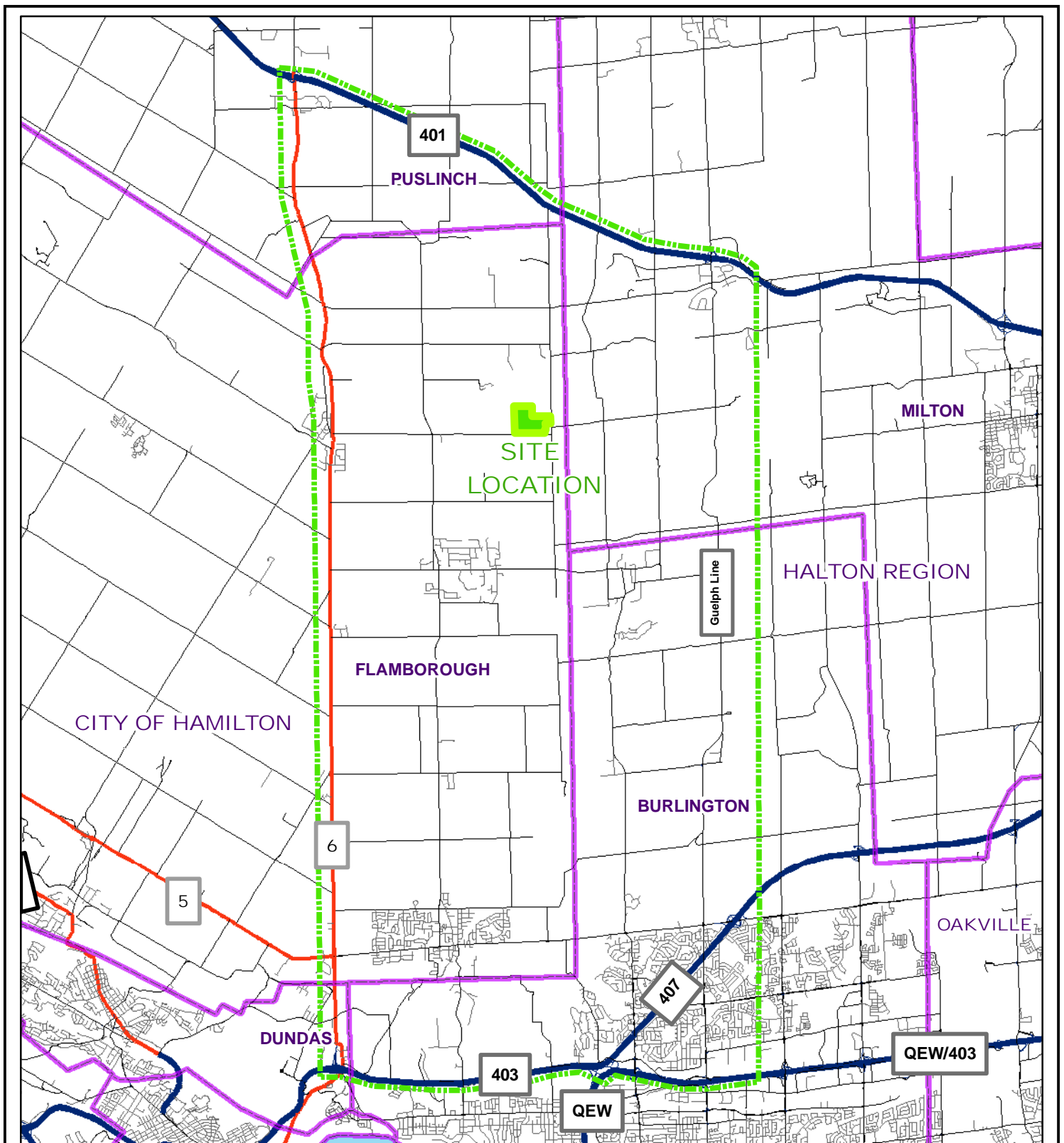


Figure 1

Mountsberg Quarry
Haul Route Evaluation
Terms of Reference-

Haul Route Evaluation
Study Area

Road Type

- Major Highway
- Ramp
- Highway
- Major Road
- Local Road



- Proposed Lowndes Quarry
- Study Area
- Municipal Boundary





Appendix B

Table 1: Screening of Alternative Haul Route Links

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
No. 1 Centre Road From Campbellville Rd To Concession 11 E	-No impacts on conservation lands -No impacts on sensitive wetlands	-Crosses an ESA		-34 driveways		-Passes by Mountsberg Baptist Church and Cemetery -45 driveways -Frequency of 23 school buses daily in total for both directions along this route	-No businesses				-Existing designated truck route -No CP railway crossings -Easily accessible for trucks from quarry site	-On-street bike route (cautionary, un-signed)		-Road upgrades	Yes
No. 2 Centre Road From Concession 11 E To Carlisle Road	-No impacts on sensitive wetlands			-Passes through the heart of the Carlisle community -Passes by two schools, Balaclava Elementary School and our Lady of Mount Carmel Catholic School - Passes by Carlisle Community Centre and Hamilton Public Library -Passes by Flamborough Carlisle Memorial Park		-Passes through the heart of the Carlisle community -Passes by two schools, Balaclava Elementary School and our Lady of Mount Carmel Catholic School - Passes by Carlisle Community Centre and Hamilton Public Library -Passes by Flamborough Carlisle Memorial Park -Frequency of 54 school buses daily in total for both directions along this route		-Passes through the heart of the Carlisle community -6 businesses			-No CP railway crossings	-On-street bike route (cautionary, un-signed) -Reconstruction and widening required -Existing designated truck route with maximum 30-tonne restriction		-Reconstruction and widening required.	No
No. 3 Centre Road From Carlisle Road To Dundas Street		-Passes by Carlisle Conservation Area -Crosses several ESAs		-Passes through the heart of the Carlisle community -Passes by Carlisle United Church and Cemetery -Passes through Flamborough Centre -Passes through Concession 5 E settlement area -Passes through the Waterdown community		-Passes through the heart of the Carlisle community -Passes by Carlisle United Church and Cemetery -Passes through Flamborough Centre -Passes through Concession 5 E settlement area -Passes through the Waterdown community		-Passes through the heart of the Carlisle community -Passes by Carlisle United Church and Cemetery -Passes through Flamborough Centre -Passes through the Waterdown community			-Designated truck route with no restrictions	-Congestion through Waterdown -Speed limits to <60km/hr near Carlisle and Waterdown -Reconstruction and widening required -On-street bike route (cautionary, un-signed)		-Reconstruction and widening required	No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
				-Passes by four schools: Riverwalk Country Day Montessori, Guardian Angels Elementary School, Flamborough Centre Elementary and St. Thomas. -Passes by four parks, Carlisle Conservation Area, Flamborough Centre Community Park, Centre Park and Waterdown Memorial Park		-Passes by four schools, Riverwalk Country Day Montessori, Guardian Angels Elementary School, Flamborough Centre Elementary and St. Thomas. -Passes by four parks, Carlisle Conservation Area, Flamborough Centre Community Park, Centre Park and Waterdown Memorial Park -Frequency of 232 school buses daily in total for both directions along this route		-Passes by four parks, Carlisle Conservation Area, Flamborough Centre Community Park, Centre Park and Waterdown Memorial Park -27 businesses							
No. 4 Milborough Line From Highway 401 To Campbellville Road		-Passes by Mountsberg Wildlife Centre -Passes by Environmentally Significant Area -Conservation Land		-Passes by Mountsberg Wildlife Centre -Conservation Land		-On-street bike route						-Not an existing truck route -Questionable feasibility for new 401 interchange -Existing railway crossing with lights only control -On-street bike route (cautionary, un-signed) -Significant engineering deficiencies -Major reconstruction and widening required		-Significant engineering deficiencies -Major reconstruction and widening required -Construction of a trumpet interchange required	Yes
No. 5 Milborough Line From Campbellville Rd To Concession 11 E		-Passes an ESA		-25 driveways		-On-street bike route -25 driveways -Frequency of 11 school buses daily in total for both directions along this route		-1 business			-Easily accessible for trucks from quarry site	-Truck route with seasonal or year round load restrictions -Substandard visibility -On-street bike route (cautionary, un-signed)		-Reconstruction and widening required	Yes
No. 6 Milborough Line From Concession 11 E To Derry Road		-Passes several ESAs				-On-street bike route -Frequency of 25 school buses daily in total for both directions along this route		-1 business				-Not an existing truck route -Substandard visibility and significant engineering		-Significant engineering deficiencies -Major reconstruction and widening required	No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
												deficiencies -On-street bike route (cautionary, un-signed) -Major reconstruction and widening required -CP rail crossing (lights only)			
No. 7 Brant Street From Dundas Street To QEW				-Passes through heavily-built up area in Burlington -Passes by Kingsbridge School -Passes by Brant Hill Community Centre & Library -Passes by two churches, Brant Hills Presbyterian Church and Prince of Peace Lutheran Church -Numerous homes backing on to Brant -Numerous business along Brant		-Passes through heavily-built up area in Burlington -Passes by Kingsbridge School -Passes by Brant Hill Community Centre & Library -Passes by two churches, Brant Hills Presbyterian Church and Prince of Peace Lutheran Church -Numerous homes backing on to Brant		-Numerous businesses along Brant				-Cannot access QEW Niagara without going on Faireview or Plains Road -Numerous traffic signals along this link -Significant traffic congestion on Brant			No
No. 8 Guelph Line From Highway 401 To Derry Road		-Passes by Conservation Areas: Campbellville Conservation Area, Carwford Lake Forestry Tract, Crawford Lake Conservation Area		-Passes through the heart of the Campbellville -Passes by many businesses -Passes by church and several parks/conservation areas		-Passes by several churches, St. David's Presbyterian Church & Cemetery and St. Andrew's Anglican Church -Passes by Campbellville Ball Park -Frequency of 30 school buses daily in total for both directions along this route		-Passes by 7 businesses in Campbellville and numerous other further south			-No cycling facilities -Truck route with no restrictions	-Potential conflicts with auto traffic and pedestrians -Not easily accessible for trucks from the quarry site -Cannot access 401 without passing through business heart of Campbellville -Long steep grades north of Derry Road and south of Campbellville -Interchange near 401 under construction			No
No. 9 Guelph Line From Derry Road To Dundas Street		-Passes by Mount Nemo Conservation Area		-Passes through Lowville community		-Passes by Lowville Park and Burlington Memorial Gardens		-Passes by many businesses			-No cycling facilities -Truck route with no restrictions	-Potential conflicts with auto traffic and pedestrians -Long steep grades			No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
				-Passes through Mount Nemo community -Passes by parks and Conservation Area		-Passes by Happy Times for Kids Daycare -Frequency of 47 school buses daily in total for both directions along this route		-Passes by Crosswinds Golf & Country Club and Lowville Golf Club				in Lowville area and north of Dundas Street -Not easily accessible for trucks from the quarry site			
No. 10 Guelph Line From Dundas Street To QEW				-Passes through heavily-built up area in Burlington -Passes by several churches, St. Johns Anglican Church, Calvary Baptist Church, and Glad Tidings Pentecostal Church -Passes by MM Robinson High School -Numerous homes backing on to Guelph Line -Numerous businesses along Guelph Line		-Numerous homes backing on to Guelph Line -Passes by several churches, St. Johns Anglican Church, Calvary Baptist Church, and Glad Tidings Pentecostal Church -Passes by MM Robinson High School -Frequency of 8 school buses daily in total for both directions along this route		-Numerous businesses along Guelph Line			-No cycling facilities -Truck route with no restrictions	-Guelph Line not easily accessible for trucks from the quarry site -Significant traffic congestion on Guelph Line through Burlington -Numerous traffic signals			No
No. 11 Campbellville Road From Highway 6 To Centre Road		-Crosses ESA		-Passes by Mountsberg Baptist Church & Cemetery -218 driveways		-18 driveways -Frequency of 6 school buses daily in total for both directions along this route		-2 businesses			-Designated truck route with seasonal load restrictions		-Reconstruction or and road upgrades required		Yes
No. 12 Campbellville Road From Centre Street To Milborough Line		-Crosses 2 ESAs		-38 driveways		-38 driveways -Major reconstruction required with significant implications to adjacent properties/accesses expected -5 businesses -Frequency of 5 school buses daily in total for both directions along this route					-Designated truck route with seasonal road restrictions	-Significant visibility problems with 'roller coaster' alignment -Major reconstruction required with significant implications to adjacent properties/accesses expected	-Major reconstruction required with significant implications to adjacent properties/accesses expected		Yes
No. 13 Campbellville Road From Milborough Line To Twiss Road		-Passes by Laking Tract and Thomas William Harrison Tract		-Passes by Laking Tract and Thomas William Harrison Tract -17 driveways		-17 driveways -Frequency of 8 school buses daily in total for both directions along this route		-1 business			-Truck route with seasonal load restrictions	-Passes through a CP crossing (lights only)	-Reconstruction or and road upgrades required		Yes

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
No. 14 Campbellville Road From Twiss Road To Guelph Line		-Passes by Campbellville Conservation Area		-Passes through Campbellville built-up area -Numerous homes and driveways -Passes by Campbellville Conservation Area -Passes by St. David's Presbyterian Church & Cemetery -Passes by Campbellville Ball Park		-Passes through Campbellville built-up area -Numerous homes and driveways -Passes by St. David's Presbyterian Church & Cemetery -Passes by Campbellville Ball Park -Frequency of 4 school buses daily in total for both directions along this route		-Passes through Campbellville built-up area -1 business				-Designated truck route with year- round load restrictions	-Passes through a CP crossing (with lights and gates) -Deficient road alignment at CP crossing -Major physical constraints at Guelph Line intersection for turning truck traffic -Cannot access 401 without passing through business heart of Campbellville -Interchange near 401 under construction	-Reconstruction required to mitigate the deficient road alignment at CP crossing -Upgrade existing road structure	No
No. 15 Carlisle Road From Highway 6 To Milborough Line		-Passes by Carlisle Conservation Area		-Passes through the heart of Carlisle community -Passes by Courtcliff Park and Carlisle Conservation Area -Numerous homes and businesses		-Passes through the heart of Carlisle community -Numerous homes along the route -Passes by Carlisle Golf & Country Club -Frequency of 36 school buses daily in total for both directions along this route		-Passes through the heart of Carlisle community -11 businesses along the route -Passes by Carlisle Golf & Country Club				-Designated truck route with seasonal load restrictions	-Passes through a CP crossing (lights only) -Numerous driveways and accesses along the route -On-street bike route (cautionary, un-signed) -Potential conflicts with autos and pedestrians -Reconstruction and widening required	-Reconstruction, upgrade and widening required	No
No. 16 Derry Road From Milborough Line To Guelph Line						-Frequency of 16 school buses daily in total for both directions along this route							-Milborough Line not suitable access route to Derry due to significant engineering and safety deficiencies -Suggested bike route east of Twiss Road -Reconstruction and widening required	-Reconstruction, upgrade and widening required	No
No. 17 Concession 11 E From Highway 6 To Centre Road		-ANSI -ESA		-37 driveways		-Passes by 37 driveways -Frequency of 9 school buses daily in total for both directions along this route						-Easily accessible for trucks from the quarry site -Direct access from quarry site to Highway 6 via this route	-On-street bike route (cautionary, un-signed) -Not an existing truck route	-Reconstruction and widening required	Yes

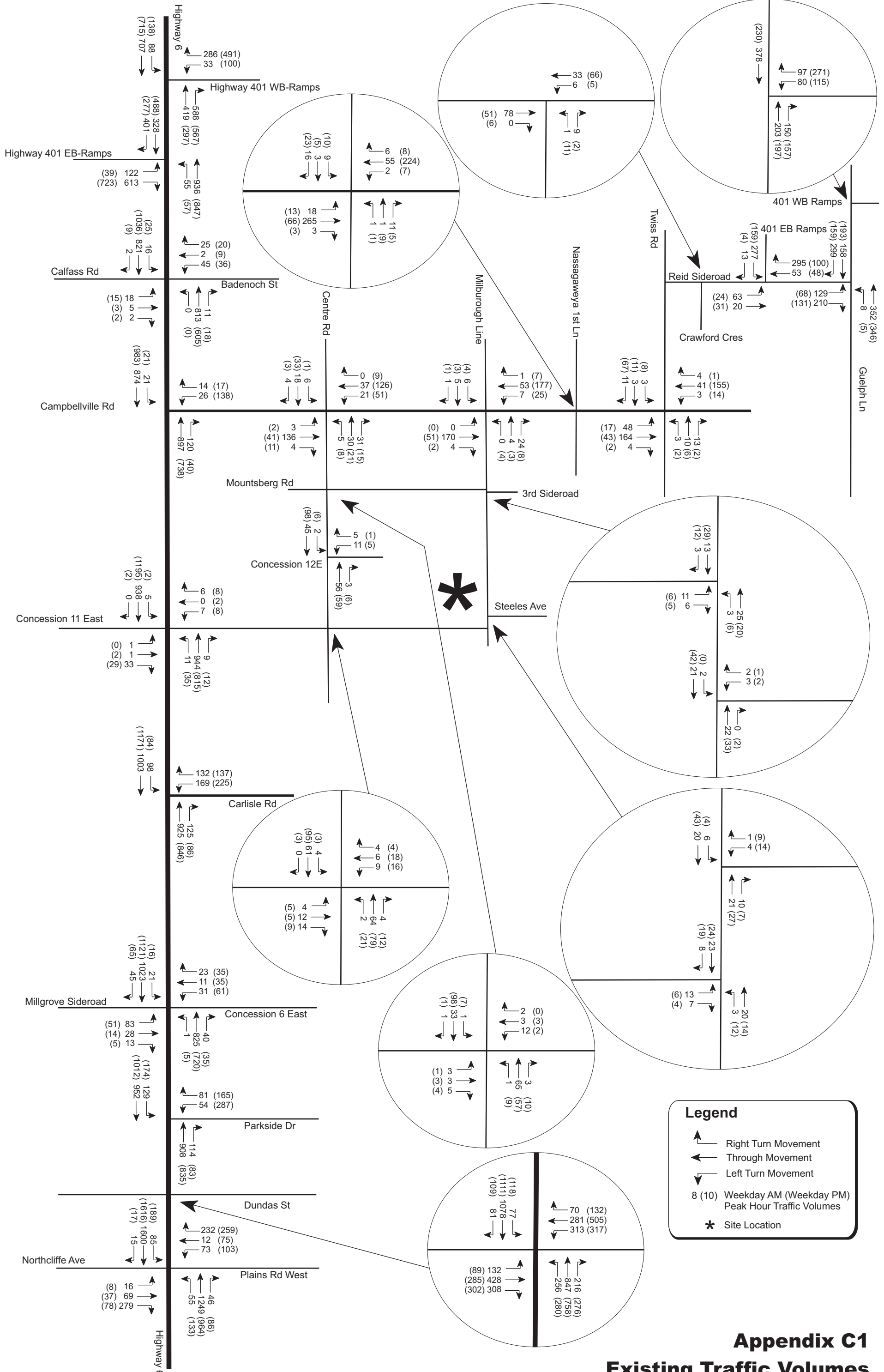
Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
No. 18 Concession 11 E From Centre Road To Milborough Line		-Passes by an ESA		-44 driveways		-Passes by Lawson Park -Passes by 44 driveways -Frequency of 5 school buses daily in total for both directions along this route					-Easily accessible for trucks from the quarry site -Direct access from quarry site to Highway 6 via this route	-Short section of substandard visibility -			Yes
No. 19 Concession 6 E From Highway 6 To Centre Road				-Passes through Flamborough Centre Community -Passes by Flamborough Centre Community Park, Centre Park -Passes by Community Church, Flamborough Christian Fellowship -Passes by Flamborough Centre Elementary School		-Passes by Community Church, Flamborough Christian Fellowship -Passes by Flamborough Centre Elementary School -Frequency of 10 school buses daily in total for both directions along this route					-Designated truck route with seasonal load restrictions -Traffic signal at Highway 6	-On-street bike route (cautionary, un-signed)			No
No. 20 Parkside Drive From Highway 6 To Evans Road				-Passes through the Waterdown built-up area -Numerous homes along the route -Passes by several schools		-Numerous homes along the route -Passes by Flamborough YMCA -Passes by several schools, Allan A. Greenleaf, Guy Brown, Waterdown District Secondary School -Passes by James United Church -Passes by Fire Station #24		-Numerous businesses along the route -Passes by Flamborough YMCA				-Traffic congestion -Passes through a CP crossing (lights and gates) -Passes by Fire Station #24 -On-street bike route (cautionary, un-signed)			No
No. 21 Dundas Street From Highway 6 To Guelph Line				-Passes by numerous homes -Passes by numerous businesses		-Numerous homes along the route -Passes by St. Thomas Church, St. Johns Anglican Church, Nelson United Church and Cemetery -Passes by Kingsbridge School		-Numerous businesses along the route			-Designated truck route with no restrictions	-Significant conflicts with pedestrians and auto traffic -Passes by numerous driveways and acceses			No

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
						-Passes through the heart of the Waterdown community -Passes by New City Park									
No. 22 Concession 12 E		-Significant impacts on the natural environment -Large ESA -Located on sensitive wetlands		-Located on sensitive wetlands		-Neighbouring subdivision						-Not an existing truck route -Significant construction required		-Significant construction required	No
No. 23 Highway 6 From Highway 401 To Campbellville Road		-Passes by ESA				-Passes through Morriston community -Frequency of 6 school buses daily in total for both directions along this route		-Passes numerous businesses			-Easily accessible for trucks from quarry site -Direct access to 401 and 403 -Designated truck route with no restrictions -No widening required	-Existing congestion through Morriston	-No widening required		Yes
No. 24 Highway 6 From Campbellville Rd To Concession 11 E		-Passes by ESA				-Passes through Freerton community -Frequency of 10 school buses daily in total for both directions along this route		-Passes through Freerton community			-Easily accessible for trucks from quarry site -Direct access to 401 and 403 -Designated truck route with no restrictions		-No new construction		Yes
No. 25 Highway 6 From Concession 11 E To Highway 403		-Passes by small ESAs				-Passes through Millgrove community -Frequency of 73 school buses daily in total for both directions along this route		-Passes through Millgrove community			-Easily accessible for trucks from quarry site -Direct access to 401 and 403 -Designated truck route with no restrictions -No widening required		-No new construction		
No. 26 Twiss Road From Campbellville Rd To Reid Sideroad								-2 businesses			-Truck route with no restrictions	-Passes through a CP crossing (lights and gates) -May require railway crossing upgrade			Yes
No. 27 Reid Sideroad From Twiss Road To Guelph Line				-Passes by Campbellville Ball Park		-Passes by Campbellville Emergency Response Centre (Fire Station #2)		-1 business			-Truck route with no restrictions				Yes

Link No. / Road Link/ To/From	Aquatic and Terrestrial Environment		Existing and Planned Land Use		Social Environment		Economic Environment		Cultural Resources		Transportation		Costs		Carry Forward
	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Advantage	Disadvantage	Yes/No
						-Passes by St. David's Presbyterian Church and Cemetery -Passes by Campbellville Ball Park -Frequency of 4 school buses daily in total for both directions along this route									



Appendix C1

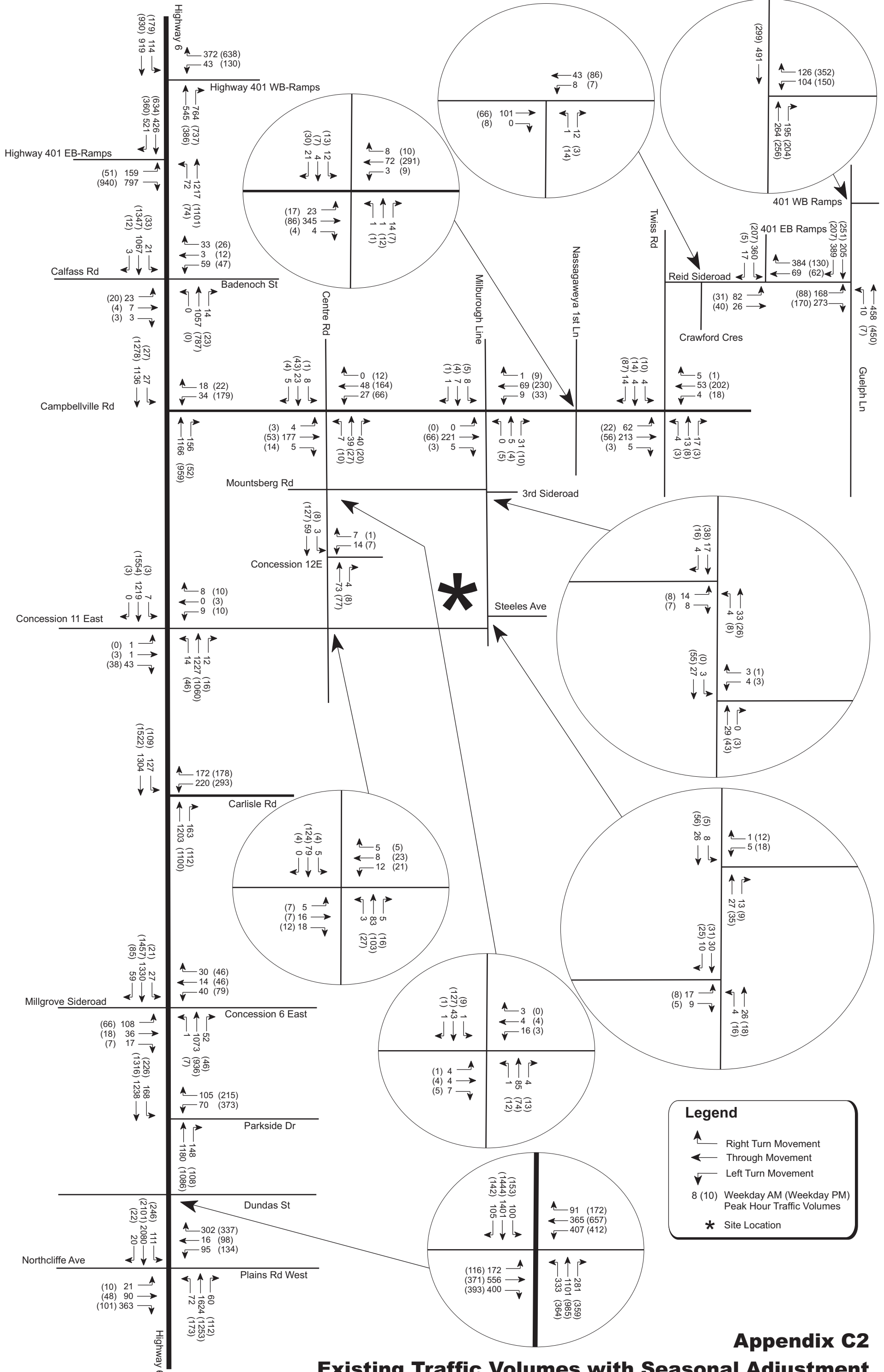


Legend

- Right Turn Movement
- Through Movement
- Left Turn Movement
- 8 (10) Weekday AM (Weekday PM) Peak Hour Traffic Volumes
- * Site Location

Appendix C1
Existing Traffic Volumes

Appendix C2



Legend

- Right Turn Movement
- Through Movement
- Left Turn Movement
- 8 (10) Weekday AM (Weekday PM) Peak Hour Traffic Volumes
- * Site Location













Appendix C2
Existing Traffic Volumes with Seasonal Adjustment



Appendix D

HCM Signalized Intersection Capacity Analysis
1: 401 WB-Ramps & Highway 6

Weekday AM Peak Hour
2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1517	1452	1743	1452	1385	1681
Flt Permitted	0.95	1.00	1.00	1.00	0.35	1.00
Satd. Flow (perm)	1517	1452	1743	1452	511	1681
Volume (vph)	49	423	705	870	130	1189
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	51	441	734	906	135	1239
RTOR Reduction (vph)	0	0	0	173	0	0
Lane Group Flow (vph)	51	441	734	733	135	1239
Heavy Vehicles (%)	15%	10%	9%	10%	26%	13%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	6.0	88.0	69.7	69.7	69.7	69.7
Effective Green, g (s)	6.8	88.0	71.2	71.2	71.2	71.2
Actuated g/C Ratio	0.08	1.00	0.81	0.81	0.81	0.81
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	117	1452	1410	1175	413	1360
v/s Ratio Prot	0.03		0.42			c0.74
v/s Ratio Perm		c0.30		0.50	0.26	
v/c Ratio	0.44	0.30	0.52	0.62	0.33	0.91
Uniform Delay, d1	38.8	0.0	2.8	3.2	2.2	6.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	0.5	1.4	2.5	2.1	10.7
Delay (s)	41.4	0.5	4.1	5.7	4.3	16.8
Level of Service	D	A	A	A	A	B
Approach Delay (s)	4.8		5.0			15.6
Approach LOS	A		A			B
Intersection Summary						
HCM Average Control Delay			9.1		HCM Level of Service	A
HCM Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	5.0
Intersection Capacity Utilization			79.2%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
3: 401 EB-Ramps & Highway 6

Weekday AM Peak Hour
2021 Background Traffic






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1616	1413	1504	1743	1681	1377
Flt Permitted	0.95	1.00	0.11	1.00	1.00	1.00
Satd. Flow (perm)	1616	1413	175	1743	1681	1377
Volume (vph)	181	907	82	1574	551	593
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	189	945	85	1640	574	618
RTOR Reduction (vph)	0	63	0	0	0	404
Lane Group Flow (vph)	189	882	85	1640	574	214
Heavy Vehicles (%)	8%	13%	16%	9%	13%	16%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	10.0	44.0	67.7	67.7	29.7	29.7
Effective Green, g (s)	10.8	43.8	69.2	69.2	31.2	31.2
Actuated g/C Ratio	0.12	0.49	0.77	0.77	0.35	0.35
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	194	766	622	1340	583	477
v/s Ratio Prot	0.12	c0.42	0.05	c0.94	0.34	
v/s Ratio Perm		0.20	0.05			0.16
v/c Ratio	0.97	1.15	0.14	1.22	0.98	0.45
Uniform Delay, d1	39.5	23.1	7.3	10.4	29.2	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	56.7	82.8	0.1	107.6	33.7	3.0
Delay (s)	96.2	105.9	7.4	118.0	62.8	25.8
Level of Service	F	F	A	F	E	C
Approach Delay (s)	104.3			112.6	43.6	
Approach LOS	F			F	D	

Intersection Summary			
HCM Average Control Delay	90.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

Weekday AM Peak Hour
2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Fr _t		0.99			1.00	0.85		1.00		1.00	1.00	
Fl _t Protected		0.97			0.95	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1456			1779	1426		1726		1646	1624	
Fl _t Permitted		0.74			0.71	1.00		1.00		0.05	1.00	
Satd. Flow (perm)		1120			1318	1426		1726		78	1624	
Volume (vph)	26	8	3	67	3	38	0	1367	16	24	1380	3
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	27	8	3	70	3	40	0	1424	17	25	1438	3
RTOR Reduction (vph)	0	3	0	0	0	36	0	0	0	0	0	0
Lane Group Flow (vph)	0	35	0	0	73	4	0	1441	0	25	1441	0
Heavy Vehicles (%)	17%	60%	0%	2%	0%	12%	0%	10%	0%	6%	17%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		10.1			10.1	10.1		87.3		87.3	87.3	
Effective Green, g (s)		11.3			11.3	11.3		88.7		88.7	88.7	
Actuated g/C Ratio		0.10			0.10	0.10		0.81		0.81	0.81	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		115			135	146		1392		63	1310	
v/s Ratio Prot								0.83			c0.89	
v/s Ratio Perm		0.03			c0.06	0.00				0.32		
v/c Ratio		0.31			0.54	0.03		1.04		0.40	1.10	
Uniform Delay, d ₁		45.7			46.9	44.4		10.6		3.0	10.6	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d ₂		1.5			4.4	0.1		33.7		17.6	56.9	
Delay (s)		47.2			51.3	44.5		44.3		20.7	67.6	
Level of Service		D			D	D		D		C	E	
Approach Delay (s)		47.2			48.9			44.3			66.8	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM Average Control Delay		55.3										E
HCM Volume to Capacity ratio		1.04										
Actuated Cycle Length (s)		110.0								10.0		
Intersection Capacity Utilization		102.1%										G
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

Weekday AM Peak Hour
2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1678	1581	3438	1566	1728	3505
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1678	1581	3438	1566	161	3505
Volume (vph)	250	196	1556	186	145	1687
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	275	215	1710	204	159	1854
RTOR Reduction (vph)	0	107	0	97	0	0
Lane Group Flow (vph)	275	108	1710	107	159	1854
Heavy Vehicles (%)	4%	1%	5%	2%	1%	3%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.4	16.4	37.2	37.2	46.2	46.2
Effective Green, g (s)	17.4	17.4	40.1	40.1	49.1	49.1
Actuated g/C Ratio	0.23	0.23	0.52	0.52	0.64	0.64
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	382	360	1802	821	185	2250
v/s Ratio Prot	c0.16		c0.50		0.04	c0.53
v/s Ratio Perm		0.07		0.07	0.51	
v/c Ratio	0.72	0.30	0.95	0.13	0.86	0.82
Uniform Delay, d1	27.3	24.5	17.2	9.3	16.1	10.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.4	0.5	12.1	0.3	30.5	3.6
Delay (s)	33.7	25.0	29.4	9.6	46.6	14.0
Level of Service	C	C	C	A	D	B
Approach Delay (s)	29.9		27.3			16.6
Approach LOS	C		C			B
Intersection Summary						
HCM Average Control Delay			22.7	HCM Level of Service		C
HCM Volume to Capacity ratio			0.91			
Actuated Cycle Length (s)			76.5	Sum of lost time (s)	15.0	
Intersection Capacity Utilization			77.4%	ICU Level of Service	D	
Analysis Period (min)			15			
c	Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
 116: Reid Sideroad & Guelph Line

Weekday AM Peak Hour
 2021 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1646	1566	1544	1792	1648	
Flt Permitted	0.95	1.00	0.30	1.00	1.00	
Satd. Flow (perm)	1646	1566	489	1792	1648	
Volume (vph)	191	311	11	521	233	443
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	203	331	12	554	248	471
RTOR Reduction (vph)	0	260	0	0	61	0
Lane Group Flow (vph)	203	71	12	554	658	0
Heavy Vehicles (%)	6%	2%	13%	6%	9%	3%
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	15.3	15.3	53.2	53.2	53.2	
Effective Green, g (s)	17.3	17.3	55.2	55.2	55.2	
Actuated g/C Ratio	0.21	0.21	0.69	0.69	0.69	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	354	337	335	1229	1130	
v/s Ratio Prot	c0.12			0.31	c0.40	
v/s Ratio Perm		0.05	0.02			
v/c Ratio	0.57	0.21	0.04	0.45	0.58	
Uniform Delay, d1	28.3	26.0	4.1	5.8	6.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.2	0.3	0.2	1.2	2.2	
Delay (s)	30.5	26.3	4.3	7.0	8.8	
Level of Service	C	C	A	A	A	
Approach Delay (s)	27.9			6.9	8.8	
Approach LOS	C			A	A	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 9: Concession 6 E & Highway 6















Weekday AM Peak Hour
 2021 Background Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.95		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1614		1556	1527		1805	3282	1468	1719	3312	1455
Flt Permitted	0.72	1.00		0.71	1.00		0.07	1.00	1.00	0.11	1.00	1.00
Satd. Flow (perm)	1290	1614		1166	1527		129	3282	1468	205	3312	1455
Volume (vph)	123	41	19	46	16	34	1	1388	59	31	1720	67
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	140	47	22	52	18	39	1	1577	67	35	1955	76
RTOR Reduction (vph)	0	7	0	0	20	0	0	0	21	0	0	23
Lane Group Flow (vph)	140	62	0	52	37	0	1	1577	46	35	1955	53
Heavy Vehicles (%)	6%	7%	23%	16%	0%	17%	0%	10%	10%	5%	9%	11%
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	14.3	14.3		14.3	14.3		56.0	56.0	56.0	56.0	56.0	56.0
Effective Green, g (s)	16.1	16.1		16.1	16.1		58.9	58.9	58.9	58.9	58.9	58.9
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.69	0.69	0.69	0.69	0.69	0.69
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	244	306		221	289		89	2274	1017	142	2295	1008
v/s Ratio Prot		0.04			0.02			0.48			c0.59	
v/s Ratio Perm	c0.11			0.04			0.01		0.03	0.17		0.04
v/c Ratio	0.57	0.20		0.24	0.13		0.01	0.69	0.05	0.25	0.85	0.05
Uniform Delay, d1	31.3	29.0		29.2	28.6		4.0	7.7	4.1	4.8	9.8	4.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	0.3		0.6	0.2		0.2	1.8	0.1	4.1	4.2	0.1
Delay (s)	34.6	29.4		29.8	28.8		4.3	9.5	4.2	8.9	14.0	4.3
Level of Service	C	C		C	C		A	A	A	A	B	A
Approach Delay (s)		32.9			29.3			9.3			13.6	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM Average Control Delay			13.2			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			85.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			69.4%			ICU Level of Service				C		
Analysis Period (min)			15									

c Critical Lane Group




































HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

Weekday AM Peak Hour
 2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1599	3312	1615	1703	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.08	1.00
Satd. Flow (perm)	1805	1599	3312	1615	141	3471
Volume (vph)	80	119	1526	168	191	1601
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	82	123	1573	173	197	1651
RTOR Reduction (vph)	0	106	0	69	0	0
Lane Group Flow (vph)	82	17	1573	104	197	1651
Heavy Vehicles (%)	0%	1%	9%	0%	6%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	10.6	10.6	49.6	49.6	62.0	62.0
Effective Green, g (s)	12.1	12.1	52.5	52.5	64.9	64.9
Actuated g/C Ratio	0.14	0.14	0.60	0.60	0.75	0.75
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	251	222	1999	975	238	2589
v/s Ratio Prot	c0.05		0.47		0.07	c0.48
v/s Ratio Perm		0.01		0.06	c0.55	
v/c Ratio	0.33	0.08	0.79	0.11	0.83	0.64
Uniform Delay, d1	33.8	32.6	13.0	7.3	20.4	5.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.1	3.2	0.2	19.6	1.2
Delay (s)	34.5	32.7	16.2	7.5	40.0	6.6
Level of Service	C	C	B	A	D	A
Approach Delay (s)	33.5		15.4			10.1
Approach LOS	C		B			B
Intersection Summary						
HCM Average Control Delay			13.8	HCM Level of Service		B
HCM Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			87.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			73.6%	ICU Level of Service		D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Dundas St & Highway 6





















Weekday AM Peak Hour
2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	 		 	  		  	  	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	4988	1417	3367	3438	1468	3183	4803	1583	1612	4848	1442
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1687	4988	1417	3367	3438	1468	3183	4803	1583	1612	4848	1442
Volume (vph)	196	633	455	463	415	104	379	1424	320	114	1812	119
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	200	646	464	472	423	106	387	1453	327	116	1849	121
RTOR Reduction (vph)	0	0	158	0	0	81	0	0	201	0	0	52
Lane Group Flow (vph)	200	646	306	472	423	25	387	1453	126	116	1849	69
Heavy Vehicles (%)	7%	4%	14%	4%	5%	10%	10%	8%	2%	12%	7%	12%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	15.6	24.0	24.0	16.6	25.0	25.0	14.6	44.1	44.1	11.5	41.0	41.0
Effective Green, g (s)	15.1	26.8	26.8	16.1	27.8	27.8	14.1	46.1	46.1	11.0	43.0	43.0
Actuated g/C Ratio	0.13	0.22	0.22	0.13	0.23	0.23	0.12	0.38	0.38	0.09	0.36	0.36
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	212	1114	316	452	796	340	374	1845	608	148	1737	517
v/s Ratio Prot	0.12	0.13		c0.14	0.12		c0.12	c0.30		0.07	c0.38	
v/s Ratio Perm			c0.22			0.02			0.08			0.05
v/c Ratio	0.94	0.58	0.97	1.04	0.53	0.07	1.03	0.79	0.21	0.78	1.06	0.13
Uniform Delay, d1	52.0	41.6	46.2	52.0	40.4	36.0	53.0	32.6	24.7	53.3	38.5	25.9
Progression 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
Incremental Delay, d2	45.4	0.5	41.6	54.3	0.3	0.0	55.8	3.5	0.8	21.6	41.1	0.5
Delay (s)	97.4	42.0	87.8	106.3	40.7	36.1	108.8	36.1	25.5	75.0	79.6	26.5
Level of Service	F	D	F	F	D	D	F	D	C	E	E	C
Approach Delay (s)		66.7			71.2			47.5			76.3	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM Average Control Delay			64.1			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.08									
Actuated Cycle Length (s)			120.0	Sum of lost time (s)			25.0					
Intersection Capacity Utilization			88.9%	ICU Level of Service			E					
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 15: Northcliffe Ave & Highway 6












Weekday AM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.90			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00			0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1682			1719	1538	1770	3223	1553	1736	3277	
Flt Permitted		0.98			0.15	1.00	0.07	1.00	1.00	0.07	1.00	
Satd. Flow (perm)		1656			266	1538	122	3223	1553	120	3277	
Volume (vph)	24	102	413	108	18	344	82	2101	68	126	2691	23
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	25	105	426	111	19	355	85	2166	70	130	2774	24
RTOR Reduction (vph)	0	64	0	0	0	68	0	0	19	0	0	0
Lane Group Flow (vph)	0	492	0	0	130	287	85	2166	51	130	2798	0
Heavy Vehicles (%)	6%	4%	0%	7%	0%	5%	2%	12%	4%	4%	10%	13%
Turn Type	Perm			Perm		Perm	pm+pt		Perm	pm+pt		
Protected Phases		4			8		5	2			1	6
Permitted Phases	4			8		8	2		2		6	
Actuated Green, G (s)		26.5			26.5	26.5	63.1	58.1	58.1	63.1	58.1	
Effective Green, g (s)		28.0			28.0	28.0	64.0	61.0	61.0	64.0	61.0	
Actuated g/C Ratio		0.26			0.26	0.26	0.60	0.57	0.57	0.60	0.57	
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9	
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0	
Lane Grp Cap (vph)		433			70	402	119	1837	885	117	1868	
v/s Ratio Prot							0.02	0.67		c0.03	c0.85	
v/s Ratio Perm		0.30			c0.49	0.19	0.41		0.03	0.63		
v/c Ratio		1.14			1.86	0.71	0.71	1.18	0.06	1.11	1.50	
Uniform Delay, d1		39.5			39.5	35.9	53.1	23.0	10.2	54.2	23.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		85.8			435.1	5.9	15.5	86.6	0.1	116.2	226.8	
Delay (s)		125.3			474.6	41.8	68.6	109.6	10.3	170.4	249.8	
Level of Service		F			F	D	E	F	B	F	F	
Approach Delay (s)		125.3			157.8			105.1			246.3	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM Average Control Delay		176.7		HCM Level of Service				F				
HCM Volume to Capacity ratio		1.60										
Actuated Cycle Length (s)		107.0		Sum of lost time (s)				15.0				
Intersection Capacity Utilization		136.8%		ICU Level of Service				H				
Analysis Period (min)		15										

c Critical Lane Group





















HCM Unsignalized Intersection Capacity Analysis
 100: Campbellville Rd & Highway 6

Weekday AM Peak Hour
 2021 Background Traffic

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Volume (veh/h)	39	20	1508	178	31	1470	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	
Hourly flow rate (vph)	43	22	1657	196	34	1615	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	2533	829			1853		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2533	829			1853		
tC, single (s)	6.8	7.2			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.4			2.2		
p0 queue free %	0	92			90		
cM capacity (veh/h)	21	290			331		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	829	829	196	34	808	808
Volume Left	43	0	0	0	34	0	0
Volume Right	22	0	0	196	0	0	0
cSH	30	1700	1700	1700	331	1700	1700
Volume to Capacity	2.14	0.49	0.49	0.12	0.10	0.48	0.48
Queue Length 95th (m)	57.3	0.0	0.0	0.0	2.6	0.0	0.0
Control Delay (s)	804.7	0.0	0.0	0.0	17.1	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	804.7	0.0			0.4		
Approach LOS	F						
Intersection Summary							
Average Delay		14.8					
Intersection Capacity Utilization		51.7%			ICU Level of Service		A
Analysis Period (min)		15					

















HCM Unsignalized Intersection Capacity Analysis
 102: Concession 11 East & Highway 6

Weekday AM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Volume (veh/h)	1	1	49	10	0	9	16	1587	14	8	1577	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	52	11	0	9	17	1671	15	8	1660	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)												
pX, platoon unblocked												
vC, conflicting volume	2555	3396	830	2603	3381	835	1660			1685		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2555	3396	830	2603	3381	835	1660			1685		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	7.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.3			2.2		
p0 queue free %	92	85	84	0	100	97	95			98		
cM capacity (veh/h)	12	7	317	9	7	282	354			385		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4		
Volume Total	54	20	17	835	835	15	8	830	830	0		
Volume Left	1	11	17	0	0	0	8	0	0	0		
Volume Right	52	9	0	0	0	15	0	0	0	0		
cSH	135	16	354	1700	1700	1700	385	1700	1700	1700		
Volume to Capacity	0.40	1.23	0.05	0.49	0.49	0.01	0.02	0.49	0.49	0.00		
Queue Length 95th (m)	12.9	22.7	1.1	0.0	0.0	0.0	0.5	0.0	0.0	0.0		
Control Delay (s)	48.1	633.7	15.7	0.0	0.0	0.0	14.6	0.0	0.0	0.0		
Lane LOS	E	F	C				B					
Approach Delay (s)	48.1	633.7	0.2				0.1					
Approach LOS	E	F										
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			58.0%		ICU Level of Service					B		
Analysis Period (min)			15									

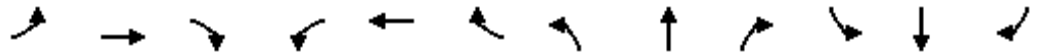
HCM Unsignalized Intersection Capacity Analysis
 104: Campbellville Rd & Centre Rd

Weekday AM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	201	6	31	55	0	8	44	46	9	26	6
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	6	254	8	39	70	0	10	56	58	11	33	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	70			262			443	419	258	505	423	70
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	70			262			443	419	258	505	423	70
tC, single (s)	4.4			4.1			7.3	6.5	6.2	7.3	6.6	6.4
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.7	4.0	3.3	3.7	4.1	3.5
p0 queue free %	100			97			98	89	93	97	93	99
cM capacity (veh/h)	1356			1285			454	505	778	375	491	933
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	268	109	124	52								
Volume Left	6	39	10	11								
Volume Right	8	0	58	8								
cSH	1356	1285	598	492								
Volume to Capacity	0.00	0.03	0.21	0.11								
Queue Length 95th (m)	0.1	0.7	5.9	2.7								
Control Delay (s)	0.2	3.0	12.6	13.2								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.2	3.0	12.6	13.2								
Approach LOS			B	B								
Intersection Summary												
Average Delay			4.8									
Intersection Capacity Utilization			31.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 106: Campbellville Rd & Milborough Town Line

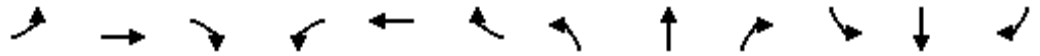
Weekday AM Peak Hour
 2021 Background Traffic



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	252	6	10	79	1	0	6	35	9	8	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	315	8	12	99	1	0	8	44	11	10	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	100			322			449	444	319	491	447	99
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			322			449	444	319	491	447	99
tC, single (s)	4.1			4.4			7.1	6.8	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.2	3.3	3.5	4.0	4.2
p0 queue free %	100			99			100	98	94	98	98	100
cM capacity (veh/h)	1505			1100			510	470	717	452	504	744
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	322	112	51	22								
Volume Left	0	12	0	11								
Volume Right	8	1	44	1								
cSH	1505	1100	666	485								
Volume to Capacity	0.00	0.01	0.08	0.05								
Queue Length 95th (m)	0.0	0.3	1.9	1.1								
Control Delay (s)	0.0	1.0	10.9	12.8								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	1.0	10.9	12.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			27.9%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 108: Campbellville Rd & Nassagaweya 1st Line

Weekday AM Peak Hour
 2021 Background Traffic



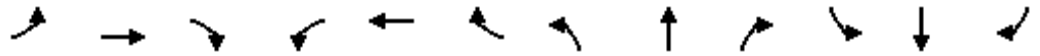
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	26	393	5	3	82	9	1	1	16	14	5	24
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	33	504	6	4	105	12	1	1	21	18	6	31
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	117			510			726	698	507	713	696	111
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	117			510			726	698	507	713	696	111
tC, single (s)	4.1			4.6			7.1	6.5	6.5	7.2	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.5	4.0	3.5	3.6	4.0	3.4
p0 queue free %	98			100			100	100	96	94	98	97
cM capacity (veh/h)	1484			849			320	357	519	314	358	932

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	544	121	23	55
Volume Left	33	4	1	18
Volume Right	6	12	21	31
cSH	1484	849	490	510
Volume to Capacity	0.02	0.00	0.05	0.11
Queue Length 95th (m)	0.5	0.1	1.1	2.7
Control Delay (s)	0.7	0.3	12.7	12.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.7	0.3	12.7	12.9
Approach LOS			B	B

Intersection Summary			
Average Delay		1.9	
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 110: Campbellville Rd & Twiss Rd

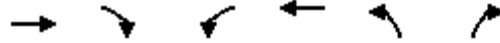
Weekday AM Peak Hour
 2021 Background Traffic



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	71	242	6	5	60	6	5	15	19	5	5	16
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	79	269	7	6	67	7	6	17	21	6	6	18
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	73			276			532	514	272	541	514	70
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	73			276			532	514	272	541	514	70
tC, single (s)	4.2			4.1			7.4	6.6	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.8	4.1	3.3	3.5	4.0	3.4
p0 queue free %	95			100			99	96	97	99	99	98
cM capacity (veh/h)	1501			1299			385	427	771	411	440	974
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	354	79	43	29								
Volume Left	79	6	6	6								
Volume Right	7	7	21	18								
cSH	1501	1299	536	651								
Volume to Capacity	0.05	0.00	0.08	0.04								
Queue Length 95th (m)	1.3	0.1	2.0	1.1								
Control Delay (s)	2.0	0.6	12.3	10.8								
Lane LOS	A	A	B	B								
Approach Delay (s)	2.0	0.6	12.3	10.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			33.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 112: Reid Sideroad & Crawford Cres

Weekday AM Peak Hour
 2021 Background Traffic



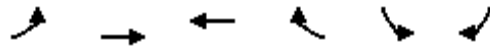
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	↻
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	115	0	9	49	1	14
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	126	0	10	54	1	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)				315		
pX, platoon unblocked						
vC, conflicting volume			126		200	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			126		200	126
tC, single (s)			4.4		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.4
p0 queue free %			99		100	98
cM capacity (veh/h)			1289		787	900

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	126	64	16
Volume Left	0	10	1
Volume Right	0	0	15
cSH	1700	1289	892
Volume to Capacity	0.07	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.4
Control Delay (s)	0.0	1.3	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	1.3	9.1
Approach LOS			A

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 114: Reid Sideroad & 401 EB-Ramps












Weekday AM Peak Hour
 2021 Background Traffic



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	93	30	79	437	410	19
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	102	33	87	480	451	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)			154			
pX, platoon unblocked						
vC, conflicting volume	567				324	87
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	567				324	87
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	90				25	98
cM capacity (veh/h)	1000				598	955
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	102	33	87	480	451	21
Volume Left	102	0	0	0	451	0
Volume Right	0	0	0	480	0	21
cSH	1000	1700	1700	1700	598	955
Volume to Capacity	0.10	0.02	0.05	0.28	0.75	0.02
Queue Length 95th (m)	2.6	0.0	0.0	0.0	51.1	0.5
Control Delay (s)	9.0	0.0	0.0	0.0	27.1	8.9
Lane LOS	A				D	A
Approach Delay (s)	6.8		0.0		26.3	
Approach LOS					D	
Intersection Summary						
Average Delay			11.4			
Intersection Capacity Utilization			41.2%		ICU Level of Service	A
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 118: 401 WB-Ramps & Guelph Line

Weekday AM Peak Hour
 2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	118	143	300	222	0	559
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	123	149	312	231	0	582
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	895	312			544	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	895	312			544	
tC, single (s)	6.5	6.3			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	59	79			100	
cM capacity (veh/h)	300	716			1035	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total	123	149	312	231	582	
Volume Left	123	0	0	0	0	
Volume Right	0	149	0	231	0	
cSH	300	716	1700	1700	1700	
Volume to Capacity	0.41	0.21	0.18	0.14	0.34	
Queue Length 95th (m)	14.6	5.9	0.0	0.0	0.0	
Control Delay (s)	25.1	11.3	0.0	0.0	0.0	
Lane LOS	D	B				
Approach Delay (s)	17.5		0.0		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			42.6%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 120: Mountsberg Rd & Centre Rd

Weekday AM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	5	8	18	5	3	1	97	5	1	49	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	6	9	21	6	3	1	113	6	1	57	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	184	181	58	190	178	116	58			119		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184	181	58	190	178	116	58			119		
tC, single (s)	7.4	6.5	6.4	7.3	6.8	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.5	3.7	4.3	3.3	2.2			2.2		
p0 queue free %	99	99	99	97	99	100	100			100		
cM capacity (veh/h)	705	716	960	726	662	942	1559			1482		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	21	30	120	59								
Volume Left	6	21	1	1								
Volume Right	9	3	6	1								
cSH	803	731	1559	1482								
Volume to Capacity	0.03	0.04	0.00	0.00								
Queue Length 95th (m)	0.6	1.0	0.0	0.0								
Control Delay (s)	9.6	10.1	0.1	0.2								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.6	10.1	0.1	0.2								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			15.9%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 122: Mountsberg Rd & Milborough Town Line

Weekday AM Peak Hour
 2021 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	16	9	5	38	19	5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	17	9	5	40	20	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	73	23	25			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	73	23	25			
tC, single (s)	6.7	6.2	4.4			
tC, 2 stage (s)						
tF (s)	3.7	3.3	2.5			
p0 queue free %	98	99	100			
cM capacity (veh/h)	869	1060	1410			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	26	45	25			
Volume Left	17	5	0			
Volume Right	9	0	5			
cSH	929	1410	1700			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.7	0.1	0.0			
Control Delay (s)	9.0	0.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	0.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization	16.2%		ICU Level of Service	A		
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 124: Concession 12 East & Centre Rd

Weekday AM Peak Hour
 2021 Background Traffic



















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	16	8	83	5	3	67
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	20	10	104	6	4	84
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	198	107			110	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	198	107			110	
tC, single (s)	6.7	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.7	3.3			3.1	
p0 queue free %	97	99			100	
cM capacity (veh/h)	735	953			1042	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	30	110	88
Volume Left	20	0	4
Volume Right	10	6	0
cSH	795	1700	1042
Volume to Capacity	0.04	0.06	0.00
Queue Length 95th (m)	0.9	0.0	0.1
Control Delay (s)	9.7	0.0	0.4
Lane LOS	A		A
Approach Delay (s)	9.7	0.0	0.4
Approach LOS	A		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization	16.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

Weekday AM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Volume (veh/h)	6	18	20	14	9	6	3	94	6	6	90	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	22	24	17	11	7	4	115	7	7	110	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)												
pX, platoon unblocked												
vC, conflicting volume	263	254	110	285	250	118	110			122		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	263	254	110	285	250	118	110			122		
tC, single (s)	7.1	6.7	6.5	7.2	6.5	6.2	4.1			4.6		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.6	3.6	4.0	3.3	2.2			2.7		
p0 queue free %	99	96	97	97	98	99	100			99		
cM capacity (veh/h)	675	620	875	610	651	939	1493			1215		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	54	35	126	117								
Volume Left	7	17	4	7								
Volume Right	24	7	7	0								
cSH	724	672	1493	1215								
Volume to Capacity	0.07	0.05	0.00	0.01								
Queue Length 95th (m)	1.8	1.3	0.1	0.1								
Control Delay (s)	10.4	10.7	0.2	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.4	10.7	0.2	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay				3.1								
Intersection Capacity Utilization				18.4%	ICU Level of Service							A
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis
 128: Concession 11 East & Milborough Town Line

Weekday AM Peak Hour
 2021 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T	T	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	19	10	5	30	34	11
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	23	12	6	36	40	13
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	95	47	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95	47	54			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	97	99	100			
cM capacity (veh/h)	887	1028	1565			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	35	42	54			
Volume Left	23	6	0			
Volume Right	12	0	13			
cSH	931	1565	1700			
Volume to Capacity	0.04	0.00	0.03			
Queue Length 95th (m)	0.9	0.1	0.0			
Control Delay (s)	9.0	1.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	1.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			15.8%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 130: 3rd Sideroad & Milbrough Town Line

Weekday AM Peak Hour
 2021 Background Traffic



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	5	3	33	0	3	31
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	6	4	42	0	4	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	90	42			42	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90	42			42	
tC, single (s)	6.7	6.7			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.8			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	838	907			1580	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	10	42	44
Volume Left	6	0	4
Volume Right	4	0	0
cSH	863	1700	1580
Volume to Capacity	0.01	0.02	0.00
Queue Length 95th (m)	0.3	0.0	0.1
Control Delay (s)	9.2	0.0	0.7
Lane LOS	A		A
Approach Delay (s)	9.2	0.0	0.7
Approach LOS	A		

Intersection Summary			
Average Delay		1.3	
Intersection Capacity Utilization	14.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 132: Steeles Ave & Milbrough Town Line

Weekday AM Peak Hour
 2021 Background Traffic















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	6	1	31	15	9	30
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	7	1	36	17	10	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	101	45			53	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	101	45			53	
tC, single (s)	6.4	6.2			4.6	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.7	
p0 queue free %	99	100			99	
cM capacity (veh/h)	896	1031			1294	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	53	45
Volume Left	7	0	10
Volume Right	1	17	0
cSH	913	1700	1294
Volume to Capacity	0.01	0.03	0.01
Queue Length 95th (m)	0.2	0.0	0.2
Control Delay (s)	9.0	0.0	1.9
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	1.9
Approach LOS	A		

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization		18.7%	ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
1: 401 WB-Ramps & Highway 6

Weekday PM Peak Hour
2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1572	1551	1759	1452	1558	1759
Flt Permitted	0.95	1.00	1.00	1.00	0.45	1.00
Satd. Flow (perm)	1572	1551	1759	1452	738	1759
Volume (vph)	148	726	499	839	204	1203
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	153	748	514	865	210	1240
RTOR Reduction (vph)	0	0	0	206	0	0
Lane Group Flow (vph)	153	748	514	659	210	1240
Heavy Vehicles (%)	11%	3%	8%	10%	12%	8%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	10.2	88.0	65.5	65.5	65.5	65.5
Effective Green, g (s)	11.0	88.0	67.0	67.0	67.0	67.0
Actuated g/C Ratio	0.12	1.00	0.76	0.76	0.76	0.76
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	197	1551	1339	1106	562	1339
v/s Ratio Prot	c0.10		0.29			c0.70
v/s Ratio Perm		0.48		0.45	0.28	
v/c Ratio	0.78	0.48	0.38	0.60	0.37	0.93
Uniform Delay, d1	37.3	0.0	3.5	4.6	3.5	8.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.3	1.1	0.8	2.4	1.9	12.3
Delay (s)	54.6	1.1	4.4	6.9	5.4	20.8
Level of Service	D	A	A	A	A	C
Approach Delay (s)	10.2		6.0			18.6
Approach LOS	B		A			B
Intersection Summary						
HCM Average Control Delay			11.9		HCM Level of Service	B
HCM Volume to Capacity ratio			0.91			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			80.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
3: 401 EB-Ramps & Highway 6

Weekday PM Peak Hour
2021 Background Traffic






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1264	1479	1544	1743	1727	1479
Flt Permitted	0.95	1.00	0.10	1.00	1.00	1.00
Satd. Flow (perm)	1264	1479	163	1743	1727	1479
Volume (vph)	58	1070	84	1424	820	410
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	60	1103	87	1468	845	423
RTOR Reduction (vph)	0	37	0	0	0	259
Lane Group Flow (vph)	60	1066	87	1468	845	165
Heavy Vehicles (%)	38%	8%	13%	9%	10%	8%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	8.0	40.2	69.7	69.7	33.5	33.5
Effective Green, g (s)	8.8	40.0	71.2	71.2	35.0	35.0
Actuated g/C Ratio	0.10	0.44	0.79	0.79	0.39	0.39
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	124	740	608	1379	672	575
v/s Ratio Prot	0.05	c0.50	0.05	0.84	c0.49	
v/s Ratio Perm		0.22	0.06			0.11
v/c Ratio	0.48	1.44	0.14	1.06	1.26	0.29
Uniform Delay, d1	38.4	25.0	20.4	9.4	27.5	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	206.1	0.1	43.4	127.7	1.2
Delay (s)	41.4	231.1	20.5	52.8	155.2	20.2
Level of Service	D	F	C	D	F	C
Approach Delay (s)	221.3			51.0	110.2	
Approach LOS	F			D	F	

Intersection Summary			
HCM Average Control Delay	119.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	117.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

Weekday PM Peak Hour
2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Frt		0.99			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.96			0.96	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1808			1828	1597		1707		1745	1774	
Flt Permitted		0.73			0.75	1.00		1.00		0.18	1.00	
Satd. Flow (perm)		1377			1425	1597		1707		339	1774	
Volume (vph)	23	5	3	53	14	30	0	1018	26	38	1742	14
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	24	5	3	56	15	32	0	1083	28	40	1853	15
RTOR Reduction (vph)	0	3	0	0	0	29	0	1	0	0	0	0
Lane Group Flow (vph)	0	29	0	0	71	3	0	1110	0	40	1868	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	11%	6%	0%	7%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		9.6			9.6	9.6		87.8		87.8	87.8	
Effective Green, g (s)		10.8			10.8	10.8		89.2		89.2	89.2	
Actuated g/C Ratio		0.10			0.10	0.10		0.81		0.81	0.81	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		135			140	157		1384		275	1439	
v/s Ratio Prot								0.65			c1.05	
v/s Ratio Perm		0.02			c0.05	0.00				0.12		
v/c Ratio		0.22			0.51	0.02		0.80		0.15	1.30	
Uniform Delay, d1		45.7			47.1	44.8		5.6		2.2	10.4	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.8			2.9	0.1		5.0		1.1	139.3	
Delay (s)		46.5			49.9	44.9		10.6		3.3	149.7	
Level of Service		D			D	D		B		A	F	
Approach Delay (s)		46.5			48.4			10.6			146.7	
Approach LOS		D			D			B			F	
Intersection Summary												
HCM Average Control Delay			94.5				HCM Level of Service				F	
HCM Volume to Capacity ratio			1.21									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			10.0		
Intersection Capacity Utilization			109.3%				ICU Level of Service				H	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

Weekday PM Peak Hour
2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1745	1581	3539	1597	1745	3438
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1745	1581	3539	1597	163	3438
Volume (vph)	333	203	1423	127	124	1969
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	358	218	1530	137	133	2117
RTOR Reduction (vph)	0	108	0	67	0	0
Lane Group Flow (vph)	358	110	1530	70	133	2117
Heavy Vehicles (%)	0%	1%	2%	0%	0%	5%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.5	18.5	37.1	37.1	46.1	46.1
Effective Green, g (s)	19.5	19.5	40.0	40.0	49.0	49.0
Actuated g/C Ratio	0.25	0.25	0.51	0.51	0.62	0.62
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	433	393	1803	814	182	2146
v/s Ratio Prot	c0.21		0.43		0.04	c0.62
v/s Ratio Perm		0.07		0.04	0.42	
v/c Ratio	0.83	0.28	0.85	0.09	0.73	0.99
Uniform Delay, d1	27.9	23.8	16.6	9.9	14.3	14.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.2	0.4	5.2	0.2	14.0	16.5
Delay (s)	40.1	24.2	21.8	10.1	28.3	30.9
Level of Service	D	C	C	B	C	C
Approach Delay (s)	34.1		20.9			30.8
Approach LOS	C		C			C
Intersection Summary						
HCM Average Control Delay			27.5	HCM Level of Service		C
HCM Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			78.5	Sum of lost time (s)	10.0	
Intersection Capacity Utilization			81.2%	ICU Level of Service	D	
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
116: Reid Sideroad & Guelph Line

Weekday PM Peak Hour
2021 Background Traffic


























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.94	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1601	1536	1745	1810	1699	
Flt Permitted	0.95	1.00	0.41	1.00	1.00	
Satd. Flow (perm)	1601	1536	752	1810	1699	
Volume (vph)	100	193	8	512	286	236
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	106	205	9	545	304	251
RTOR Reduction (vph)	0	169	0	0	22	0
Lane Group Flow (vph)	106	36	9	545	533	0
Heavy Vehicles (%)	9%	4%	0%	5%	5%	5%
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	11.2	11.2	51.2	51.2	51.2	
Effective Green, g (s)	13.2	13.2	53.2	53.2	53.2	
Actuated g/C Ratio	0.18	0.18	0.72	0.72	0.72	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	284	273	538	1294	1215	
v/s Ratio Prot	c0.07			0.30	c0.31	
v/s Ratio Perm		0.02	0.01			
v/c Ratio	0.37	0.13	0.02	0.42	0.44	
Uniform Delay, d1	27.0	25.8	3.1	4.3	4.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.2	0.1	1.0	1.2	
Delay (s)	27.8	26.0	3.1	5.3	5.6	
Level of Service	C	C	A	A	A	
Approach Delay (s)	26.6			5.3	5.6	
Approach LOS	C			A	A	

Intersection Summary

HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	74.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Concession 6 E & Highway 6















Weekday PM Peak Hour
2021 Background Traffic

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1734		1752	1732		1805	3312	1615	1703	3312	1538	
Flt Permitted	0.69	1.00		0.74	1.00		0.07	1.00	1.00	0.19	1.00	1.00	
Satd. Flow (perm)	1280	1734		1362	1732		127	3312	1615	349	3312	1538	
Volume (vph)	75	20	8	90	52	52	8	1211	52	24	1885	97	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	78	21	8	94	54	54	8	1261	54	25	1964	101	
RTOR Reduction (vph)	0	7	0	0	47	0	0	0	14	0	0	26	
Lane Group Flow (vph)	78	22	0	94	61	0	8	1261	40	25	1964	75	
Heavy Vehicles (%)	2%	7%	0%	3%	3%	0%	0%	9%	0%	6%	9%	5%	
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm	
Protected Phases		4			8			2				6	
Permitted Phases	4			8			2		2	6		6	
Actuated Green, G (s)	9.7	9.7		9.7	9.7		60.6	60.6	60.6	60.6	60.6	60.6	
Effective Green, g (s)	11.5	11.5		11.5	11.5		63.5	63.5	63.5	63.5	63.5	63.5	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.75	0.75	0.75	0.75	0.75	0.75	
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	173	235		184	234		95	2474	1207	261	2474	1149	
v/s Ratio Prot		0.01			0.04			0.38			c0.59		
v/s Ratio Perm	0.06			c0.07			0.06		0.02	0.07		0.05	
v/c Ratio	0.45	0.09		0.51	0.26		0.08	0.51	0.03	0.10	0.79	0.07	
Uniform Delay, d1	33.8	32.2		34.1	32.9		2.9	4.4	2.8	2.9	6.7	2.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.9	0.2		2.4	0.6		1.7	0.8	0.1	0.7	2.7	0.1	
Delay (s)	35.7	32.4		36.5	33.5		4.6	5.1	2.8	3.7	9.4	3.0	
Level of Service	D	C		D	C		A	A	A	A	A	A	
Approach Delay (s)		34.8			34.9			5.0			9.0		
Approach LOS		C			C			A			A		
Intersection Summary													
HCM Average Control Delay			9.8				HCM Level of Service			A			
HCM Volume to Capacity ratio			0.75										
Actuated Cycle Length (s)			85.0				Sum of lost time (s)			10.0			
Intersection Capacity Utilization			72.1%				ICU Level of Service			C			
Analysis Period (min)			15										

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

Weekday PM Peak Hour
 2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	3374	1615	1787	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1770	1599	3374	1615	164	3471
Volume (vph)	425	245	1405	123	257	1702
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	462	266	1527	134	279	1850
RTOR Reduction (vph)	0	190	0	71	0	0
Lane Group Flow (vph)	462	76	1527	63	279	1850
Heavy Vehicles (%)	2%	1%	7%	0%	1%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Actuated Green, G (s)	20.5	20.5	38.1	38.1	52.1	52.1
Effective Green, g (s)	22.0	22.0	41.0	41.0	55.0	55.0
Actuated g/C Ratio	0.25	0.25	0.47	0.47	0.63	0.63
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	448	404	1590	761	272	2194
v/s Ratio Prot	c0.26		0.45		0.11	c0.53
v/s Ratio Perm		0.05		0.04	c0.54	
v/c Ratio	1.03	0.19	0.96	0.08	1.03	0.84
Uniform Delay, d1	32.5	25.5	22.2	12.7	26.0	12.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	50.8	0.2	14.9	0.2	61.4	4.2
Delay (s)	83.3	25.7	37.1	12.9	87.4	16.8
Level of Service	F	C	D	B	F	B
Approach Delay (s)	62.3		35.2			26.0
Approach LOS	E		D			C
Intersection Summary						
HCM Average Control Delay			35.2	HCM Level of Service		D
HCM Volume to Capacity ratio			1.00			
Actuated Cycle Length (s)			87.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			89.1%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Dundas St & Highway 6





















Weekday PM Peak Hour
2021 Background Traffic

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	5085	1553	3433	3574	1583	3335	4715	1583	1752	4715	1468
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	5085	1553	3433	3574	1583	3335	4715	1583	1752	4715	1468
Volume (vph)	132	422	447	469	748	196	414	1274	409	174	1868	162
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	138	440	466	489	779	204	431	1327	426	181	1946	169
RTOR Reduction (vph)	0	0	148	0	0	152	0	0	219	0	0	80
Lane Group Flow (vph)	138	440	318	489	779	52	431	1327	207	181	1946	89
Heavy Vehicles (%)	3%	2%	4%	2%	1%	2%	5%	10%	2%	3%	10%	10%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.7	22.9	22.9	10.5	23.7	23.7	10.6	34.5	34.5	12.3	36.2	36.2
Effective Green, g (s)	9.2	25.7	25.7	10.0	26.5	26.5	10.1	36.5	36.5	11.8	38.2	38.2
Actuated g/C Ratio	0.09	0.25	0.25	0.10	0.25	0.25	0.10	0.35	0.35	0.11	0.37	0.37
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	155	1257	384	330	911	403	324	1655	556	199	1732	539
v/s Ratio Prot	0.08	0.09		c0.14	c0.22		c0.13	0.28		0.10	c0.41	
v/s Ratio Perm			0.20			0.03			0.13			0.06
v/c Ratio	0.89	0.35	0.83	1.48	0.86	0.13	1.33	0.80	0.37	0.91	1.12	0.17
Uniform Delay, d1	46.9	32.3	37.0	47.0	36.9	29.9	47.0	30.5	25.2	45.6	32.9	22.2
Progression 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
Incremental Delay, d2	41.2	0.1	13.0	232.5	7.6	0.1	168.4	4.2	1.9	38.4	63.8	0.7
Delay (s)	88.1	32.3	50.1	279.5	44.5	29.9	215.3	34.7	27.1	84.0	96.7	22.8
Level of Service	F	C	D	F	D	C	F	C	C	F	F	C
Approach Delay (s)		47.6			120.6			68.9			90.3	
Approach LOS		D			F			E			F	
Intersection Summary												
HCM Average Control Delay			83.6	HCM Level of Service				F				
HCM Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			104.0	Sum of lost time (s)				10.0				
Intersection Capacity Utilization			92.6%	ICU Level of Service				F				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Northcliffe Ave & Highway 6












Weekday PM Peak Hour
2021 Background Traffic

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		1.00			0.97	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1721			1775	1568	1805	3374	1524	1787	3371		
Flt Permitted		0.97			0.59	1.00	0.08	1.00	1.00	0.07	1.00		
Satd. Flow (perm)		1676			1077	1568	143	3374	1524	130	3371		
Volume (vph)	11	55	115	153	112	384	197	1621	127	280	2718	25	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	12	60	125	166	122	417	214	1762	138	304	2954	27	
RTOR Reduction (vph)	0	58	0	0	0	164	0	0	46	0	0	0	
Lane Group Flow (vph)	0	139	0	0	288	253	214	1762	92	304	2981	0	
Heavy Vehicles (%)	0%	0%	1%	7%	0%	3%	0%	7%	6%	1%	7%	0%	
Turn Type	Perm			Perm		Perm	pm+pt		Perm	pm+pt			
Protected Phases		4			8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)		24.5			24.5	24.5	57.1	50.1	50.1	68.1	58.1		
Effective Green, g (s)		26.0			26.0	26.0	58.0	53.0	53.0	71.0	61.0		
Actuated g/C Ratio		0.24			0.24	0.24	0.54	0.50	0.50	0.66	0.57		
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9		
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0		
Lane Grp Cap (vph)		407			262	381	155	1671	755	288	1922		
v/s Ratio Prot							0.06	0.52		c0.13	c0.88		
v/s Ratio Perm		0.08			c0.27	0.16	0.68		0.06	0.57			
v/c Ratio		0.34			1.10	0.66	1.38	1.05	0.12	1.06	1.55		
Uniform Delay, d1		33.4			40.5	36.6	53.2	27.0	14.5	36.6	23.0		
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2		0.5			84.8	4.3	206.3	38.0	0.3	68.4	250.5		
Delay (s)		33.9			125.3	40.9	259.5	65.0	14.8	105.0	273.5		
Level of Service		C			F	D	F	E	B	F	F		
Approach Delay (s)		33.9			75.3			81.4			257.9		
Approach LOS		C			E			F			F		
Intersection Summary													
HCM Average Control Delay		171.2										HCM Level of Service	F
HCM Volume to Capacity ratio		1.43											
Actuated Cycle Length (s)		107.0										Sum of lost time (s)	15.0
Intersection Capacity Utilization		128.4%										ICU Level of Service	H
Analysis Period (min)		15											

c Critical Lane Group





















HCM Unsignalized Intersection Capacity Analysis
 100: Campbellville Rd & Highway 6

Weekday PM Peak Hour
 2021 Background Traffic

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Volume (veh/h)	204	25	1241	59	31	1653	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	
Hourly flow rate (vph)	212	26	1293	61	32	1722	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	2218	646			1354		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2218	646			1354		
tC, single (s)	6.9	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	0	94			94		
cM capacity (veh/h)	34	419			515		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	239	646	646	61	32	861	861
Volume Left	212	0	0	0	32	0	0
Volume Right	26	0	0	61	0	0	0
cSH	38	1700	1700	1700	515	1700	1700
Volume to Capacity	6.27	0.38	0.38	0.04	0.06	0.51	0.51
Queue Length 95th (m)	Err	0.0	0.0	0.0	1.5	0.0	0.0
Control Delay (s)	Err	0.0	0.0	0.0	12.5	0.0	0.0
Lane LOS	F				B		
Approach Delay (s)	Err	0.0			0.2		
Approach LOS	F						
Intersection Summary							
Average Delay			712.8				
Intersection Capacity Utilization			65.2%		ICU Level of Service		C
Analysis Period (min)			15				

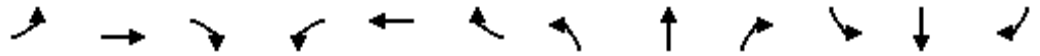
HCM Unsignalized Intersection Capacity Analysis
 102: Concession 11 East & Highway 6

Weekday PM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	3	43	11	3	11	52	1371	18	3	2010	3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	3	47	12	3	12	57	1507	20	3	2209	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	3097	3856	1104	2781	3840	753	2212			1526		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3097	3856	1104	2781	3840	753	2212			1526		
tC, single (s)	7.5	6.5	6.9	7.8	6.5	6.9	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	77	0	0	97	75			99		
cM capacity (veh/h)	0	3	209	0	3	357	230			442		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4		
Volume Total	51	27	57	753	753	20	3	1104	1104	3		
Volume Left	0	12	57	0	0	0	3	0	0	0		
Volume Right	47	12	0	0	0	20	0	0	0	3		
cSH	36	0	230	1700	1700	1700	442	1700	1700	1700		
Volume to Capacity	1.42	Err	0.25	0.44	0.44	0.01	0.01	0.65	0.65	0.00		
Queue Length 95th (m)	40.9	Err	7.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0		
Control Delay (s)	471.7	Err	25.7	0.0	0.0	0.0	13.2	0.0	0.0	0.0		
Lane LOS	F	F	D				B					
Approach Delay (s)	471.7	Err	0.9				0.0					
Approach LOS	F	F										
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			70.3%	ICU Level of Service							C	
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 104: Campbellville Rd & Centre Rd

Weekday PM Peak Hour
 2021 Background Traffic



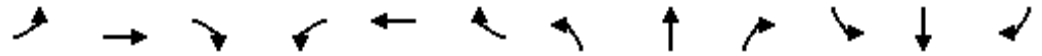
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	3	60	16	75	187	14	11	31	23	1	49	5
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	4	71	19	88	220	16	13	36	27	1	58	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	236			89			526	500	80	537	501	228
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	236			89			526	500	80	537	501	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			97	92	97	100	87	99
cM capacity (veh/h)	1343			1519			397	447	986	398	442	816

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	93	325	76	65
Volume Left	4	88	13	1
Volume Right	19	16	27	6
cSH	1343	1519	540	460
Volume to Capacity	0.00	0.06	0.14	0.14
Queue Length 95th (m)	0.1	1.4	3.7	3.7
Control Delay (s)	0.3	2.4	12.8	14.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	2.4	12.8	14.1
Approach LOS			B	B

Intersection Summary			
Average Delay		4.8	
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 106: Campbellville Rd & Milborough Town Line

Weekday PM Peak Hour
 2021 Background Traffic



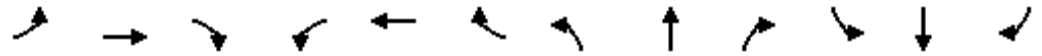
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	75	3	38	262	10	6	5	11	6	5	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	0	86	3	44	301	11	7	6	13	7	6	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	313			90			486	488	88	498	484	307
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	313			90			486	488	88	498	484	307
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			99	99	99	99	99	100
cM capacity (veh/h)	1259			1518			479	469	976	465	472	738

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	90	356	25	14
Volume Left	0	44	7	7
Volume Right	3	11	13	1
cSH	1259	1518	638	483
Volume to Capacity	0.00	0.03	0.04	0.03
Queue Length 95th (m)	0.0	0.7	0.9	0.7
Control Delay (s)	0.0	1.1	10.9	12.7
Lane LOS		A	B	B
Approach Delay (s)	0.0	1.1	10.9	12.7
Approach LOS			B	B

Intersection Summary			
Average Delay		1.8	
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 108: Campbellville Rd & Nassagaweya 1st Line

















Weekday PM Peak Hour
 2021 Background Traffic



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	19	98	5	10	331	11	1	14	8	15	8	34
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
Hourly flow rate (vph)	21	107	5	11	360	12	1	15	9	16	9	37
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	372			112			579	544	109	554	541	366
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	372			112			579	544	109	554	541	366
tC, single (s)	4.1			4.1			8.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.4	4.0	3.3	3.5	4.0	3.4
p0 queue free %	98			99			100	97	99	96	98	94
cM capacity (veh/h)	1198			1490			283	438	950	422	440	664
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	133	383	25	62								
Volume Left	21	11	1	16								
Volume Right	5	12	9	37								
cSH	1198	1490	524	543								
Volume to Capacity	0.02	0.01	0.05	0.11								
Queue Length 95th (m)	0.4	0.2	1.1	2.9								
Control Delay (s)	1.4	0.3	12.2	12.5								
Lane LOS	A	A	B	B								
Approach Delay (s)	1.4	0.3	12.2	12.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			35.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 110: Campbellville Rd & Twiss Rd

Weekday PM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	25	64	3	20	230	1	3	9	3	11	16	99
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	28	72	3	22	258	1	3	10	3	12	18	111
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	260			75			554	434	74	442	435	259
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	260			75			554	434	74	442	435	259
tC, single (s)	4.1			4.2			7.6	6.5	6.2	7.1	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			4.0	4.0	3.3	3.5	4.1	3.3
p0 queue free %	98			98			99	98	100	98	96	86
cM capacity (veh/h)	1317			1493			306	499	994	505	486	777
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	103	282	17	142								
Volume Left	28	22	3	12								
Volume Right	3	1	3	111								
cSH	1317	1493	486	692								
Volume to Capacity	0.02	0.02	0.03	0.20								
Queue Length 95th (m)	0.5	0.3	0.8	5.8								
Control Delay (s)	2.2	0.7	12.7	11.5								
Lane LOS	A	A	B	B								
Approach Delay (s)	2.2	0.7	12.7	11.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			4.2									
Intersection Capacity Utilization			29.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
112: Reid Sideroad & Crawford Cres

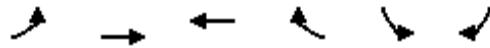
Weekday PM Peak Hour
2021 Background Traffic



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	↻
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	75	9	8	98	16	3
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	96	12	10	126	21	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)				315		
pX, platoon unblocked						
vC, conflicting volume			108		248	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			108		248	102
tC, single (s)			4.3		6.4	6.7
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.8
p0 queue free %			99		97	100
cM capacity (veh/h)			1378		739	837
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	108	136	24			
Volume Left	0	10	21			
Volume Right	12	0	4			
cSH	1700	1378	753			
Volume to Capacity	0.06	0.01	0.03			
Queue Length 95th (m)	0.0	0.2	0.8			
Control Delay (s)	0.0	0.6	9.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.6	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization		21.8%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 114: Reid Sideroad & 401 EB-Ramps












Weekday PM Peak Hour
 2021 Background Traffic



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	35	46	71	148	236	6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	37	48	75	156	248	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)			154			
pX, platoon unblocked						
vC, conflicting volume	231				197	75
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	231				197	75
tC, single (s)	4.2				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.3
p0 queue free %	97				67	99
cM capacity (veh/h)	1275				760	992
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	37	48	75	156	248	6
Volume Left	37	0	0	0	248	0
Volume Right	0	0	0	156	0	6
cSH	1275	1700	1700	1700	760	992
Volume to Capacity	0.03	0.03	0.04	0.09	0.33	0.01
Queue Length 95th (m)	0.7	0.0	0.0	0.0	10.8	0.1
Control Delay (s)	7.9	0.0	0.0	0.0	12.0	8.7
Lane LOS	A				B	A
Approach Delay (s)	3.4		0.0		11.9	
Approach LOS					B	
Intersection Summary						
Average Delay			5.8			
Intersection Capacity Utilization			28.3%		ICU Level of Service	A
Analysis Period (min)			15			

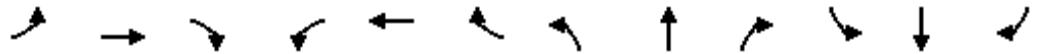
HCM Unsignalized Intersection Capacity Analysis
 118: 401 WB-Ramps & Guelph Line

Weekday PM Peak Hour
 2021 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	171	401	291	232	0	340
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	180	422	306	244	0	358
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	664	306			551	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	664	306			551	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	57	42			100	
cM capacity (veh/h)	422	731			1029	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total	180	422	306	244	358	
Volume Left	180	0	0	0	0	
Volume Right	0	422	0	244	0	
cSH	422	731	1700	1700	1700	
Volume to Capacity	0.43	0.58	0.18	0.14	0.21	
Queue Length 95th (m)	15.8	28.4	0.0	0.0	0.0	
Control Delay (s)	19.7	16.4	0.0	0.0	0.0	
Lane LOS	C	C				
Approach Delay (s)	17.4		0.0		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			6.9			
Intersection Capacity Utilization			46.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 120: Mountsberg Rd & Centre Rd

Weekday PM Peak Hour
 2021 Background Traffic



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	5	6	3	5	0	14	84	15	10	145	1
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	1	6	7	4	6	0	17	100	18	12	173	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	342	348	173	349	340	109	174			118		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	342	348	173	349	340	109	174			118		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	99	99	99	100	99			99		
cM capacity (veh/h)	602	567	875	590	573	950	1415			1483		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	14	10	135	186								
Volume Left	1	4	17	12								
Volume Right	7	0	18	1								
cSH	693	580	1415	1483								
Volume to Capacity	0.02	0.02	0.01	0.01								
Queue Length 95th (m)	0.5	0.4	0.3	0.2								
Control Delay (s)	10.3	11.3	1.0	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.3	11.3	1.0	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			19.8%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 122: Mountsberg Rd & Milborough Town Line

Weekday PM Peak Hour
 2021 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T	T	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	9	8	9	30	43	18
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	12	10	12	38	55	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	128	67	78			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	128	67	78			
tC, single (s)	6.4	6.4	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	864	949	1533			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	22	50	78			
Volume Left	12	12	0			
Volume Right	10	0	23			
cSH	902	1533	1700			
Volume to Capacity	0.02	0.01	0.05			
Queue Length 95th (m)	0.6	0.2	0.0			
Control Delay (s)	9.1	1.7	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	1.7	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			18.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 124: Concession 12 East & Centre Rd

Weekday PM Peak Hour
 2021 Background Traffic



















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	8	1	88	9	9	145
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	9	1	100	10	10	165
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	290	105			110	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	290	105			110	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			99	
cM capacity (veh/h)	700	955			1492	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	10	110	175
Volume Left	9	0	10
Volume Right	1	10	0
cSH	721	1700	1492
Volume to Capacity	0.01	0.06	0.01
Queue Length 95th (m)	0.3	0.0	0.2
Control Delay (s)	10.1	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	10.1	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization	24.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

Weekday PM Peak Hour
 2021 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	8	14	24	26	6	31	117	18	5	141	5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	8	15	25	27	6	33	123	19	5	148	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	379	369	151	378	362	133	154			142		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	379	369	151	378	362	133	154			142		
tC, single (s)	7.1	6.7	6.2	7.1	6.7	6.4	4.1			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.3	3.5	4.2	3.5	2.2			2.5		
p0 queue free %	98	98	98	95	95	99	98			100		
cM capacity (veh/h)	544	519	901	555	528	859	1439			1271		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	32	59	175	159								
Volume Left	8	25	33	5								
Volume Right	15	6	19	5								
cSH	657	563	1439	1271								
Volume to Capacity	0.05	0.10	0.02	0.00								
Queue Length 95th (m)	1.1	2.7	0.5	0.1								
Control Delay (s)	10.8	12.1	1.6	0.3								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.8	12.1	1.6	0.3								
Approach LOS	B	B										
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			32.0%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 128: Concession 11 East & Milborough Town Line

Weekday PM Peak Hour
 2021 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↑	↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	9	6	18	20	35	28
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	11	8	23	25	44	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	133	62	80			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	133	62	80			
tC, single (s)	6.6	6.4	4.2			
tC, 2 stage (s)						
tF (s)	3.7	3.5	2.3			
p0 queue free %	99	99	98			
cM capacity (veh/h)	814	942	1481			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	19	48	80			
Volume Left	11	23	0			
Volume Right	8	0	35			
cSH	861	1481	1700			
Volume to Capacity	0.02	0.02	0.05			
Queue Length 95th (m)	0.5	0.4	0.0			
Control Delay (s)	9.3	3.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.3	3.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization	18.7%		ICU Level of Service	A		
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 130: 3rd Sideroad & Milbrough Town Line

Weekday PM Peak Hour
 2021 Background Traffic



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	3	1	49	3	0	63
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Hourly flow rate (vph)	5	2	75	5	0	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	175	78			80	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	175	78			80	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	820	989			1531	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	6	80	97
Volume Left	5	0	0
Volume Right	2	5	0
cSH	856	1700	1531
Volume to Capacity	0.01	0.05	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	9.2	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.2	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		0.3	
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 132: Steeles Ave & Milbrough Town Line













Weekday PM Peak Hour
 2021 Background Traffic



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	20	14	40	10	6	64
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	29	20	57	14	9	91
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	173	64			71	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	173	64			71	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	98			99	
cM capacity (veh/h)	817	1006			1542	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	49	71	100			
Volume Left	29	0	9			
Volume Right	20	14	0			
cSH	886	1700	1542			
Volume to Capacity	0.05	0.04	0.01			
Queue Length 95th (m)	1.3	0.0	0.1			
Control Delay (s)	9.3	0.0	0.7			
Lane LOS	A		A			
Approach Delay (s)	9.3	0.0	0.7			
Approach LOS	A					
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization		18.3%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 1: 401 WB-Ramps & Highway 6

Weekday AM Peak Hour
 2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1517	1452	1743	1452	1385	1681
Flt Permitted	0.95	1.00	1.00	1.00	0.28	1.00
Satd. Flow (perm)	1517	1452	1743	1452	406	1681
Volume (vph)	54	468	859	960	143	1449
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	56	488	895	1000	149	1509
RTOR Reduction (vph)	0	0	0	191	0	0
Lane Group Flow (vph)	56	488	895	809	149	1509
Heavy Vehicles (%)	15%	10%	9%	10%	26%	13%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	6.0	88.0	69.7	69.7	69.7	69.7
Effective Green, g (s)	6.8	88.0	71.2	71.2	71.2	71.2
Actuated g/C Ratio	0.08	1.00	0.81	0.81	0.81	0.81
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	117	1452	1410	1175	328	1360
v/s Ratio Prot	0.04		0.51			c0.90
v/s Ratio Perm		c0.34		0.56	0.37	
v/c Ratio	0.48	0.34	0.63	0.69	0.45	1.11
Uniform Delay, d1	38.9	0.0	3.3	3.6	2.5	8.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.6	2.2	3.3	4.5	60.3
Delay (s)	42.0	0.6	5.5	6.9	7.0	68.7
Level of Service	D	A	A	A	A	E
Approach Delay (s)	4.9		6.2			63.1
Approach LOS	A		A			E
Intersection Summary						
HCM Average Control Delay			29.1		HCM Level of Service	C
HCM Volume to Capacity ratio			1.00			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	5.0
Intersection Capacity Utilization			92.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
3: 401 EB-Ramps & Highway 6

Weekday AM Peak Hour
2031 Background Traffic






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1616	1413	1504	1743	1681	1377
Flt Permitted	0.95	1.00	0.12	1.00	1.00	1.00
Satd. Flow (perm)	1616	1413	185	1743	1681	1377
Volume (vph)	200	1002	91	1919	672	655
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	208	1044	95	1999	700	682
RTOR Reduction (vph)	0	84	0	0	0	379
Lane Group Flow (vph)	208	960	95	1999	700	303
Heavy Vehicles (%)	8%	13%	16%	9%	13%	16%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	11.2	35.2	66.5	66.5	38.5	38.5
Effective Green, g (s)	12.0	35.0	68.0	68.0	40.0	40.0
Actuated g/C Ratio	0.13	0.39	0.76	0.76	0.44	0.44
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	215	628	477	1317	747	612
v/s Ratio Prot	0.13	c0.39	0.05	c1.15	0.42	
v/s Ratio Perm		0.29	0.10			0.22
v/c Ratio	0.97	1.53	0.20	1.52	0.94	0.50
Uniform Delay, d1	38.8	27.5	9.5	11.0	23.8	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.5	246.1	0.2	237.0	20.7	2.9
Delay (s)	90.3	273.6	9.7	248.0	44.5	20.7
Level of Service	F	F	A	F	D	C
Approach Delay (s)	243.2			237.2	32.7	
Approach LOS	F			F	C	

Intersection Summary

HCM Average Control Delay	179.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.48		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	120.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

Weekday AM Peak Hour
2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Fr _t		0.99			1.00	0.85		1.00		1.00	1.00	
Fl _t Protected		0.97			0.95	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1457			1780	1426		1726		1646	1624	
Fl _t Permitted		0.74			0.78	1.00		1.00		0.05	1.00	
Satd. Flow (perm)		1118			1456	1426		1726		79	1624	
Volume (vph)	29	9	4	74	4	41	0	1667	18	26	1683	4
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	30	9	4	77	4	43	0	1736	19	27	1753	4
RTOR Reduction (vph)	0	4	0	0	0	37	0	0	0	0	0	0
Lane Group Flow (vph)	0	39	0	0	81	6	0	1755	0	27	1757	0
Heavy Vehicles (%)	17%	60%	0%	2%	0%	12%	0%	10%	0%	6%	17%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		10.6			10.6	10.6		86.8		86.8	86.8	
Effective Green, g (s)		11.8			11.8	11.8		88.2		88.2	88.2	
Actuated g/C Ratio		0.11			0.11	0.11		0.80		0.80	0.80	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		120			156	153		1384		63	1302	
v/s Ratio Prot								1.02			c1.08	
v/s Ratio Perm		0.04			c0.06	0.00				0.34		
v/c Ratio		0.33			0.52	0.04		1.27		0.43	1.35	
Uniform Delay, d ₁		45.4			46.4	44.0		10.9		3.3	10.9	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d ₂		1.6			2.9	0.1		126.4		19.9	162.4	
Delay (s)		47.0			49.3	44.1		137.3		23.2	173.3	
Level of Service		D			D	D		F		C	F	
Approach Delay (s)		47.0			47.5			137.3			171.1	
Approach LOS		D			D			F			F	
Intersection Summary												
HCM Average Control Delay		149.5									F	
HCM Volume to Capacity ratio		1.25										
Actuated Cycle Length (s)		110.0						10.0				
Intersection Capacity Utilization		118.0%									H	
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

Weekday AM Peak Hour
2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1678	1581	3438	1566	1728	3505
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1678	1581	3438	1566	92	3505
Volume (vph)	277	216	1897	205	160	2056
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	304	237	2085	225	176	2259
RTOR Reduction (vph)	0	118	0	86	0	0
Lane Group Flow (vph)	304	119	2085	139	176	2259
Heavy Vehicles (%)	4%	1%	5%	2%	1%	3%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	21.0	21.0	71.1	71.1	85.1	85.1
Effective Green, g (s)	22.0	22.0	74.0	74.0	88.0	88.0
Actuated g/C Ratio	0.18	0.18	0.62	0.62	0.73	0.73
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	308	290	2120	966	190	2570
v/s Ratio Prot	c0.18		c0.61		0.07	c0.64
v/s Ratio Perm		0.08		0.09	0.61	
v/c Ratio	0.99	0.41	0.98	0.14	0.93	0.88
Uniform Delay, d1	48.9	43.3	22.4	9.7	41.4	12.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	47.3	1.0	16.0	0.3	44.4	4.7
Delay (s)	96.1	44.2	38.4	10.0	85.8	16.7
Level of Service	F	D	D	A	F	B
Approach Delay (s)	73.4		35.7			21.7
Approach LOS	E		D			C
Intersection Summary						
HCM Average Control Delay			33.1	HCM Level of Service		C
HCM Volume to Capacity ratio			1.00			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		15.0
Intersection Capacity Utilization			89.1%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
116: Reid Sideroad & Guelph Line

Weekday AM Peak Hour
2031 Background Traffic

























Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.91	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1646	1566	1544	1792	1648	
Flt Permitted	0.95	1.00	0.26	1.00	1.00	
Satd. Flow (perm)	1646	1566	420	1792	1648	
Volume (vph)	211	343	13	576	258	489
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	224	365	14	613	274	520
RTOR Reduction (vph)	0	285	0	0	65	0
Lane Group Flow (vph)	224	80	14	613	729	0
Heavy Vehicles (%)	6%	2%	13%	6%	9%	3%
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	16.3	16.3	55.2	55.2	55.2	
Effective Green, g (s)	18.3	18.3	57.2	57.2	57.2	
Actuated g/C Ratio	0.22	0.22	0.69	0.69	0.69	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	361	343	288	1228	1129	
v/s Ratio Prot	c0.14			0.34	c0.44	
v/s Ratio Perm		0.05	0.03			
v/c Ratio	0.62	0.23	0.05	0.50	0.65	
Uniform Delay, d1	29.5	26.8	4.3	6.3	7.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.3	0.4	0.3	1.5	2.9	
Delay (s)	32.8	27.2	4.6	7.7	10.3	
Level of Service	C	C	A	A	B	
Approach Delay (s)	29.3			7.7	10.3	
Approach LOS	C			A	B	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	83.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Concession 6 E & Highway 6















Weekday AM Peak Hour
2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.95		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1613		1556	1528		1805	3282	1468	1719	3312	1455
Flt Permitted	0.72	1.00		0.71	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1283	1613		1160	1528		107	3282	1468	112	3312	1455
Volume (vph)	136	45	21	50	18	38	1	1692	65	34	2097	74
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	155	51	24	57	20	43	1	1923	74	39	2383	84
RTOR Reduction (vph)	0	5	0	0	14	0	0	0	21	0	0	24
Lane Group Flow (vph)	155	70	0	57	49	0	1	1923	53	39	2383	60
Heavy Vehicles (%)	6%	7%	23%	16%	0%	17%	0%	10%	10%	5%	9%	11%
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	16.9	16.9		16.9	16.9		68.4	68.4	68.4	68.4	68.4	68.4
Effective Green, g (s)	18.7	18.7		18.7	18.7		71.3	71.3	71.3	71.3	71.3	71.3
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.71	0.71	0.71	0.71	0.71	0.71
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	240	302		217	286		76	2340	1047	80	2361	1037
v/s Ratio Prot		0.04			0.03			0.59			c0.72	
v/s Ratio Perm	c0.12			0.05			0.01		0.04	0.35		0.04
v/c Ratio	0.65	0.23		0.26	0.17		0.01	0.82	0.05	0.49	1.01	0.06
Uniform Delay, d1	37.6	34.5		34.8	34.1		4.2	9.9	4.3	6.3	14.4	4.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.9	0.4		0.6	0.3		0.3	3.4	0.1	19.7	20.8	0.1
Delay (s)	43.4	34.9		35.4	34.4		4.5	13.3	4.4	26.0	35.2	4.4
Level of Service	D	C		D	C		A	B	A	C	D	A
Approach Delay (s)		40.7			34.9			13.0			34.0	
Approach LOS		D			C			B			C	
Intersection Summary												
HCM Average Control Delay			25.7				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			100.0				Sum of lost time (s)				10.0	
Intersection Capacity Utilization			80.5%				ICU Level of Service				D	
Analysis Period (min)			15									

c Critical Lane Group


































HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

Weekday AM Peak Hour
 2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1599	3312	1615	1703	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1805	1599	3312	1615	130	3471
Volume (vph)	88	132	1861	186	211	1952
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	91	136	1919	192	218	2012
RTOR Reduction (vph)	0	117	0	81	0	0
Lane Group Flow (vph)	91	19	1919	111	218	2012
Heavy Vehicles (%)	0%	1%	9%	0%	6%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Actuated Green, G (s)	10.9	10.9	47.3	47.3	61.7	61.7
Effective Green, g (s)	12.4	12.4	50.2	50.2	64.6	64.6
Actuated g/C Ratio	0.14	0.14	0.58	0.58	0.74	0.74
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	257	228	1911	932	266	2577
v/s Ratio Prot	c0.05		c0.58		0.09	c0.58
v/s Ratio Perm		0.01		0.07	0.52	
v/c Ratio	0.35	0.09	1.00	0.12	0.82	0.78
Uniform Delay, d1	33.7	32.4	18.4	8.4	26.3	6.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	21.6	0.3	16.8	2.4
Delay (s)	34.5	32.5	40.0	8.6	43.0	9.3
Level of Service	C	C	D	A	D	A
Approach Delay (s)	33.3		37.1			12.6
Approach LOS	C		D			B
Intersection Summary						
HCM Average Control Delay			25.0		HCM Level of Service	C
HCM Volume to Capacity ratio			0.89			
Actuated Cycle Length (s)			87.0		Sum of lost time (s)	15.0
Intersection Capacity Utilization			84.0%		ICU Level of Service	E
Analysis Period (min)			15			
c	Critical Lane Group					

HCM Signalized Intersection Capacity Analysis
13: Dundas St & Highway 6





















Weekday AM Peak Hour
2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	 		 	  			  	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	4988	1417	3367	3438	1468	3183	4803	1583	1612	4848	1442
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1687	4988	1417	3367	3438	1468	3183	4803	1583	1612	4848	1442
Volume (vph)	216	699	503	512	459	114	419	1736	353	126	2209	132
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	220	713	513	522	468	116	428	1771	360	129	2254	135
RTOR Reduction (vph)	0	0	137	0	0	88	0	0	196	0	0	48
Lane Group Flow (vph)	220	713	376	522	468	28	428	1771	164	129	2254	87
Heavy Vehicles (%)	7%	4%	14%	4%	5%	10%	10%	8%	2%	12%	7%	12%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.5	24.2	24.2	14.5	26.2	26.2	12.5	46.5	46.5	11.0	45.0	45.0
Effective Green, g (s)	12.0	27.0	27.0	14.0	29.0	29.0	12.0	48.5	48.5	10.5	47.0	47.0
Actuated g/C Ratio	0.10	0.22	0.22	0.12	0.24	0.24	0.10	0.40	0.40	0.09	0.39	0.39
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	169	1122	319	393	831	355	318	1941	640	141	1899	565
v/s Ratio Prot	0.13	0.14		c0.16	0.14		c0.13	0.37		0.08	c0.46	
v/s Ratio Perm			c0.27			0.02			0.10			0.06
v/c Ratio	1.30	0.64	1.18	1.33	0.56	0.08	1.35	0.91	0.26	0.91	1.19	0.15
Uniform Delay, d1	54.0	42.0	46.5	53.0	39.9	35.2	54.0	33.7	23.8	54.3	36.5	23.6
Progression 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
Incremental Delay, d2	172.1	0.9	107.9	164.4	0.5	0.0	175.2	8.0	1.0	49.9	89.8	0.6
Delay (s)	226.1	42.9	154.4	217.4	40.5	35.2	229.2	41.8	24.7	104.2	126.3	24.2
Level of Service	F	D	F	F	D	D	F	D	C	F	F	C
Approach Delay (s)		110.3			123.4			70.7			119.7	
Approach LOS		F			F			E			F	
Intersection Summary												
HCM Average Control Delay			102.0				HCM Level of Service			F		
HCM Volume to Capacity ratio			1.22									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		20.0			
Intersection Capacity Utilization			100.9%				ICU Level of Service		G			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Northcliffe Ave & Highway 6












Weekday AM Peak Hour
2031 Background Traffic

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt		0.90			1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		1.00			0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1682			1719	1538	1770	3223	1553	1736	3277		
Flt Permitted		0.98			0.15	1.00	0.07	1.00	1.00	0.07	1.00		
Satd. Flow (perm)		1655			260	1538	126	3223	1553	124	3277		
Volume (vph)	26	113	456	119	20	380	91	2561	75	140	3280	25	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	27	116	470	123	21	392	94	2640	77	144	3381	26	
RTOR Reduction (vph)	0	64	0	0	0	65	0	0	17	0	0	0	
Lane Group Flow (vph)	0	549	0	0	144	327	94	2640	60	144	3407	0	
Heavy Vehicles (%)	6%	4%	0%	7%	0%	5%	2%	12%	4%	4%	10%	13%	
Turn Type	Perm			Perm			Perm	pm+pt		Perm	pm+pt		
Protected Phases		4			8			5	2		1	6	
Permitted Phases	4			8		8		2		2	6		
Actuated Green, G (s)		28.5			28.5	28.5	61.1	56.1	56.1	61.1	56.1		
Effective Green, g (s)		30.0			30.0	30.0	62.0	59.0	59.0	62.0	59.0		
Actuated g/C Ratio		0.28			0.28	0.28	0.58	0.55	0.55	0.58	0.55		
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9		
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0		
Lane Grp Cap (vph)		464			73	431	119	1777	856	117	1807		
v/s Ratio Prot							0.02	0.82		c0.03	c1.04		
v/s Ratio Perm		0.33			c0.55	0.21	0.43		0.04	0.68			
v/c Ratio		1.18			1.97	0.76	0.79	1.49	0.07	1.23	1.89		
Uniform Delay, d1		38.5			38.5	35.2	53.4	24.0	11.2	54.2	24.0		
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2		102.5			483.0	7.5	26.6	221.6	0.2	157.8	400.4		
Delay (s)		141.0			521.5	42.7	80.0	245.6	11.4	212.0	424.4		
Level of Service		F			F	D	F	F	B	F	F		
Approach Delay (s)		141.0			171.3			233.6			415.8		
Approach LOS		F			F			F			F		
Intersection Summary													
HCM Average Control Delay		307.8										HCM Level of Service	F
HCM Volume to Capacity ratio		1.89											
Actuated Cycle Length (s)		107.0										Sum of lost time (s)	15.0
Intersection Capacity Utilization		157.0%										ICU Level of Service	H
Analysis Period (min)		15											

c Critical Lane Group





















HCM Unsignalized Intersection Capacity Analysis
 100: Campbellville Rd & Highway 6

Weekday AM Peak Hour
 2031 Background Traffic

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Volume (veh/h)	43	23	1839	196	34	1791	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	
Hourly flow rate (vph)	47	25	2021	215	37	1968	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	3080	1010			2236		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	3080	1010			2236		
tC, single (s)	6.8	7.2			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.4			2.2		
p0 queue free %	0	88			84		
cM capacity (veh/h)	8	217			235		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	73	1010	1010	215	37	984	984
Volume Left	47	0	0	0	37	0	0
Volume Right	25	0	0	215	0	0	0
cSH	12	1700	1700	1700	235	1700	1700
Volume to Capacity	5.94	0.59	0.59	0.13	0.16	0.58	0.58
Queue Length 95th (m)	Err	0.0	0.0	0.0	4.2	0.0	0.0
Control Delay (s)	Err	0.0	0.0	0.0	23.2	0.0	0.0
Lane LOS	F				C		
Approach Delay (s)	Err	0.0			0.4		
Approach LOS	F						
Intersection Summary							
Average Delay			168.3				
Intersection Capacity Utilization			61.3%		ICU Level of Service		B
Analysis Period (min)			15				

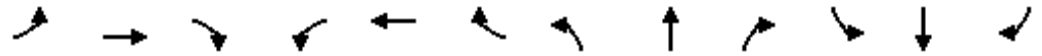
HCM Unsignalized Intersection Capacity Analysis
 102: Concession 11 East & Highway 6

Weekday AM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free				Free
Grade		0%			0%			0%				0%
Volume (veh/h)	1	1	54	11	0	10	18	1935	15	9	1922	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	1	1	57	12	0	11	19	2037	16	9	2023	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)												
pX, platoon unblocked												
vC, conflicting volume	3109	4133	1012	3163	4117	1018	2023			2053		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3109	4133	1012	3163	4117	1018	2023			2053		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	7.2	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.3			2.2		
p0 queue free %	76	51	76	0	100	95	92			97		
cM capacity (veh/h)	4	2	241	2	2	210	252			277		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4		
Volume Total	59	22	19	1018	1018	16	9	1012	1012	0		
Volume Left	1	12	19	0	0	0	9	0	0	0		
Volume Right	57	11	0	0	0	16	0	0	0	0		
cSH	61	4	252	1700	1700	1700	277	1700	1700	1700		
Volume to Capacity	0.97	5.90	0.08	0.60	0.60	0.01	0.03	0.60	0.60	0.00		
Queue Length 95th (m)	34.8	Err	1.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0		
Control Delay (s)	217.2	Err	20.4	0.0	0.0	0.0	18.4	0.0	0.0	0.0		
Lane LOS	F	F	C				C					
Approach Delay (s)	217.2	Err	0.2				0.1					
Approach LOS	F	F										
Intersection Summary												
Average Delay			56.0									
Intersection Capacity Utilization			68.0%		ICU Level of Service					C		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 104: Campbellville Rd & Centre Rd

Weekday AM Peak Hour
 2031 Background Traffic



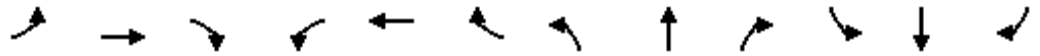
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	223	6	34	60	0	9	49	50	10	29	6
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	6	282	8	43	76	0	11	62	63	13	37	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None			None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	76			290			487	461	286	555	465	76
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	76			290			487	461	286	555	465	76
tC, single (s)	4.4			4.1			7.3	6.5	6.2	7.3	6.6	6.4
tC, 2 stage (s)												
tF (s)	2.5			2.2			3.7	4.0	3.3	3.7	4.1	3.5
p0 queue free %	100			97			97	87	92	96	92	99
cM capacity (veh/h)	1348			1255			419	477	751	336	463	925

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	296	119	137	57
Volume Left	6	43	11	13
Volume Right	8	0	63	8
cSH	1348	1255	566	455
Volume to Capacity	0.00	0.03	0.24	0.13
Queue Length 95th (m)	0.1	0.8	7.1	3.2
Control Delay (s)	0.2	3.1	13.4	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	3.1	13.4	14.0
Approach LOS			B	B

Intersection Summary			
Average Delay		5.0	
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 106: Campbellville Rd & Milborough Town Line

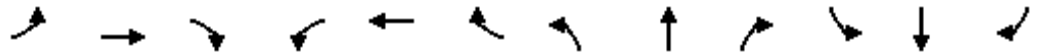
Weekday AM Peak Hour
 2031 Background Traffic



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	278	6	11	87	1	0	6	39	10	9	1
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	348	8	14	109	1	0	8	49	12	11	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	110			355			495	489	351	541	492	109
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	110			355			495	489	351	541	492	109
tC, single (s)	4.1			4.4			7.1	6.8	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.2			2.5			3.5	4.2	3.3	3.5	4.0	4.2
p0 queue free %	100			99			100	98	93	97	98	100
cM capacity (veh/h)	1493			1069			474	442	688	413	474	734
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	355	124	56	25								
Volume Left	0	14	0	12								
Volume Right	8	1	49	1								
cSH	1493	1069	640	449								
Volume to Capacity	0.00	0.01	0.09	0.06								
Queue Length 95th (m)	0.0	0.3	2.2	1.3								
Control Delay (s)	0.0	1.0	11.2	13.5								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	1.0	11.2	13.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			29.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 108: Campbellville Rd & Nassagaweya 1st Line

















Weekday AM Peak Hour
 2031 Background Traffic



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	29	434	5	4	91	10	1	1	18	15	5	26
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	37	556	6	5	117	13	1	1	23	19	6	33
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	129			563			804	774	560	791	771	123
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	129			563			804	774	560	791	771	123
tC, single (s)	4.1			4.6			7.1	6.5	6.5	7.2	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.5	4.0	3.5	3.6	4.0	3.4
p0 queue free %	97			99			100	100	95	93	98	96
cM capacity (veh/h)	1469			808			281	321	483	275	323	917
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	600	135	26	59								
Volume Left	37	5	1	19								
Volume Right	6	13	23	33								
cSH	1469	808	456	468								
Volume to Capacity	0.03	0.01	0.06	0.13								
Queue Length 95th (m)	0.6	0.1	1.4	3.3								
Control Delay (s)	0.7	0.4	13.4	13.8								
Lane LOS	A	A	B	B								
Approach Delay (s)	0.7	0.4	13.4	13.8								
Approach LOS			B	B								
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			46.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 110: Campbellville Rd & Twiss Rd

Weekday AM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	78	268	6	5	67	6	5	16	21	5	5	18
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	87	298	7	6	74	7	6	18	23	6	6	20
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	81			304			586	567	301	596	567	78
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	81			304			586	567	301	596	567	78
tC, single (s)	4.2			4.1			7.4	6.6	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.8	4.1	3.3	3.5	4.0	3.4
p0 queue free %	94			100			98	96	97	99	99	98
cM capacity (veh/h)	1492			1268			350	396	743	373	409	964
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	391	87	47	31								
Volume Left	87	6	6	6								
Volume Right	7	7	23	20								
cSH	1492	1268	506	632								
Volume to Capacity	0.06	0.00	0.09	0.05								
Queue Length 95th (m)	1.4	0.1	2.3	1.2								
Control Delay (s)	2.1	0.5	12.8	11.0								
Lane LOS	A	A	B	B								
Approach Delay (s)	2.1	0.5	12.8	11.0								
Approach LOS			B	B								
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			35.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 112: Reid Sideroad & Crawford Cres

Weekday AM Peak Hour
 2031 Background Traffic



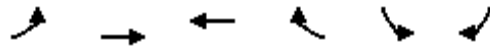
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	↻
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	127	0	10	54	1	15
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	140	0	11	59	1	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)				315		
pX, platoon unblocked						
vC, conflicting volume			140		221	140
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			140		221	140
tC, single (s)			4.4		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.5		3.5	3.4
p0 queue free %			99		100	98
cM capacity (veh/h)			1274		765	885

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	140	70	18
Volume Left	0	11	1
Volume Right	0	0	16
cSH	1700	1274	877
Volume to Capacity	0.08	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.5
Control Delay (s)	0.0	1.3	9.2
Lane LOS		A	A
Approach Delay (s)	0.0	1.3	9.2
Approach LOS			A

Intersection Summary			
Average Delay		1.1	
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 114: Reid Sideroad & 401 EB-Ramps

Weekday AM Peak Hour
 2031 Background Traffic














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	103	33	87	483	453	21
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	113	36	96	531	498	23
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)			154			
pX, platoon unblocked						
vC, conflicting volume	626				358	96
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	626				358	96
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	88				11	98
cM capacity (veh/h)	950				560	945

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	113	36	96	531	498	23
Volume Left	113	0	0	0	498	0
Volume Right	0	0	0	531	0	23
cSH	950	1700	1700	1700	560	945
Volume to Capacity	0.12	0.02	0.06	0.31	0.89	0.02
Queue Length 95th (m)	3.1	0.0	0.0	0.0	78.2	0.6
Control Delay (s)	9.3	0.0	0.0	0.0	42.8	8.9
Lane LOS	A				E	A
Approach Delay (s)	7.0		0.0		41.3	
Approach LOS					E	

Intersection Summary						
Average Delay			17.4			
Intersection Capacity Utilization			44.1%		ICU Level of Service	A
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 118: 401 WB-Ramps & Guelph Line

Weekday AM Peak Hour
 2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	131	158	332	245	0	617
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	136	165	346	255	0	643
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	989	346			601	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	989	346			601	
tC, single (s)	6.5	6.3			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.2	
p0 queue free %	48	76			100	
cM capacity (veh/h)	264	686			986	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total	136	165	346	255	643	
Volume Left	136	0	0	0	0	
Volume Right	0	165	0	255	0	
cSH	264	686	1700	1700	1700	
Volume to Capacity	0.52	0.24	0.20	0.15	0.38	
Queue Length 95th (m)	20.9	7.1	0.0	0.0	0.0	
Control Delay (s)	32.5	11.9	0.0	0.0	0.0	
Lane LOS	D	B				
Approach Delay (s)	21.2		0.0		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			4.1			
Intersection Capacity Utilization			46.4%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 120: Mountsberg Rd & Centre Rd

Weekday AM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	5	5	9	20	5	4	1	107	5	1	54	1
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	6	10	23	6	5	1	124	6	1	63	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	203	198	63	209	196	127	64			130		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	203	198	63	209	196	127	64			130		
tC, single (s)	7.4	6.5	6.4	7.3	6.8	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.8	4.0	3.5	3.7	4.3	3.3	2.2			2.2		
p0 queue free %	99	99	99	97	99	99	100			100		
cM capacity (veh/h)	684	700	953	704	647	928	1551			1468		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	22	34	131	65								
Volume Left	6	23	1	1								
Volume Right	10	5	6	1								
cSH	795	717	1551	1468								
Volume to Capacity	0.03	0.05	0.00	0.00								
Queue Length 95th (m)	0.7	1.1	0.0	0.0								
Control Delay (s)	9.7	10.3	0.1	0.1								
Lane LOS	A	B	A	A								
Approach Delay (s)	9.7	10.3	0.1	0.1								
Approach LOS	A	B										
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			16.8%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 122: Mountsberg Rd & Milborough Town Line

Weekday AM Peak Hour
 2031 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	18	10	5	41	21	5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	19	11	5	43	22	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	78	25	27			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	78	25	27			
tC, single (s)	6.7	6.2	4.4			
tC, 2 stage (s)						
tF (s)	3.7	3.3	2.5			
p0 queue free %	98	99	100			
cM capacity (veh/h)	863	1057	1407			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	29	48	27			
Volume Left	19	5	0			
Volume Right	11	0	5			
cSH	924	1407	1700			
Volume to Capacity	0.03	0.00	0.02			
Queue Length 95th (m)	0.8	0.1	0.0			
Control Delay (s)	9.0	0.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	0.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization		16.3%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 124: Concession 12 East & Centre Rd

Weekday AM Peak Hour
 2031 Background Traffic



















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	18	9	92	5	4	74
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	22	11	115	6	5	92
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	221	118			121	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	221	118			121	
tC, single (s)	6.7	6.2			5.1	
tC, 2 stage (s)						
tF (s)	3.7	3.3			3.1	
p0 queue free %	97	99			100	
cM capacity (veh/h)	712	939			1030	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	34	121	98
Volume Left	22	0	5
Volume Right	11	6	0
cSH	774	1700	1030
Volume to Capacity	0.04	0.07	0.00
Queue Length 95th (m)	1.0	0.0	0.1
Control Delay (s)	9.9	0.0	0.5
Lane LOS	A		A
Approach Delay (s)	9.9	0.0	0.5
Approach LOS	A		

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization	17.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

Weekday AM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	20	23	15	10	6	4	104	6	6	99	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	24	28	18	12	7	5	127	7	7	121	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)												
pX, platoon unblocked												
vC, conflicting volume	289	279	121	316	276	130	121			134		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	289	279	121	316	276	130	121			134		
tC, single (s)	7.1	6.7	6.5	7.2	6.5	6.2	4.1			4.6		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.6	3.6	4.0	3.3	2.2			2.7		
p0 queue free %	99	96	97	97	98	99	100			99		
cM capacity (veh/h)	648	599	863	577	629	924	1479			1202		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	60	38	139	128								
Volume Left	7	18	5	7								
Volume Right	28	7	7	0								
cSH	707	641	1479	1202								
Volume to Capacity	0.08	0.06	0.00	0.01								
Queue Length 95th (m)	2.1	1.4	0.1	0.1								
Control Delay (s)	10.6	11.0	0.3	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.6	11.0	0.3	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			3.2									
Intersection Capacity Utilization			19.2%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 128: Concession 11 East & Milborough Town Line

Weekday AM Peak Hour
 2031 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↔			↑	↑	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	21	11	5	33	38	13
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	25	13	6	39	45	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	104	53	61			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	104	53	61			
tC, single (s)	6.5	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.3	2.2			
p0 queue free %	97	99	100			
cM capacity (veh/h)	876	1020	1556			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	38	45	61			
Volume Left	25	6	0			
Volume Right	13	0	15			
cSH	921	1556	1700			
Volume to Capacity	0.04	0.00	0.04			
Queue Length 95th (m)	1.0	0.1	0.0			
Control Delay (s)	9.1	1.0	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.1	1.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			16.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 130: 3rd Sideroad & Milbrough Town Line

Weekday AM Peak Hour
 2031 Background Traffic



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	5	4	36	0	4	34
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	6	5	46	0	5	44
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	100	46			46	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	100	46			46	
tC, single (s)	6.7	6.7			4.1	
tC, 2 stage (s)						
tF (s)	3.8	3.8			2.2	
p0 queue free %	99	99			100	
cM capacity (veh/h)	826	902			1575	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	46	49
Volume Left	6	0	5
Volume Right	5	0	0
cSH	858	1700	1575
Volume to Capacity	0.01	0.03	0.00
Queue Length 95th (m)	0.3	0.0	0.1
Control Delay (s)	9.3	0.0	0.8
Lane LOS	A		A
Approach Delay (s)	9.3	0.0	0.8
Approach LOS	A		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization	15.1%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 132: Steeles Ave & Milbrough Town Line

Weekday AM Peak Hour
 2031 Background Traffic















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	6	1	34	16	10	33
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	7	1	40	19	12	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	110	49			58	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	110	49			58	
tC, single (s)	6.4	6.2			4.6	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.7	
p0 queue free %	99	100			99	
cM capacity (veh/h)	883	1026			1288	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	58	50
Volume Left	7	0	12
Volume Right	1	19	0
cSH	901	1700	1288
Volume to Capacity	0.01	0.03	0.01
Queue Length 95th (m)	0.2	0.0	0.2
Control Delay (s)	9.0	0.0	1.9
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	1.9
Approach LOS	A		

Intersection Summary			
Average Delay		1.4	
Intersection Capacity Utilization	19.0%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis
 1: 401 WB-Ramps & Highway 6

Weekday PM Peak Hour
 2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1572	1551	1759	1452	1558	1759
Flt Permitted	0.95	1.00	1.00	1.00	0.39	1.00
Satd. Flow (perm)	1572	1551	1759	1452	635	1759
Volume (vph)	163	802	609	927	225	1467
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	168	827	628	956	232	1512
RTOR Reduction (vph)	0	0	0	226	0	0
Lane Group Flow (vph)	168	827	628	730	232	1512
Heavy Vehicles (%)	11%	3%	8%	10%	12%	8%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	10.0	88.0	65.7	65.7	65.7	65.7
Effective Green, g (s)	10.8	88.0	67.2	67.2	67.2	67.2
Actuated g/C Ratio	0.12	1.00	0.76	0.76	0.76	0.76
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	193	1551	1343	1109	485	1343
v/s Ratio Prot	c0.11		0.36			c0.86
v/s Ratio Perm		0.53		0.50	0.37	
v/c Ratio	0.87	0.53	0.47	0.66	0.48	1.13
Uniform Delay, d1	37.9	0.0	3.8	4.9	3.9	10.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	32.0	1.3	1.2	3.1	3.4	66.8
Delay (s)	69.9	1.3	5.0	8.0	7.2	77.2
Level of Service	E	A	A	A	A	E
Approach Delay (s)	12.9		6.8			67.9
Approach LOS	B		A			E
Intersection Summary						
HCM Average Control Delay			32.9		HCM Level of Service	C
HCM Volume to Capacity ratio			1.09			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			94.6%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
3: 401 EB-Ramps & Highway 6

Weekday PM Peak Hour
2031 Background Traffic






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1264	1479	1544	1743	1727	1479
Flt Permitted	0.95	1.00	0.09	1.00	1.00	1.00
Satd. Flow (perm)	1264	1479	151	1743	1727	1479
Volume (vph)	64	1182	93	1736	1000	453
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	66	1219	96	1790	1031	467
RTOR Reduction (vph)	0	27	0	0	0	238
Lane Group Flow (vph)	66	1193	96	1790	1031	229
Heavy Vehicles (%)	38%	8%	13%	9%	10%	8%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	8.0	37.2	69.7	69.7	36.5	36.5
Effective Green, g (s)	8.8	37.0	71.2	71.2	38.0	38.0
Actuated g/C Ratio	0.10	0.41	0.79	0.79	0.42	0.42
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	124	690	556	1379	729	624
v/s Ratio Prot	0.05	c0.54	0.05	1.03	c0.60	
v/s Ratio Perm		0.26	0.08			0.15
v/c Ratio	0.53	1.73	0.17	1.30	1.41	0.37
Uniform Delay, d1	38.6	26.5	12.4	9.4	26.0	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.3	333.8	0.1	139.6	194.5	1.7
Delay (s)	43.0	360.3	12.5	149.0	220.5	19.4
Level of Service	D	F	B	F	F	B
Approach Delay (s)	344.0			142.0	157.8	
Approach LOS	F			F	F	

Intersection Summary

HCM Average Control Delay	202.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	134.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

Weekday PM Peak Hour
2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Fr _t		0.98			1.00	0.85		1.00		1.00	1.00	
Fl _t Protected		0.96			0.96	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1804			1827	1597		1708		1745	1775	
Fl _t Permitted		0.73			0.74	1.00		1.00		0.07	1.00	
Satd. Flow (perm)		1364			1415	1597		1708		132	1775	
Volume (vph)	25	5	4	59	15	33	0	1241	29	41	2124	15
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	5	4	63	16	35	0	1320	31	44	2260	16
RTOR Reduction (vph)	0	4	0	0	0	31	0	1	0	0	0	0
Lane Group Flow (vph)	0	32	0	0	79	4	0	1350	0	44	2276	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	11%	6%	0%	7%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		10.1			10.1	10.1		87.3		87.3	87.3	
Effective Green, g (s)		11.3			11.3	11.3		88.7		88.7	88.7	
Actuated g/C Ratio		0.10			0.10	0.10		0.81		0.81	0.81	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		140			145	164		1377		106	1431	
v/s Ratio Prot								0.79			c1.28	
v/s Ratio Perm		0.02			c0.06	0.00				0.33		
v/c Ratio		0.23			0.54	0.02		0.98		0.42	1.59	
Uniform Delay, d ₁		45.4			46.9	44.4		9.9		3.1	10.6	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d ₂		0.9			4.1	0.1		20.1		11.5	269.0	
Delay (s)		46.2			51.0	44.4		29.9		14.6	279.7	
Level of Service		D			D	D		C		B	F	
Approach Delay (s)		46.2			49.0			29.9			274.6	
Approach LOS		D			D			C			F	
Intersection Summary												
HCM Average Control Delay		179.2										F
HCM Volume to Capacity ratio		1.47										
Actuated Cycle Length (s)		110.0							10.0			
Intersection Capacity Utilization		129.6%										H
Analysis Period (min)		15										
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

Weekday PM Peak Hour
2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1745	1581	3539	1597	1745	3438
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1745	1581	3539	1597	171	3438
Volume (vph)	368	224	1735	141	137	2400
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	396	241	1866	152	147	2581
RTOR Reduction (vph)	0	120	0	79	0	0
Lane Group Flow (vph)	396	121	1866	73	147	2581
Heavy Vehicles (%)	0%	1%	2%	0%	0%	5%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2		6
Actuated Green, G (s)	19.9	19.9	35.1	35.1	45.1	45.1
Effective Green, g (s)	20.9	20.9	38.0	38.0	48.0	48.0
Actuated g/C Ratio	0.26	0.26	0.48	0.48	0.61	0.61
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	462	419	1704	769	204	2092
v/s Ratio Prot	c0.23		0.53		0.05	c0.75
v/s Ratio Perm		0.08		0.05	0.39	
v/c Ratio	0.86	0.29	1.10	0.10	0.72	1.23
Uniform Delay, d1	27.6	23.1	20.5	11.1	37.8	15.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	14.5	0.4	52.7	0.2	11.8	109.5
Delay (s)	42.1	23.5	73.1	11.4	49.6	125.0
Level of Service	D	C	E	B	D	F
Approach Delay (s)	35.0		68.5			120.9
Approach LOS	D		E			F
Intersection Summary						
HCM Average Control Delay			91.1	HCM Level of Service		F
HCM Volume to Capacity ratio			1.12			
Actuated Cycle Length (s)			78.9	Sum of lost time (s)	10.0	
Intersection Capacity Utilization			95.1%	ICU Level of Service	F	
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 116: Reid Sideroad & Guelph Line

Weekday PM Peak Hour
 2031 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.94	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1601	1536	1745	1810	1699	
Flt Permitted	0.95	1.00	0.38	1.00	1.00	
Satd. Flow (perm)	1601	1536	690	1810	1699	
Volume (vph)	111	214	9	566	316	260
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	118	228	10	602	336	277
RTOR Reduction (vph)	0	187	0	0	23	0
Lane Group Flow (vph)	118	41	10	602	590	0
Heavy Vehicles (%)	9%	4%	0%	5%	5%	5%
Turn Type		Perm	Perm			
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	11.8	11.8	53.4	53.4	53.4	
Effective Green, g (s)	13.8	13.8	55.4	55.4	55.4	
Actuated g/C Ratio	0.18	0.18	0.72	0.72	0.72	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	286	275	495	1299	1219	
v/s Ratio Prot	c0.07			0.33	c0.35	
v/s Ratio Perm		0.03	0.01			
v/c Ratio	0.41	0.15	0.02	0.46	0.48	
Uniform Delay, d1	28.1	26.7	3.1	4.6	4.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.3	0.1	1.2	1.4	
Delay (s)	29.1	27.0	3.2	5.8	6.1	
Level of Service	C	C	A	A	A	
Approach Delay (s)	27.7			5.8	6.1	
Approach LOS	C			A	A	

Intersection Summary

HCM Average Control Delay	10.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	77.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
 9: Concession 6 E & Highway 6

Weekday PM Peak Hour
 2031 Background Traffic















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1734		1752	1732		1805	3312	1615	1703	3312	1538
Flt Permitted	0.68	1.00		0.74	1.00		0.07	1.00	1.00	0.13	1.00	1.00
Satd. Flow (perm)	1259	1734		1357	1732		124	3312	1615	228	3312	1538
Volume (vph)	83	23	9	99	58	58	9	1476	58	26	2298	107
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	86	24	9	103	60	60	9	1538	60	27	2394	111
RTOR Reduction (vph)	0	3	0	0	23	0	0	0	17	0	0	31
Lane Group Flow (vph)	86	30	0	103	97	0	9	1538	43	27	2394	80
Heavy Vehicles (%)	2%	7%	0%	3%	3%	0%	0%	9%	0%	6%	9%	5%
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	12.1	12.1		12.1	12.1		58.2	58.2	58.2	58.2	58.2	58.2
Effective Green, g (s)	13.9	13.9		13.9	13.9		61.1	61.1	61.1	61.1	61.1	61.1
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.72	0.72	0.72	0.72	0.72	0.72
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	206	284		222	283		89	2381	1161	164	2381	1106
v/s Ratio Prot		0.02			0.06			0.46			c0.72	
v/s Ratio Perm	0.07			c0.08			0.07		0.03	0.12		0.05
v/c Ratio	0.42	0.11		0.46	0.34		0.10	0.65	0.04	0.16	1.01	0.07
Uniform Delay, d1	31.9	30.3		32.2	31.5		3.6	6.3	3.5	3.8	11.9	3.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.2		1.5	0.7		2.3	1.4	0.1	2.2	19.8	0.1
Delay (s)	33.3	30.4		33.7	32.2		5.9	7.6	3.5	6.0	31.7	3.7
Level of Service	C	C		C	C		A	A	A	A	C	A
Approach Delay (s)		32.5			32.9			7.5			30.2	
Approach LOS		C			C			A			C	

Intersection Summary		
HCM Average Control Delay	22.3	HCM Level of Service C
HCM Volume to Capacity ratio	0.91	
Actuated Cycle Length (s)	85.0	Sum of lost time (s) 10.0
Intersection Capacity Utilization	84.0%	ICU Level of Service E
Analysis Period (min)	15	

c Critical Lane Group




































HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

Weekday PM Peak Hour
 2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	3374	1615	1787	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1770	1599	3374	1615	160	3471
Volume (vph)	469	270	1713	136	284	2075
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	510	293	1862	148	309	2255
RTOR Reduction (vph)	0	169	0	77	0	0
Lane Group Flow (vph)	510	124	1862	71	309	2255
Heavy Vehicles (%)	2%	1%	7%	0%	1%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	20.5	20.5	39.1	39.1	52.1	52.1
Effective Green, g (s)	22.0	22.0	42.0	42.0	55.0	55.0
Actuated g/C Ratio	0.25	0.25	0.48	0.48	0.63	0.63
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	448	404	1629	780	251	2194
v/s Ratio Prot	c0.29		0.55		0.11	c0.65
v/s Ratio Perm		0.08		0.04	c0.67	
v/c Ratio	1.14	0.31	1.14	0.09	1.23	1.03
Uniform Delay, d1	32.5	26.3	22.5	12.2	41.7	16.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	86.2	0.4	72.2	0.2	133.7	26.7
Delay (s)	118.7	26.8	94.7	12.4	175.4	42.7
Level of Service	F	C	F	B	F	D
Approach Delay (s)	85.1		88.7			58.7
Approach LOS	F		F			E
Intersection Summary						
HCM Average Control Delay			73.9	HCM Level of Service		E
HCM Volume to Capacity ratio			1.18			
Actuated Cycle Length (s)			87.0	Sum of lost time (s)	10.0	
Intersection Capacity Utilization			101.6%	ICU Level of Service	G	
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Dundas St & Highway 6

Weekday PM Peak Hour
2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	 		 	  		  	  	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	5085	1553	3433	3574	1583	3335	4715	1583	1752	4715	1468
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	5085	1553	3433	3574	1583	3335	4715	1583	1752	4715	1468
Volume (vph)	146	466	494	518	826	216	458	1553	451	192	2277	179
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	152	485	515	540	860	225	477	1618	470	200	2372	186
RTOR Reduction (vph)	0	0	140	0	0	138	0	0	168	0	0	72
Lane Group Flow (vph)	152	485	375	540	860	87	477	1618	302	200	2372	114
Heavy Vehicles (%)	3%	2%	4%	2%	1%	2%	5%	10%	2%	3%	10%	10%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.5	23.6	23.6	9.5	26.6	26.6	8.9	34.5	34.5	12.6	38.2	38.2
Effective Green, g (s)	6.0	26.4	26.4	9.0	29.4	29.4	8.4	36.5	36.5	12.1	40.2	40.2
Actuated g/C Ratio	0.06	0.25	0.25	0.09	0.28	0.28	0.08	0.35	0.35	0.12	0.39	0.39
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	101	1291	394	297	1010	448	269	1655	556	204	1823	567
v/s Ratio Prot	0.09	0.10		c0.16	c0.24		c0.14	0.34		0.11	c0.50	
v/s Ratio Perm			c0.24			0.05			0.19			0.08
v/c Ratio	1.50	0.38	0.95	1.82	0.85	0.19	1.77	0.98	0.54	0.98	1.30	0.20
Uniform Delay, d1	49.0	32.0	38.2	47.5	35.2	28.3	47.8	33.3	27.1	45.8	31.9	21.2
Progression 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
Incremental Delay, d2	271.7	0.1	32.9	381.2	6.8	0.1	362.7	17.4	3.8	57.0	139.7	0.8
Delay (s)	320.7	32.1	71.1	428.7	42.0	28.4	410.5	50.8	30.8	102.8	171.6	22.0
Level of Service	F	C	E	F	D	C	F	D	C	F	F	C
Approach Delay (s)		87.6			168.6			114.0			156.5	
Approach LOS		F			F			F			F	






















Intersection Summary

HCM Average Control Delay	135.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	104.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	104.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 15: Northcliffe Ave & Highway 6












Weekday PM Peak Hour
 2031 Background Traffic

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		1.00			0.97	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1720			1775	1568	1805	3374	1524	1787	3371		
Flt Permitted		0.91			0.57	1.00	0.07	1.00	1.00	0.07	1.00		
Satd. Flow (perm)		1573			1037	1568	131	3374	1524	123	3371		
Volume (vph)	13	60	127	168	123	424	217	1976	141	309	3313	28	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	14	65	138	183	134	461	236	2148	153	336	3601	30	
RTOR Reduction (vph)	0	59	0	0	0	83	0	0	42	0	0	0	
Lane Group Flow (vph)	0	158	0	0	317	378	236	2148	111	336	3631	0	
Heavy Vehicles (%)	0%	0%	1%	7%	0%	3%	0%	7%	6%	1%	7%	0%	
Turn Type	Perm			Perm		Perm	pm+pt		Perm	pm+pt			
Protected Phases		4			8		5	2			1	6	
Permitted Phases	4			8		8	2		2		6		
Actuated Green, G (s)		25.5			25.5	25.5	61.1	55.1	55.1	67.1	58.1		
Effective Green, g (s)		27.0			27.0	27.0	62.0	58.0	58.0	68.0	61.0		
Actuated g/C Ratio		0.25			0.25	0.25	0.58	0.54	0.54	0.64	0.57		
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9		
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0		
Lane Grp Cap (vph)		397			262	396	138	1829	826	187	1922		
v/s Ratio Prot							0.06	0.64		c0.12	c1.08		
v/s Ratio Perm		0.10			c0.31	0.24	0.92		0.07	1.02			
v/c Ratio		0.40			1.21	0.95	1.71	1.17	0.13	1.80	1.89		
Uniform Delay, d1		33.2			40.0	39.4	12.4	24.5	12.1	52.2	23.0		
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2		0.7			124.5	33.4	348.4	84.6	0.3	379.1	402.0		
Delay (s)		33.9			164.5	72.8	360.8	109.1	12.4	431.3	425.0		
Level of Service		C			F	E	F	F	B	F	F		
Approach Delay (s)		33.9			110.2			126.7			425.5		
Approach LOS		C			F			F			F		
Intersection Summary													
HCM Average Control Delay		280.4										HCM Level of Service	F
HCM Volume to Capacity ratio		1.74											
Actuated Cycle Length (s)		107.0										Sum of lost time (s)	15.0
Intersection Capacity Utilization		148.6%										ICU Level of Service	H
Analysis Period (min)		15											

c Critical Lane Group





















HCM Unsignalized Intersection Capacity Analysis
 100: Campbellville Rd & Highway 6

Weekday PM Peak Hour
 2031 Background Traffic

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Volume (veh/h)	225	28	1512	65	34	2015	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	
Hourly flow rate (vph)	234	29	1575	68	35	2099	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None						
Median storage (veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	2695	788			1643		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	2695	788			1643		
tC, single (s)	6.9	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	0	91			91		
cM capacity (veh/h)	16	339			399		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	264	788	788	68	35	1049	1049
Volume Left	234	0	0	0	35	0	0
Volume Right	29	0	0	68	0	0	0
cSH	17	1700	1700	1700	399	1700	1700
Volume to Capacity	15.16	0.46	0.46	0.04	0.09	0.62	0.62
Queue Length 95th (m)	Err	0.0	0.0	0.0	2.2	0.0	0.0
Control Delay (s)	Err	0.0	0.0	0.0	14.9	0.0	0.0
Lane LOS	F					B	
Approach Delay (s)	Err	0.0			0.2		
Approach LOS	F						
Intersection Summary							
Average Delay			652.3				
Intersection Capacity Utilization			76.5%		ICU Level of Service		D
Analysis Period (min)			15				

















HCM Unsignalized Intersection Capacity Analysis
 102: Concession 11 East & Highway 6

Weekday PM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	4	48	13	4	13	58	1672	20	4	2451	4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	4	53	14	4	14	64	1837	22	4	2693	4
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	3765	4689	1347	3375	4671	919	2698			1859		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3765	4689	1347	3375	4671	919	2698			1859		
tC, single (s)	7.5	6.5	6.9	7.8	6.5	6.9	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	63	0	0	95	57			99		
cM capacity (veh/h)	0	1	144	0	1	277	147			329		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4		
Volume Total	57	33	64	919	919	22	4	1347	1347	4		
Volume Left	0	14	64	0	0	0	4	0	0	0		
Volume Right	53	14	0	0	0	22	0	0	0	4		
cSH	7	0	147	1700	1700	1700	329	1700	1700	1700		
Volume to Capacity	8.29	Err	0.43	0.54	0.54	0.01	0.01	0.79	0.79	0.00		
Queue Length 95th (m)	Err	Err	14.7	0.0	0.0	0.0	0.3	0.0	0.0	0.0		
Control Delay (s)	Err	Err	47.0	0.0	0.0	0.0	16.1	0.0	0.0	0.0		
Lane LOS	F	F	E				C					
Approach Delay (s)	Err	Err	1.6				0.0					
Approach LOS	F	F										
Intersection Summary												
Average Delay			Err									
Intersection Capacity Utilization			82.8%	ICU Level of Service	E							
Analysis Period (min)			15									

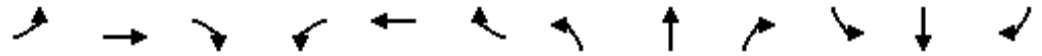
HCM Unsignalized Intersection Capacity Analysis
 104: Campbellville Rd & Centre Rd

Weekday PM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	67	18	83	206	15	13	34	25	1	54	5
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	5	79	21	98	242	18	15	40	29	1	64	6
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	260			100			583	554	89	595	556	251
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	260			100			583	554	89	595	556	251
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			96	90	97	100	84	99
cM capacity (veh/h)	1316			1505			354	413	974	357	408	792
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	105	358	85	71								
Volume Left	5	98	15	1								
Volume Right	21	18	29	6								
cSH	1316	1505	498	424								
Volume to Capacity	0.00	0.06	0.17	0.17								
Queue Length 95th (m)	0.1	1.6	4.6	4.5								
Control Delay (s)	0.4	2.5	13.7	15.2								
Lane LOS	A	A	B	C								
Approach Delay (s)	0.4	2.5	13.7	15.2								
Approach LOS			B	C								
Intersection Summary												
Average Delay			5.1									
Intersection Capacity Utilization			40.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 106: Campbellville Rd & Milborough Town Line

Weekday PM Peak Hour
 2031 Background Traffic



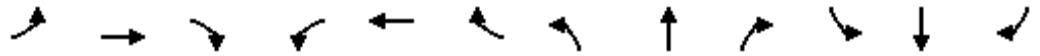
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	83	4	41	289	11	6	5	13	6	5	1
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	0	95	5	47	332	13	7	6	15	7	6	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type							None				None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	345			100			534	537	98	548	533	339
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	345			100			534	537	98	548	533	339
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			98	99	98	98	99	100
cM capacity (veh/h)	1225			1505			443	439	964	428	441	708

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	100	392	28	14
Volume Left	0	47	7	7
Volume Right	5	13	15	1
cSH	1225	1505	625	449
Volume to Capacity	0.00	0.03	0.04	0.03
Queue Length 95th (m)	0.0	0.7	1.1	0.7
Control Delay (s)	0.0	1.2	11.0	13.3
Lane LOS		A	B	B
Approach Delay (s)	0.0	1.2	11.0	13.3
Approach LOS			B	B

Intersection Summary			
Average Delay		1.8	
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 108: Campbellville Rd & Nassagaweya 1st Line

Weekday PM Peak Hour
 2031 Background Traffic



















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	21	108	5	11	366	13	1	15	9	16	9	38
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
Hourly flow rate (vph)	23	117	5	12	398	14	1	16	10	17	10	41
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	412			123			641	602	120	612	597	405
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	412			123			641	602	120	612	597	405
tC, single (s)	4.1			4.1			8.1	6.5	6.2	7.1	6.5	6.3
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.4	4.0	3.3	3.5	4.0	3.4
p0 queue free %	98			99			100	96	99	95	98	93
cM capacity (veh/h)	1158			1477			251	405	937	383	407	631

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	146	424	27	68
Volume Left	23	12	1	17
Volume Right	5	14	10	41
cSH	1158	1477	494	508
Volume to Capacity	0.02	0.01	0.06	0.13
Queue Length 95th (m)	0.5	0.2	1.3	3.5
Control Delay (s)	1.4	0.3	12.7	13.2
Lane LOS	A	A	B	B
Approach Delay (s)	1.4	0.3	12.7	13.2
Approach LOS			B	B

Intersection Summary			
Average Delay		2.4	
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 110: Campbellville Rd & Twiss Rd

Weekday PM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	28	70	4	23	254	1	4	10	4	13	18	109
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	31	79	4	26	285	1	4	11	4	15	20	122
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	287			83			614	482	81	492	484	286
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	287			83			614	482	81	492	484	286
tC, single (s)	4.1			4.2			7.6	6.5	6.2	7.1	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			4.0	4.0	3.3	3.5	4.1	3.3
p0 queue free %	98			98			98	98	100	97	96	84
cM capacity (veh/h)	1287			1483			268	467	985	464	453	751
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	115	312	20	157								
Volume Left	31	26	4	15								
Volume Right	4	1	4	122								
cSH	1287	1483	446	658								
Volume to Capacity	0.02	0.02	0.05	0.24								
Queue Length 95th (m)	0.6	0.4	1.1	7.1								
Control Delay (s)	2.3	0.8	13.5	12.2								
Lane LOS	A	A	B	B								
Approach Delay (s)	2.3	0.8	13.5	12.2								
Approach LOS			B	B								
Intersection Summary												
Average Delay			4.5									
Intersection Capacity Utilization			31.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 112: Reid Sideroad & Crawford Cres

Weekday PM Peak Hour
 2031 Background Traffic



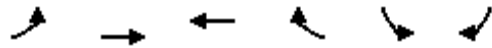
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↻			↻	↻	↻
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	83	10	9	108	18	4
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	106	13	12	138	23	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)				315		
pX, platoon unblocked						
vC, conflicting volume			119		274	113
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			119		274	113
tC, single (s)			4.3		6.4	6.7
tC, 2 stage (s)						
tF (s)			2.4		3.5	3.8
p0 queue free %			99		97	99
cM capacity (veh/h)			1364		713	825

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	119	150	28
Volume Left	0	12	23
Volume Right	13	0	5
cSH	1700	1364	731
Volume to Capacity	0.07	0.01	0.04
Queue Length 95th (m)	0.0	0.2	0.9
Control Delay (s)	0.0	0.7	10.1
Lane LOS		A	B
Approach Delay (s)	0.0	0.7	10.1
Approach LOS			B

Intersection Summary			
Average Delay		1.3	
Intersection Capacity Utilization	22.8%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
 114: Reid Sideroad & 401 EB-Ramps

Weekday PM Peak Hour
 2031 Background Traffic














Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	39	50	78	163	260	6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	41	53	82	172	274	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (m)			154			
pX, platoon unblocked						
vC, conflicting volume	254				217	82
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	254				217	82
tC, single (s)	4.2				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.3
p0 queue free %	97				63	99
cM capacity (veh/h)	1250				737	983

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	41	53	82	172	274	6
Volume Left	41	0	0	0	274	0
Volume Right	0	0	0	172	0	6
cSH	1250	1700	1700	1700	737	983
Volume to Capacity	0.03	0.03	0.05	0.10	0.37	0.01
Queue Length 95th (m)	0.8	0.0	0.0	0.0	13.1	0.1
Control Delay (s)	8.0	0.0	0.0	0.0	12.7	8.7
Lane LOS	A				B	A
Approach Delay (s)	3.5		0.0		12.6	
Approach LOS					B	

Intersection Summary						
Average Delay			6.2			
Intersection Capacity Utilization			29.9%		ICU Level of Service	A
Analysis Period (min)			15			

















HCM Unsignalized Intersection Capacity Analysis
 118: 401 WB-Ramps & Guelph Line

Weekday PM Peak Hour
 2031 Background Traffic

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	189	443	322	256	0	376
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	199	466	339	269	0	396
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	735	339			608	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	735	339			608	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	48	33			100	
cM capacity (veh/h)	384	701			980	
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total	199	466	339	269	396	
Volume Left	199	0	0	0	0	
Volume Right	0	466	0	269	0	
cSH	384	701	1700	1700	1700	
Volume to Capacity	0.52	0.67	0.20	0.16	0.23	
Queue Length 95th (m)	21.8	38.6	0.0	0.0	0.0	
Control Delay (s)	24.0	19.7	0.0	0.0	0.0	
Lane LOS	C	C				
Approach Delay (s)	21.0		0.0		0.0	
Approach LOS	C					
Intersection Summary						
Average Delay			8.4			
Intersection Capacity Utilization			51.0%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
120: Mountsberg Rd & Centre Rd

Weekday PM Peak Hour
2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	5	6	4	5	0	15	93	16	11	160	1
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	1	6	7	5	6	0	18	111	19	13	190	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	376	383	191	383	374	120	192			130		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	376	383	191	383	374	120	192			130		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	99	99	99	99	100	99			99		
cM capacity (veh/h)	570	542	856	560	548	937	1394			1468		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	14	11	148	205								
Volume Left	1	5	18	13								
Volume Right	7	0	19	1								
cSH	667	553	1394	1468								
Volume to Capacity	0.02	0.02	0.01	0.01								
Queue Length 95th (m)	0.5	0.5	0.3	0.2								
Control Delay (s)	10.5	11.6	1.0	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	10.5	11.6	1.0	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization			20.6%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 122: Mountsberg Rd & Milborough Town Line

Weekday PM Peak Hour
 2031 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T	T	
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	9	10	33	48	20
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	13	12	13	42	62	26
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	142	74	87			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	142	74	87			
tC, single (s)	6.4	6.4	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.5	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	848	939	1522			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	24	55	87			
Volume Left	13	13	0			
Volume Right	12	0	26			
cSH	889	1522	1700			
Volume to Capacity	0.03	0.01	0.05			
Queue Length 95th (m)	0.6	0.2	0.0			
Control Delay (s)	9.2	1.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.2	1.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.9			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 124: Concession 12 East & Centre Rd

Weekday PM Peak Hour
 2031 Background Traffic



















Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Volume (veh/h)	9	1	97	10	10	160
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	10	1	110	11	11	182
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	320	116			122	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	320	116			122	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			99	
cM capacity (veh/h)	672	942			1478	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	11	122	193
Volume Left	10	0	11
Volume Right	1	11	0
cSH	692	1700	1478
Volume to Capacity	0.02	0.07	0.01
Queue Length 95th (m)	0.4	0.0	0.2
Control Delay (s)	10.3	0.0	0.5
Lane LOS	B		A
Approach Delay (s)	10.3	0.0	0.5
Approach LOS	B		

Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

Weekday PM Peak Hour
 2031 Background Traffic

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	9	9	15	26	29	6	34	129	20	5	156	5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	9	9	16	27	31	6	36	136	21	5	164	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	417	406	167	416	398	146	169			157		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	417	406	167	416	398	146	169			157		
tC, single (s)	7.1	6.7	6.2	7.1	6.7	6.5	4.1			4.4		
tC, 2 stage (s)												
tF (s)	3.5	4.2	3.3	3.5	4.2	3.5	2.2			2.5		
p0 queue free %	98	98	98	95	94	99	97			100		
cM capacity (veh/h)	509	493	883	521	502	843	1420			1255		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	35	64	193	175								
Volume Left	9	27	36	5								
Volume Right	16	6	21	5								
cSH	623	531	1420	1255								
Volume to Capacity	0.06	0.12	0.03	0.00								
Queue Length 95th (m)	1.3	3.1	0.6	0.1								
Control Delay (s)	11.1	12.7	1.6	0.3								
Lane LOS	B	B	A	A								
Approach Delay (s)	11.1	12.7	1.6	0.3								
Approach LOS	B	B										
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			34.1%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 128: Concession 11 East & Milborough Town Line

Weekday PM Peak Hour
 2031 Background Traffic



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	10	6	20	23	39	31
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	13	8	25	29	49	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	149	69	89			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	149	69	89			
tC, single (s)	6.6	6.5	4.2			
tC, 2 stage (s)						
tF (s)	3.7	3.5	2.3			
p0 queue free %	98	99	98			
cM capacity (veh/h)	795	933	1470			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	20	54	89			
Volume Left	13	25	0			
Volume Right	8	0	39			
cSH	842	1470	1700			
Volume to Capacity	0.02	0.02	0.05			
Queue Length 95th (m)	0.6	0.4	0.0			
Control Delay (s)	9.4	3.6	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.4	3.6	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization		19.0%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
 130: 3rd Sideroad & Milbrough Town Line

Weekday PM Peak Hour
 2031 Background Traffic



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	4	1	54	4	0	69
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65
Hourly flow rate (vph)	6	2	83	6	0	106
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	192	86			89	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	192	86			89	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	100			100	
cM capacity (veh/h)	801	978			1519	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	8	89	106
Volume Left	6	0	0
Volume Right	2	6	0
cSH	831	1700	1519
Volume to Capacity	0.01	0.05	0.00
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	9.4	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.4	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		0.4	
Intersection Capacity Utilization	13.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 132: Steeles Ave & Milbrough Town Line

Weekday PM Peak Hour
 2031 Background Traffic



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	23	15	44	11	6	70
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Hourly flow rate (vph)	33	21	63	16	9	100
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	188	71			79	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188	71			79	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	98			99	
cM capacity (veh/h)	801	997			1533	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	54	79	109
Volume Left	33	0	9
Volume Right	21	16	0
cSH	869	1700	1533
Volume to Capacity	0.06	0.05	0.01
Queue Length 95th (m)	1.5	0.0	0.1
Control Delay (s)	9.4	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	9.4	0.0	0.6
Approach LOS	A		













Intersection Summary			
Average Delay		2.4	
Intersection Capacity Utilization	18.6%	ICU Level of Service	A
Analysis Period (min)	15		



Appendix E

HCM Signalized Intersection Capacity Analysis
 1: 401 WB-Ramps & Highway 6

2021 Total Traffic - Alternative 1
 Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1104	1452	1743	1439	1385	1681
Flt Permitted	0.95	1.00	1.00	1.00	0.33	1.00
Satd. Flow (perm)	1104	1452	1743	1439	484	1681
Volume (vph)	101	423	705	878	130	1189
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	105	441	734	915	135	1239
RTOR Reduction (vph)	0	0	0	218	0	0
Lane Group Flow (vph)	105	441	734	697	135	1239
Heavy Vehicles (%)	58%	10%	9%	11%	26%	13%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	10.2	88.0	65.5	65.5	65.5	65.5
Effective Green, g (s)	11.0	88.0	67.0	67.0	67.0	67.0
Actuated g/C Ratio	0.12	1.00	0.76	0.76	0.76	0.76
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	138	1452	1327	1096	369	1280
v/s Ratio Prot	c0.10		0.42			c0.74
v/s Ratio Perm		0.30		0.48	0.28	
v/c Ratio	0.76	0.30	0.55	0.64	0.37	0.97
Uniform Delay, d1	37.2	0.0	4.3	4.9	3.5	9.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.6	0.5	1.7	2.8	2.8	18.6
Delay (s)	58.8	0.5	6.0	7.7	6.3	28.1
Level of Service	E	A	A	A	A	C
Approach Delay (s)	11.7		6.9			26.0
Approach LOS	B		A			C
Intersection Summary						
HCM Average Control Delay			15.0		HCM Level of Service	B
HCM Volume to Capacity ratio			0.94			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			79.4%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 3: 401 EB-Ramps & Highway 6

2021 Total Traffic - Alternative 1
 Weekday AM Peak Hour






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1616	1401	1171	1743	1583	1377
Flt Permitted	0.95	1.00	0.14	1.00	1.00	1.00
Satd. Flow (perm)	1616	1401	173	1743	1583	1377
Volume (vph)	181	917	134	1582	603	593
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	189	955	140	1648	628	618
RTOR Reduction (vph)	0	86	0	0	0	363
Lane Group Flow (vph)	189	869	140	1648	628	255
Heavy Vehicles (%)	8%	14%	49%	9%	20%	16%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	10.0	38.0	67.7	67.7	35.7	35.7
Effective Green, g (s)	10.8	37.8	69.2	69.2	37.2	37.2
Actuated g/C Ratio	0.12	0.42	0.77	0.77	0.41	0.41
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	194	666	432	1340	654	569
v/s Ratio Prot	0.12	c0.39	0.10	c0.95	0.40	
v/s Ratio Perm		0.23	0.15			0.19
v/c Ratio	0.97	1.31	0.32	1.23	0.96	0.45
Uniform Delay, d1	39.5	26.1	8.8	10.4	25.7	19.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	56.7	148.0	0.4	110.2	26.7	2.6
Delay (s)	96.2	174.1	9.2	120.6	52.4	21.6
Level of Service	F	F	A	F	D	C
Approach Delay (s)	161.2			111.9	37.1	
Approach LOS	F			F	D	

Intersection Summary			
HCM Average Control Delay	103.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

2021 Total Traffic - Alternative 1
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Frt		0.99			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.97			0.95	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1465			1796	1413		1681		1616	1583	
Flt Permitted		0.74			0.71	1.00		1.00		0.05	1.00	
Satd. Flow (perm)		1127			1330	1413		1681		77	1583	
Volume (vph)	26	8	3	67	3	38	0	1427	16	24	1442	3
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	27	8	3	70	3	40	0	1486	17	25	1502	3
RTOR Reduction (vph)	0	3	0	0	0	36	0	0	0	0	0	0
Lane Group Flow (vph)	0	35	0	0	73	4	0	1503	0	25	1505	0
Heavy Vehicles (%)	15%	63%	0%	1%	0%	13%	0%	13%	0%	8%	20%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		10.1			10.1	10.1		87.3		87.3	87.3	
Effective Green, g (s)		11.3			11.3	11.3		88.7		88.7	88.7	
Actuated g/C Ratio		0.10			0.10	0.10		0.81		0.81	0.81	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		116			137	145		1355		62	1276	
v/s Ratio Prot								0.89			c0.95	
v/s Ratio Perm		0.03			c0.05	0.00				0.33		
v/c Ratio		0.30			0.53	0.03		1.11		0.40	1.18	
Uniform Delay, d1		45.7			46.8	44.4		10.6		3.1	10.6	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		1.5			3.9	0.1		60.1		18.4	89.2	
Delay (s)		47.2			50.8	44.5		70.8		21.4	99.8	
Level of Service		D			D	D		E		C	F	
Approach Delay (s)		47.2			48.6			70.8			98.5	
Approach LOS		D			D			E			F	
Intersection Summary												
HCM Average Control Delay			83.0				HCM Level of Service				F	
HCM Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			10.0		
Intersection Capacity Utilization			105.2%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

2021 Total Traffic - Alternative 1
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1678	1581	3406	1566	1728	3505
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1678	1581	3406	1566	161	3505
Volume (vph)	250	196	1587	186	145	1699
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	275	215	1744	204	159	1867
RTOR Reduction (vph)	0	106	0	97	0	0
Lane Group Flow (vph)	275	109	1744	107	159	1867
Heavy Vehicles (%)	4%	1%	6%	2%	1%	3%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.4	16.4	37.2	37.2	46.2	46.2
Effective Green, g (s)	17.4	17.4	40.1	40.1	49.1	49.1
Actuated g/C Ratio	0.23	0.23	0.52	0.52	0.64	0.64
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	382	360	1785	821	185	2250
v/s Ratio Prot	c0.16		c0.51		0.04	c0.53
v/s Ratio Perm		0.07		0.07	0.51	
v/c Ratio	0.72	0.30	0.98	0.13	0.86	0.83
Uniform Delay, d1	27.3	24.5	17.8	9.3	16.5	10.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.4	0.5	16.5	0.3	30.5	3.7
Delay (s)	33.7	25.0	34.3	9.6	47.0	14.2
Level of Service	C	C	C	A	D	B
Approach Delay (s)	29.9		31.7			16.8
Approach LOS	C		C			B
Intersection Summary						
HCM Average Control Delay			24.7	HCM Level of Service		C
HCM Volume to Capacity ratio			0.93			
Actuated Cycle Length (s)			76.5	Sum of lost time (s)	15.0	
Intersection Capacity Utilization			78.3%	ICU Level of Service	D	
Analysis Period (min)			15			
c Critical Lane Group						























HCM Signalized Intersection Capacity Analysis
 102: Concession 11 East & Highway 6

2021 Total Traffic - Alternative 1
 Weekday AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	
Total Lost time (s)		5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0		
Lane Util. Factor		1.00		1.00		1.00	1.00	0.95	1.00	1.00	0.95		
Flt		0.87		1.00		0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1656		1203		849	1646	3282	1201	948	3167		
Flt Permitted		1.00		0.93		1.00	0.15	1.00	1.00	0.07	1.00		
Satd. Flow (perm)		1649		1183		849	253	3282	1201	75	3167		
Volume (vph)	1	2	49	22	0	69	16	1587	45	70	1577	0	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	1	2	52	23	0	73	17	1671	47	74	1660	0	
RTOR Reduction (vph)	0	19	0	0	0	65	0	0	9	0	0	0	
Lane Group Flow (vph)	0	36	0	23	0	8	17	1671	38	74	1660	0	
Heavy Vehicles (%)	0%	0%	0%	45%	0%	88%	6%	10%	33%	84%	14%	0%	
Turn Type	Perm			Perm		Perm	Perm		Perm	pm+pt		Perm	
Protected Phases		4			8			2		1		6	
Permitted Phases	4			8		8	2		2	6		6	
Actuated Green, G (s)		8.1		8.1		8.1	47.4	47.4	47.4	59.9		59.9	
Effective Green, g (s)		9.1		9.1		9.1	48.4	48.4	48.4	60.9		60.9	
Actuated g/C Ratio		0.11		0.11		0.11	0.60	0.60	0.60	0.76		0.76	
Clearance Time (s)		6.0		6.0		6.0	6.0	6.0	6.0	4.0		6.0	
Vehicle Extension (s)		3.0		3.0		3.0	3.0	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)		188		135		97	153	1986	727	139		2411	
v/s Ratio Prot								c0.51		0.05		c0.52	
v/s Ratio Perm		c0.02		0.02		0.01	0.07		0.03	0.36			
v/c Ratio		0.19		0.17		0.09	0.11	0.84	0.05	0.53		0.69	
Uniform Delay, d1		32.1		32.0		31.7	6.7	12.7	6.4	12.5		4.8	
Progression Factor		1.00		1.00		1.00	1.00	1.00	1.00	1.00		1.00	
Incremental Delay, d2		0.5		0.6		0.4	1.5	4.5	0.1	3.9		1.6	
Delay (s)		32.6		32.6		32.1	8.2	17.2	6.6	16.3		6.4	
Level of Service		C		C		C	A	B	A	B		A	
Approach Delay (s)		32.6			32.2			16.9				6.8	
Approach LOS		C			C			B				A	
Intersection Summary													
HCM Average Control Delay			12.7									HCM Level of Service	B
HCM Volume to Capacity ratio			0.76										
Actuated Cycle Length (s)			80.0									Sum of lost time (s)	15.0
Intersection Capacity Utilization			74.8%									ICU Level of Service	D
Analysis Period (min)			15										
c Critical Lane Group													















HCM Signalized Intersection Capacity Analysis
9: Concession 6 E & Highway 6

2021 Total Traffic - Alternative 1
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.95		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1623		1570	1518		1805	3282	1468	1752	3282	1468
Flt Permitted	0.72	1.00		0.71	1.00		0.07	1.00	1.00	0.11	1.00	1.00
Satd. Flow (perm)	1290	1623		1176	1518		129	3282	1468	197	3282	1468
Volume (vph)	123	41	19	46	16	34	1	1419	59	31	1732	67
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	140	47	22	52	18	39	1	1612	67	35	1968	76
RTOR Reduction (vph)	0	7	0	0	19	0	0	0	21	0	0	23
Lane Group Flow (vph)	140	62	0	52	38	0	1	1612	46	35	1968	53
Heavy Vehicles (%)	6%	7%	21%	15%	0%	18%	0%	10%	10%	3%	10%	10%
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	14.3	14.3		14.3	14.3		56.0	56.0	56.0	56.0	56.0	56.0
Effective Green, g (s)	16.1	16.1		16.1	16.1		58.9	58.9	58.9	58.9	58.9	58.9
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.69	0.69	0.69	0.69	0.69	0.69
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	244	307		223	288		89	2274	1017	137	2274	1017
v/s Ratio Prot		0.04			0.03			0.49			c0.60	
v/s Ratio Perm	c0.11			0.04			0.01		0.03	0.18		0.04
v/c Ratio	0.57	0.20		0.23	0.13		0.01	0.71	0.05	0.26	0.87	0.05
Uniform Delay, d1	31.3	29.0		29.2	28.6		4.0	7.9	4.1	4.9	10.0	4.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.2	0.3		0.5	0.2		0.2	1.9	0.1	4.4	4.7	0.1
Delay (s)	34.6	29.4		29.8	28.9		4.3	9.8	4.2	9.3	14.7	4.3
Level of Service	C	C		C	C		A	A	A	A	B	A
Approach Delay (s)		32.8			29.3			9.6			14.3	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM Average Control Delay			13.7			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			85.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			69.7%			ICU Level of Service				C		
Analysis Period (min)			15									
c	Critical Lane Group											




































HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

2021 Total Traffic - Alternative 1
 Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1599	3312	1615	1703	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1805	1599	3312	1615	131	3471
Volume (vph)	80	121	1555	168	191	1613
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	82	125	1603	173	197	1663
RTOR Reduction (vph)	0	108	0	69	0	0
Lane Group Flow (vph)	82	17	1603	104	197	1663
Heavy Vehicles (%)	0%	1%	9%	0%	6%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	10.6	10.6	49.5	49.5	62.0	62.0
Effective Green, g (s)	12.1	12.1	52.4	52.4	64.9	64.9
Actuated g/C Ratio	0.14	0.14	0.60	0.60	0.75	0.75
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	251	222	1995	973	233	2589
v/s Ratio Prot	c0.05		0.48		c0.07	0.48
v/s Ratio Perm		0.01		0.06	c0.56	
v/c Ratio	0.33	0.08	0.80	0.11	0.85	0.64
Uniform Delay, d1	33.8	32.6	13.3	7.4	22.0	5.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	3.5	0.2	22.7	1.2
Delay (s)	34.5	32.7	16.9	7.6	44.7	6.6
Level of Service	C	C	B	A	D	A
Approach Delay (s)	33.5		16.0			10.7
Approach LOS	C		B			B
Intersection Summary						
HCM Average Control Delay			14.3		HCM Level of Service	B
HCM Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			87.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			74.4%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Dundas St & Highway 6





















2021 Total Traffic - Alternative 1
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	 		 	  		  	  	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	4988	1417	3367	3438	1482	3183	4759	1583	1626	4848	1429
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1687	4988	1417	3367	3438	1482	3183	4759	1583	1626	4848	1429
Volume (vph)	196	633	455	463	415	106	379	1451	320	114	1824	119
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	200	646	464	472	423	108	387	1481	327	116	1861	121
RTOR Reduction (vph)	0	0	157	0	0	83	0	0	201	0	0	52
Lane Group Flow (vph)	200	646	307	472	423	25	387	1481	126	116	1861	69
Heavy Vehicles (%)	7%	4%	14%	4%	5%	9%	10%	9%	2%	11%	7%	13%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	15.6	24.0	24.0	16.6	25.0	25.0	14.6	44.2	44.2	11.4	41.0	41.0
Effective Green, g (s)	15.1	26.8	26.8	16.1	27.8	27.8	14.1	46.2	46.2	10.9	43.0	43.0
Actuated g/C Ratio	0.13	0.22	0.22	0.13	0.23	0.23	0.12	0.38	0.38	0.09	0.36	0.36
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	212	1114	316	452	796	343	374	1832	609	148	1737	512
v/s Ratio Prot	0.12	0.13		c0.14	0.12		c0.12	c0.31		0.07	c0.38	
v/s Ratio Perm			c0.22			0.02			0.08			0.05
v/c Ratio	0.94	0.58	0.97	1.04	0.53	0.07	1.03	0.81	0.21	0.78	1.07	0.13
Uniform Delay, d1	52.0	41.6	46.2	52.0	40.4	36.0	53.0	32.9	24.7	53.4	38.5	26.0
Progression 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
Incremental Delay, d2	45.4	0.5	42.6	54.3	0.3	0.0	55.8	4.0	0.8	21.6	43.6	0.5
Delay (s)	97.4	42.0	88.9	106.3	40.7	36.1	108.8	36.9	25.4	75.0	82.1	26.5
Level of Service	F	D	F	F	D	D	F	D	C	E	F	C
Approach Delay (s)		67.1			71.1			47.9			78.5	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM Average Control Delay			64.9				HCM Level of Service			E		
HCM Volume to Capacity ratio			1.09									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			25.0		
Intersection Capacity Utilization			89.1%				ICU Level of Service			E		
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Northcliffe Ave & Highway 6

2021 Total Traffic - Alternative 1
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.90			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00			0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1681			1733	1538	1787	3223	1553	1752	3277	
Flt Permitted		0.98			0.15	1.00	0.07	1.00	1.00	0.07	1.00	
Satd. Flow (perm)		1654			268	1538	123	3223	1553	121	3277	
Volume (vph)	24	102	413	108	18	344	82	2128	68	126	2703	23
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	25	105	426	111	19	355	85	2194	70	130	2787	24
RTOR Reduction (vph)	0	64	0	0	0	67	0	0	18	0	0	0
Lane Group Flow (vph)	0	492	0	0	130	288	85	2194	52	130	2811	0
Heavy Vehicles (%)	8%	4%	0%	6%	0%	5%	1%	12%	4%	3%	10%	13%
Turn Type	Perm			Perm		Perm	pm+pt		Perm	pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		26.5			26.5	26.5	63.1	58.1	58.1	63.1	58.1	
Effective Green, g (s)		28.0			28.0	28.0	64.0	61.0	61.0	64.0	61.0	
Actuated g/C Ratio		0.26			0.26	0.26	0.60	0.57	0.57	0.60	0.57	
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9	
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0	
Lane Grp Cap (vph)		433			70	402	120	1837	885	118	1868	
v/s Ratio Prot							0.02	0.68		c0.03	c0.86	
v/s Ratio Perm		0.30			c0.48	0.19	0.40		0.03	0.63		
v/c Ratio		1.14			1.86	0.72	0.71	1.19	0.06	1.10	1.50	
Uniform Delay, d1		39.5			39.5	35.9	53.1	23.0	10.2	54.2	23.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		85.8			435.1	6.0	14.4	93.1	0.1	112.8	229.9	
Delay (s)		125.3			474.6	41.9	67.5	116.1	10.4	167.0	252.9	
Level of Service		F			F	D	E	F	B	F	F	
Approach Delay (s)		125.3			157.9			111.2			249.1	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM Average Control Delay		180.1			HCM Level of Service				F			
HCM Volume to Capacity ratio		1.60										
Actuated Cycle Length (s)		107.0			Sum of lost time (s)				15.0			
Intersection Capacity Utilization		137.1%			ICU Level of Service				H			
Analysis Period (min)		15										

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

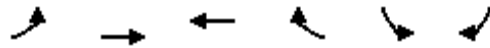
2021 Total Traffic - Alternative 1
 Weekday AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	112	20	15	81	6	3	94	13	6	90	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	137	24	18	99	7	4	115	16	7	110	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)												
pX, platoon unblocked												
vC, conflicting volume	311	262	110	347	254	123	110			130		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	311	262	110	347	254	123	110			130		
tC, single (s)	7.1	7.1	6.5	7.2	7.4	6.2	4.1			4.6		
tC, 2 stage (s)												
tF (s)	3.5	4.6	3.6	3.6	4.8	3.3	2.2			2.7		
p0 queue free %	99	75	97	96	81	99	100			99		
cM capacity (veh/h)	544	545	873	458	525	934	1493			1206		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	168	124	134	117								
Volume Left	7	18	4	7								
Volume Right	24	7	16	0								
cSH	577	527	1493	1206								
Volume to Capacity	0.29	0.24	0.00	0.01								
Queue Length 95th (m)	9.2	6.9	0.1	0.1								
Control Delay (s)	13.8	13.9	0.2	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	13.8	13.9	0.2	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			7.6									
Intersection Capacity Utilization		24.8%		ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 136: Concession 11 East & Site Driveway













2021 Total Traffic - Alternative 1
 Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↗	↖	↗
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	101	30	28	0	1	73
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	33	30	0	1	79
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	30				283	30
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30				283	30
tC, single (s)	4.8				6.4	7.2
tC, 2 stage (s)						
tF (s)	2.8				3.5	4.2
p0 queue free %	91				100	90
cM capacity (veh/h)	1244				649	830
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	110	33	30	0	1	79
Volume Left	110	0	0	0	1	0
Volume Right	0	0	0	0	0	79
cSH	1244	1700	1700	1700	649	830
Volume to Capacity	0.09	0.02	0.02	0.00	0.00	0.10
Queue Length 95th (m)	2.2	0.0	0.0	0.0	0.0	2.4
Control Delay (s)	8.2	0.0	0.0	0.0	10.6	9.8
Lane LOS	A				B	A
Approach Delay (s)	6.3		0.0		9.8	
Approach LOS					A	
Intersection Summary						
Average Delay			6.7			
Intersection Capacity Utilization			22.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 1: 401 WB-Ramps & Highway 6

2021 Total Traffic - Alternative 1
 Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1322	1521	1743	1452	1601	1792
Flt Permitted	0.95	1.00	1.00	1.00	0.44	1.00
Satd. Flow (perm)	1322	1521	1743	1452	741	1792
Volume (vph)	190	726	499	848	204	1203
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	196	748	514	874	210	1240
RTOR Reduction (vph)	0	0	0	238	0	0
Lane Group Flow (vph)	196	748	514	636	210	1240
Heavy Vehicles (%)	32%	5%	9%	10%	9%	6%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	13.2	88.0	62.5	62.5	62.5	62.5
Effective Green, g (s)	14.0	88.0	64.0	64.0	64.0	64.0
Actuated g/C Ratio	0.16	1.00	0.73	0.73	0.73	0.73
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	210	1521	1268	1056	539	1303
v/s Ratio Prot	c0.15		0.29			c0.69
v/s Ratio Perm		0.49		0.44	0.28	
v/c Ratio	0.93	0.49	0.41	0.60	0.39	0.95
Uniform Delay, d1	36.5	0.0	4.6	5.8	4.6	10.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	43.5	1.1	1.0	2.5	2.1	15.8
Delay (s)	80.0	1.1	5.6	8.4	6.7	26.4
Level of Service	F	A	A	A	A	C
Approach Delay (s)	17.5		7.3			23.5
Approach LOS	B		A			C
Intersection Summary						
HCM Average Control Delay			16.1		HCM Level of Service	B
HCM Volume to Capacity ratio			0.95			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			82.2%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
3: 401 EB-Ramps & Highway 6

2021 Total Traffic - Alternative 1
Weekday PM Peak Hour






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr _t	1.00	0.85	1.00	1.00	1.00	0.85
Fl _t Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1264	1452	1195	1743	1681	1426
Fl _t Permitted	0.95	1.00	0.10	1.00	1.00	1.00
Satd. Flow (perm)	1264	1452	123	1743	1681	1426
Volume (vph)	58	1077	126	1433	862	410
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	60	1110	130	1477	889	423
RTOR Reduction (vph)	0	35	0	0	0	250
Lane Group Flow (vph)	60	1075	130	1477	889	173
Heavy Vehicles (%)	38%	10%	46%	9%	13%	12%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	8.0	39.2	69.7	69.7	34.5	34.5
Effective Green, g (s)	8.8	39.0	71.2	71.2	36.0	36.0
Actuated g/C Ratio	0.10	0.43	0.79	0.79	0.40	0.40
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	124	710	457	1379	672	570
v/s Ratio Prot	0.05	c0.51	0.10	0.85	c0.53	
v/s Ratio Perm		0.23	0.13			0.12
v/c Ratio	0.48	1.51	0.28	1.07	1.32	0.30
Uniform Delay, d ₁	38.4	25.5	22.3	9.4	27.0	18.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d ₂	3.0	238.5	0.3	45.7	155.6	1.4
Delay (s)	41.4	264.0	22.6	55.1	182.6	19.8
Level of Service	D	F	C	E	F	B
Approach Delay (s)	252.6			52.5	130.1	
Approach LOS	F			D	F	

Intersection Summary

HCM Average Control Delay	134.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	120.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

2021 Total Traffic - Alternative 1
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Fr _t		0.99			1.00	0.85		1.00		1.00	1.00	
Fl _t Protected		0.96			0.96	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1808			1828	1597		1650		1745	1726	
Fl _t Permitted		0.73			0.75	1.00		1.00		0.16	1.00	
Satd. Flow (perm)		1377			1425	1597		1650		297	1726	
Volume (vph)	23	5	3	53	14	30	0	1069	26	38	1791	14
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	24	5	3	56	15	32	0	1137	28	40	1905	15
RTOR Reduction (vph)	0	3	0	0	0	29	0	1	0	0	0	0
Lane Group Flow (vph)	0	29	0	0	71	3	0	1164	0	40	1920	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	15%	4%	0%	10%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		9.6			9.6	9.6		87.8		87.8	87.8	
Effective Green, g (s)		10.8			10.8	10.8		89.2		89.2	89.2	
Actuated g/C Ratio		0.10			0.10	0.10		0.81		0.81	0.81	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		135			140	157		1338		241	1400	
v/s Ratio Prot								0.71			c1.11	
v/s Ratio Perm		0.02			c0.05	0.00				0.13		
v/c Ratio		0.22			0.51	0.02		0.87		0.17	1.37	
Uniform Delay, d ₁		45.7			47.1	44.8		6.7		2.3	10.4	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d ₂		0.8			2.9	0.1		7.9		1.5	171.7	
Delay (s)		46.5			49.9	44.9		14.6		3.8	182.1	
Level of Service		D			D	D		B		A	F	
Approach Delay (s)		46.5			48.4			14.6			178.5	
Approach LOS		D			D			B			F	
Intersection Summary												
HCM Average Control Delay		114.5									F	
HCM Volume to Capacity ratio		1.28										
Actuated Cycle Length (s)		110.0						10.0				
Intersection Capacity Utilization		111.8%									H	
Analysis Period (min)		15										
c Critical Lane Group												























HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

2021 Total Traffic - Alternative 1
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Fr _t	1.00	0.85	1.00	0.85	1.00	1.00
Fl _t Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1745	1597	3505	1597	1745	3438
Fl _t Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1745	1597	3505	1597	163	3438
Volume (vph)	333	203	1434	127	124	1999
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	358	218	1542	137	133	2149
RTOR Reduction (vph)	0	108	0	67	0	0
Lane Group Flow (vph)	358	110	1542	70	133	2149
Heavy Vehicles (%)	0%	0%	3%	0%	0%	5%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	18.5	18.5	37.1	37.1	46.1	46.1
Effective Green, g (s)	19.5	19.5	40.0	40.0	49.0	49.0
Actuated g/C Ratio	0.25	0.25	0.51	0.51	0.62	0.62
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	433	397	1786	814	182	2146
v/s Ratio Prot	c0.21		0.44		0.04	c0.63
v/s Ratio Perm		0.07		0.04	0.42	
v/c Ratio	0.83	0.28	0.86	0.09	0.73	1.00
Uniform Delay, d ₁	27.9	23.8	16.9	9.9	14.4	14.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d ₂	12.2	0.4	5.8	0.2	14.0	19.8
Delay (s)	40.1	24.2	22.7	10.1	28.4	34.5
Level of Service	D	C	C	B	C	C
Approach Delay (s)	34.1		21.6			34.2
Approach LOS	C		C			C
Intersection Summary						
HCM Average Control Delay			29.5	HCM Level of Service		C
HCM Volume to Capacity ratio			0.95			
Actuated Cycle Length (s)			78.5	Sum of lost time (s)		10.0
Intersection Capacity Utilization			82.0%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
102: Concession 11 East & Highway 6

2021 Total Traffic - Alternative 1
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt		0.87		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1659		1407	1900	902	1711	3312	1157	909	3406	1597
Flt Permitted		1.00		0.72	1.00	1.00	0.07	1.00	1.00	0.14	1.00	1.00
Satd. Flow (perm)		1659		1073	1900	902	120	3312	1157	135	3406	1597
Volume (vph)	0	3	43	41	4	62	52	1371	29	52	2010	3
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	3	47	45	4	68	57	1507	32	57	2209	3
RTOR Reduction (vph)	0	4	0	0	0	28	0	0	5	0	0	0
Lane Group Flow (vph)	0	46	0	45	4	40	57	1507	27	57	2209	3
Heavy Vehicles (%)	0%	0%	0%	24%	0%	77%	2%	9%	38%	92%	6%	0%
Turn Type	Perm			Perm			Perm	Perm		Perm	Perm	
Protected Phases		4			8			2				6
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		9.0		9.0	9.0	9.0	59.0	59.0	59.0	59.0	59.0	59.0
Effective Green, g (s)		10.0		10.0	10.0	10.0	60.0	60.0	60.0	60.0	60.0	60.0
Actuated g/C Ratio		0.12		0.12	0.12	0.12	0.75	0.75	0.75	0.75	0.75	0.75
Clearance Time (s)		6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		207		134	238	113	90	2484	868	101	2555	1198
v/s Ratio Prot		0.03			0.00			0.46			c0.65	
v/s Ratio Perm				0.04		c0.04	0.47		0.02	0.42		0.00
v/c Ratio		0.22		0.34	0.02	0.35	0.63	0.61	0.03	0.56	0.86	0.00
Uniform Delay, d1		31.5		32.0	30.7	32.0	4.8	4.6	2.6	4.3	7.1	2.5
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.5		1.5	0.0	1.9	29.3	1.1	0.1	20.9	4.2	0.0
Delay (s)		32.0		33.5	30.7	34.0	34.1	5.7	2.6	25.2	11.3	2.5
Level of Service		C		C	C	C	C	A	A	C	B	A
Approach Delay (s)		32.0			33.6			6.7			11.7	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM Average Control Delay			10.6									B
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			80.0							10.0		
Intersection Capacity Utilization			72.8%									C
Analysis Period (min)			15									
c Critical Lane Group												















HCM Signalized Intersection Capacity Analysis
 9: Concession 6 E & Highway 6

Weekday PM Peak Hour
 2021 Total Traffic - Alternative 1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1787	1758		1752	1740		1805	3282	1615	1671	3312	1553
Flt Permitted	0.69	1.00		0.74	1.00		0.06	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1293	1758		1362	1740		120	3282	1615	337	3312	1553
Volume (vph)	75	20	8	90	52	52	8	1222	52	24	1915	97
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	78	21	8	94	54	54	8	1273	54	25	1995	101
RTOR Reduction (vph)	0	7	0	0	47	0	0	0	14	0	0	26
Lane Group Flow (vph)	78	22	0	94	61	0	8	1273	40	25	1995	75
Heavy Vehicles (%)	1%	5%	0%	3%	2%	0%	0%	10%	0%	8%	9%	4%
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.7	9.7		9.7	9.7		60.6	60.6	60.6	60.6	60.6	60.6
Effective Green, g (s)	11.5	11.5		11.5	11.5		63.5	63.5	63.5	63.5	63.5	63.5
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.75	0.75	0.75	0.75	0.75	0.75
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	175	238		184	235		90	2452	1207	252	2474	1160
v/s Ratio Prot		0.01			0.04			0.39			c0.60	
v/s Ratio Perm	0.06			c0.07			0.07		0.02	0.07		0.05
v/c Ratio	0.45	0.09		0.51	0.26		0.09	0.52	0.03	0.10	0.81	0.07
Uniform Delay, d1	33.8	32.2		34.1	32.9		2.9	4.4	2.8	2.9	6.8	2.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.8	0.2		2.4	0.6		1.9	0.8	0.1	0.8	2.9	0.1
Delay (s)	35.6	32.4		36.5	33.5		4.9	5.2	2.8	3.7	9.8	3.0
Level of Service	D	C		D	C		A	A	A	A	A	A
Approach Delay (s)		34.7			34.9			5.1			9.4	
Approach LOS		C			C			A			A	
Intersection Summary												
HCM Average Control Delay			10.0				HCM Level of Service			A		
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			85.0				Sum of lost time (s)			10.0		
Intersection Capacity Utilization			72.9%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												


































HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

Weekday PM Peak Hour
 2021 Total Traffic - Alternative 1

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	3374	1615	1805	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1770	1599	3374	1615	165	3471
Volume (vph)	425	245	1416	123	259	1730
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	462	266	1539	134	282	1880
RTOR Reduction (vph)	0	190	0	71	0	0
Lane Group Flow (vph)	462	76	1539	63	282	1880
Heavy Vehicles (%)	2%	1%	7%	0%	0%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	20.5	20.5	38.1	38.1	52.1	52.1
Effective Green, g (s)	22.0	22.0	41.0	41.0	55.0	55.0
Actuated g/C Ratio	0.25	0.25	0.47	0.47	0.63	0.63
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	448	404	1590	761	274	2194
v/s Ratio Prot	c0.26		0.46		0.11	c0.54
v/s Ratio Perm		0.05		0.04	c0.54	
v/c Ratio	1.03	0.19	0.97	0.08	1.03	0.86
Uniform Delay, d1	32.5	25.5	22.4	12.7	26.0	12.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	50.8	0.2	16.1	0.2	62.1	4.6
Delay (s)	83.3	25.7	38.5	12.9	88.1	17.4
Level of Service	F	C	D	B	F	B
Approach Delay (s)	62.3		36.4			26.7
Approach LOS	E		D			C
Intersection Summary						
HCM Average Control Delay			35.9	HCM Level of Service		D
HCM Volume to Capacity ratio			1.00			
Actuated Cycle Length (s)			87.0	Sum of lost time (s)		10.0
Intersection Capacity Utilization			89.5%	ICU Level of Service		E
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
13: Dundas St & Highway 6





















Weekday PM Peak Hour
2021 Total Traffic - Alternative 1

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	 		 	  		  	 	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	5085	1553	3433	3574	1583	3335	4673	1583	1770	4715	1468
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	5085	1553	3433	3574	1583	3335	4673	1583	1770	4715	1468
Volume (vph)	132	422	447	469	748	196	414	1285	409	176	1894	162
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	138	440	466	489	779	204	431	1339	426	183	1973	169
RTOR Reduction (vph)	0	0	149	0	0	152	0	0	219	0	0	79
Lane Group Flow (vph)	138	440	317	489	779	52	431	1339	207	183	1973	90
Heavy Vehicles (%)	3%	2%	4%	2%	1%	2%	5%	11%	2%	2%	10%	10%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	9.7	22.9	22.9	10.5	23.7	23.7	10.6	34.5	34.5	12.3	36.2	36.2
Effective Green, g (s)	9.2	25.7	25.7	10.0	26.5	26.5	10.1	36.5	36.5	11.8	38.2	38.2
Actuated g/C Ratio	0.09	0.25	0.25	0.10	0.25	0.25	0.10	0.35	0.35	0.11	0.37	0.37
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	155	1257	384	330	911	403	324	1640	556	201	1732	539
v/s Ratio Prot	0.08	0.09		c0.14	c0.22		c0.13	0.29		0.10	c0.42	
v/s Ratio Perm			0.20			0.03			0.13			0.06
v/c Ratio	0.89	0.35	0.83	1.48	0.86	0.13	1.33	0.82	0.37	0.91	1.14	0.17
Uniform Delay, d1	46.9	32.3	37.0	47.0	36.9	29.9	47.0	30.7	25.2	45.6	32.9	22.2
Progression 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
Incremental Delay, d2	41.2	0.1	12.9	232.5	7.6	0.1	168.4	4.6	1.9	38.8	70.2	0.7
Delay (s)	88.1	32.3	49.9	279.5	44.5	29.9	215.3	35.3	27.1	84.4	103.1	22.8
Level of Service	F	C	D	F	D	C	F	D	C	F	F	C
Approach Delay (s)		47.5			120.6			69.1			95.8	
Approach LOS		D			F			E			F	
Intersection Summary												
HCM Average Control Delay			85.5	HCM Level of Service				F				
HCM Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			104.0	Sum of lost time (s)				10.0				
Intersection Capacity Utilization			93.1%	ICU Level of Service				F				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Northcliffe Ave & Highway 6

















Weekday PM Peak Hour
2021 Total Traffic - Alternative 1

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00			0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1721			1775	1568	1805	3374	1524	1787	3371	
Flt Permitted		0.97			0.59	1.00	0.07	1.00	1.00	0.07	1.00	
Satd. Flow (perm)		1676			1077	1568	141	3374	1524	128	3371	
Volume (vph)	11	55	115	153	112	384	197	1632	127	280	2744	25
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	60	125	166	122	417	214	1774	138	304	2983	27
RTOR Reduction (vph)	0	58	0	0	0	151	0	0	46	0	0	0
Lane Group Flow (vph)	0	139	0	0	288	266	214	1774	92	304	3010	0
Heavy Vehicles (%)	0%	0%	1%	7%	0%	3%	0%	7%	6%	1%	7%	0%
Turn Type	Perm			Perm		Perm	pm+pt		Perm	pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)		24.5			24.5	24.5	57.1	51.1	51.1	68.1	59.1	
Effective Green, g (s)		26.0			26.0	26.0	58.0	54.0	54.0	71.0	62.0	
Actuated g/C Ratio		0.24			0.24	0.24	0.54	0.50	0.50	0.66	0.58	
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9	
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0	
Lane Grp Cap (vph)		407			262	381	139	1703	769	271	1953	
v/s Ratio Prot							0.06	0.53		c0.13	c0.89	
v/s Ratio Perm		0.08			c0.27	0.17	0.78		0.06	0.62		
v/c Ratio		0.34			1.10	0.70	1.54	1.04	0.12	1.12	1.54	
Uniform Delay, d1		33.4			40.5	36.9	53.7	26.5	14.0	36.4	22.5	
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.5			84.8	5.5	275.4	33.5	0.3	91.5	246.0	
Delay (s)		33.9			125.3	42.4	329.1	60.0	14.3	127.8	268.5	
Level of Service		C			F	D	F	E	B	F	F	
Approach Delay (s)		33.9			76.2			84.1			255.6	
Approach LOS		C			E			F			F	
Intersection Summary												
HCM Average Control Delay		171.3			HCM Level of Service				F			
HCM Volume to Capacity ratio		1.43										
Actuated Cycle Length (s)		107.0			Sum of lost time (s)				15.0			
Intersection Capacity Utilization		129.2%			ICU Level of Service				H			
Analysis Period (min)		15										

c Critical Lane Group

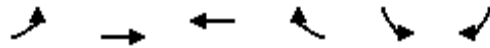
HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

2021 Total Traffic - Alternative 1
 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	68	14	31	108	6	31	117	19	5	141	5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	8	72	15	33	114	6	33	123	20	5	148	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	423	370	151	411	363	133	154			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	423	370	151	411	363	133	154			143		
tC, single (s)	7.1	7.4	6.2	7.1	7.1	6.5	4.1			4.5		
tC, 2 stage (s)												
tF (s)	3.5	4.8	3.3	3.5	4.5	3.6	2.2			2.6		
p0 queue free %	98	84	98	93	76	99	98			100		
cM capacity (veh/h)	432	435	901	468	475	840	1439			1237		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	95	153	176	159								
Volume Left	8	33	33	5								
Volume Right	15	6	20	5								
cSH	472	482	1439	1237								
Volume to Capacity	0.20	0.32	0.02	0.00								
Queue Length 95th (m)	5.6	10.2	0.5	0.1								
Control Delay (s)	14.5	15.9	1.6	0.3								
Lane LOS	B	C	A	A								
Approach Delay (s)	14.5	15.9	1.6	0.3								
Approach LOS	B	C										
Intersection Summary												
Average Delay			7.1									
Intersection Capacity Utilization			41.5%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 136: Concession 11 East & Site Driveway













2021 Total Traffic - Alternative 1
 Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↗	↖	↖	↖
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	61	30	56	0	3	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	33	61	0	3	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	61				226	61
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	61				226	61
tC, single (s)	5.0				6.4	6.8
tC, 2 stage (s)						
tF (s)	3.0				3.5	3.9
p0 queue free %	94				100	89
cM capacity (veh/h)	1117				721	855
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	66	33	61	0	3	97
Volume Left	66	0	0	0	3	0
Volume Right	0	0	0	0	0	97
cSH	1117	1700	1700	1700	721	855
Volume to Capacity	0.06	0.02	0.04	0.00	0.00	0.11
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.1	2.9
Control Delay (s)	8.4	0.0	0.0	0.0	10.0	9.7
Lane LOS	A				B	A
Approach Delay (s)	5.6		0.0		9.8	
Approach LOS					A	
Intersection Summary						
Average Delay			5.9			
Intersection Capacity Utilization			20.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 1: 401 WB-Ramps & Highway 6

2031 Total Traffic - Alternative 1
 Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1111	1452	1743	1439	1385	1681
Flt Permitted	0.95	1.00	1.00	1.00	0.26	1.00
Satd. Flow (perm)	1111	1452	1743	1439	372	1681
Volume (vph)	106	468	859	968	143	1449
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	110	488	895	1008	149	1509
RTOR Reduction (vph)	0	0	0	238	0	0
Lane Group Flow (vph)	110	488	895	770	149	1509
Heavy Vehicles (%)	57%	10%	9%	11%	26%	13%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	10.0	88.0	65.7	65.7	65.7	65.7
Effective Green, g (s)	10.8	88.0	67.2	67.2	67.2	67.2
Actuated g/C Ratio	0.12	1.00	0.76	0.76	0.76	0.76
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	136	1452	1331	1099	284	1284
v/s Ratio Prot	c0.10		0.51			c0.90
v/s Ratio Perm		0.34		0.53	0.40	
v/c Ratio	0.81	0.34	0.67	0.70	0.52	1.18
Uniform Delay, d1	37.6	0.0	5.1	5.3	4.1	10.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	28.6	0.6	2.7	3.7	6.8	87.3
Delay (s)	66.2	0.6	7.8	9.0	10.9	97.7
Level of Service	E	A	A	A	B	F
Approach Delay (s)	12.7		8.4			89.9
Approach LOS	B		A			F
Intersection Summary						
HCM Average Control Delay			41.5		HCM Level of Service	D
HCM Volume to Capacity ratio			1.12			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			92.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
3: 401 EB-Ramps & Highway 6

2031 Total Traffic - Alternative 1
Weekday AM Peak Hour






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1616	1401	1187	1743	1597	1377
Flt Permitted	0.95	1.00	0.10	1.00	1.00	1.00
Satd. Flow (perm)	1616	1401	119	1743	1597	1377
Volume (vph)	200	1012	143	1927	724	655
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	208	1054	149	2007	754	682
RTOR Reduction (vph)	0	55	0	0	0	402
Lane Group Flow (vph)	208	999	149	2007	754	280
Heavy Vehicles (%)	8%	14%	47%	9%	19%	16%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	11.2	38.2	66.5	66.5	35.5	35.5
Effective Green, g (s)	12.0	38.0	68.0	68.0	37.0	37.0
Actuated g/C Ratio	0.13	0.42	0.76	0.76	0.41	0.41
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	215	669	398	1317	657	566
v/s Ratio Prot	0.13	c0.43	0.11	c1.15	0.47	
v/s Ratio Perm		0.28	0.17			0.20
v/c Ratio	0.97	1.49	0.37	1.52	1.15	0.50
Uniform Delay, d1	38.8	26.0	14.6	11.0	26.5	19.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	51.5	229.5	0.6	239.7	83.4	3.1
Delay (s)	90.3	255.5	15.2	250.7	109.9	22.7
Level of Service	F	F	B	F	F	C
Approach Delay (s)	228.3			234.4	68.5	
Approach LOS	F			F	E	

Intersection Summary

HCM Average Control Delay	183.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	120.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

2031 Total Traffic - Alternative 1
Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Fr _t		0.99			1.00	0.85		1.00		1.00	1.00	
Fl _t Protected		0.97			0.95	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1467			1763	1426		1681		1616	1583	
Fl _t Permitted		0.74			0.78	1.00		1.00		0.14	1.00	
Satd. Flow (perm)		1126			1443	1426		1681		234	1583	
Volume (vph)	29	9	4	74	4	41	0	1727	18	26	1745	4
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	30	9	4	77	4	43	0	1799	19	27	1818	4
RTOR Reduction (vph)	0	4	0	0	0	33	0	0	0	0	0	0
Lane Group Flow (vph)	0	39	0	0	81	10	0	1818	0	27	1822	0
Heavy Vehicles (%)	17%	56%	0%	3%	0%	12%	0%	13%	0%	8%	20%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		10.6			10.6	10.6		86.8		86.8	86.8	
Effective Green, g (s)		11.8			11.8	11.8		88.2		88.2	88.2	
Actuated g/C Ratio		0.11			0.11	0.11		0.80		0.80	0.80	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		121			155	153		1348		188	1269	
v/s Ratio Prot								1.08			c1.15	
v/s Ratio Perm		0.04			c0.06	0.01				0.12		
v/c Ratio		0.33			0.52	0.07		1.35		0.14	1.44	
Uniform Delay, d ₁		45.4			46.4	44.1		10.9		2.4	10.9	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d ₂		1.6			3.2	0.2		161.8		1.6	200.7	
Delay (s)		47.0			49.6	44.3		172.7		4.0	211.6	
Level of Service		D			D	D		F		A	F	
Approach Delay (s)		47.0			47.8			172.7			208.5	
Approach LOS		D			D			F			F	
Intersection Summary												
HCM Average Control Delay		184.6									F	
HCM Volume to Capacity ratio		1.33										
Actuated Cycle Length (s)		110.0								10.0		
Intersection Capacity Utilization		121.2%									H	
ICU Level of Service												
Analysis Period (min)		15										
c Critical Lane Group												























HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

2031 Total Traffic - Alternative 1
Weekday AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1678	1581	3406	1581	1728	3505
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1678	1581	3406	1581	90	3505
Volume (vph)	277	216	1928	205	160	2068
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	304	237	2119	225	176	2273
RTOR Reduction (vph)	0	106	0	83	0	0
Lane Group Flow (vph)	304	131	2119	143	176	2273
Heavy Vehicles (%)	4%	1%	6%	1%	1%	3%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	20.0	20.0	73.1	73.1	86.1	86.1
Effective Green, g (s)	21.0	21.0	76.0	76.0	89.0	89.0
Actuated g/C Ratio	0.18	0.18	0.63	0.63	0.74	0.74
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	294	277	2157	1001	176	2600
v/s Ratio Prot	c0.18		0.62		0.07	c0.65
v/s Ratio Perm		0.08		0.09	c0.68	
v/c Ratio	1.03	0.47	0.98	0.14	1.00	0.87
Uniform Delay, d1	49.5	44.5	21.4	8.9	42.3	11.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	61.6	1.3	15.6	0.3	67.8	4.5
Delay (s)	111.1	45.8	37.0	9.2	110.2	15.8
Level of Service	F	D	D	A	F	B
Approach Delay (s)	82.5		34.3			22.6
Approach LOS	F		C			C
Intersection Summary						
HCM Average Control Delay			33.8	HCM Level of Service		C
HCM Volume to Capacity ratio			0.99			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)	10.0	
Intersection Capacity Utilization			90.0%	ICU Level of Service	E	
Analysis Period (min)			15			
c Critical Lane Group						






















HCM Signalized Intersection Capacity Analysis
 102: Concession 11 East & Highway 6

2031 Total Traffic - Alternative 1
 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0		5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor		1.00		1.00		1.00	1.00	0.95	1.00	1.00	0.95	
Fr _t		0.87		1.00		0.85	1.00	1.00	0.85	1.00	1.00	
Fl _t Protected		1.00		0.95		1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1655		1220		854	1572	3282	1201	953	3167	
Fl _t Permitted		0.99		0.93		1.00	0.09	1.00	1.00	0.07	1.00	
Satd. Flow (perm)		1647		1193		854	141	3282	1201	73	3167	
Volume (vph)	1	2	54	23	0	70	18	1935	46	71	1922	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1	2	57	24	0	74	19	2037	48	75	2023	0
RTOR Reduction (vph)	0	8	0	0	0	67	0	0	7	0	0	0
Lane Group Flow (vph)	0	52	0	24	0	7	19	2037	41	75	2023	0
Heavy Vehicles (%)	0%	0%	0%	43%	0%	87%	11%	10%	33%	83%	14%	0%
Turn Type	Perm			Perm		Perm	Perm		Perm	pm+pt		Perm
Protected Phases		4			8			2		1		6
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		6.6		6.6		6.6	48.9	48.9	48.9	61.4		61.4
Effective Green, g (s)		7.6		7.6		7.6	49.9	49.9	49.9	62.4		62.4
Actuated g/C Ratio		0.10		0.10		0.10	0.62	0.62	0.62	0.78		0.78
Clearance Time (s)		6.0		6.0		6.0	6.0	6.0	6.0	4.0		6.0
Vehicle Extension (s)		3.0		3.0		3.0	3.0	3.0	3.0	3.0		3.0
Lane Grp Cap (vph)		156		113		81	88	2047	749	139		2470
v/s Ratio Prot								c0.62		0.05		c0.64
v/s Ratio Perm		c0.03		0.02		0.01	0.13		0.03	0.37		
v/c Ratio		0.33		0.21		0.09	0.22	1.00	0.05	0.54		0.82
Uniform Delay, d ₁		33.8		33.4		33.0	6.5	14.9	5.9	17.7		5.4
Progression Factor		1.00		1.00		1.00	1.00	1.00	1.00	1.00		1.00
Incremental Delay, d ₂		1.3		0.9		0.5	5.5	18.8	0.1	4.0		3.2
Delay (s)		35.1		34.4		33.5	12.1	33.7	6.0	21.7		8.5
Level of Service		D		C		C	B	C	A	C		A
Approach Delay (s)		35.1			33.7			32.9			9.0	
Approach LOS		D			C			C			A	
Intersection Summary												
HCM Average Control Delay			21.4									HCM Level of Service C
HCM Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			80.0							15.0		
Intersection Capacity Utilization			75.3%									ICU Level of Service D
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
 9: Concession 6 E & Highway 6

Weekday AM Peak Hour
 2031 Total Traffic - Alternative 1















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.95		1.00	0.90		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1703	1609		1556	1519		1805	3282	1455	1703	3282	1455
Flt Permitted	0.72	1.00		0.71	1.00		0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)	1283	1609		1160	1519		107	3282	1455	103	3282	1455
Volume (vph)	136	45	21	50	18	38	1	1723	65	34	2109	74
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	155	51	24	57	20	43	1	1958	74	39	2397	84
RTOR Reduction (vph)	0	5	0	0	13	0	0	0	21	0	0	24
Lane Group Flow (vph)	155	70	0	57	50	0	1	1958	53	39	2397	60
Heavy Vehicles (%)	6%	7%	24%	16%	0%	18%	0%	10%	11%	6%	10%	11%
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm
Protected Phases		4			8			2				6
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	16.9	16.9		16.9	16.9		68.4	68.4	68.4	68.4	68.4	68.4
Effective Green, g (s)	18.7	18.7		18.7	18.7		71.3	71.3	71.3	71.3	71.3	71.3
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.71	0.71	0.71	0.71	0.71	0.71
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	240	301		217	284		76	2340	1037	73	2340	1037
v/s Ratio Prot		0.04			0.03			0.60			c0.73	
v/s Ratio Perm	c0.12			0.05			0.01		0.04	0.38		0.04
v/c Ratio	0.65	0.23		0.26	0.18		0.01	0.84	0.05	0.53	1.02	0.06
Uniform Delay, d1	37.6	34.6		34.8	34.2		4.2	10.2	4.3	6.7	14.4	4.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.9	0.4		0.6	0.3		0.3	3.8	0.1	25.2	25.1	0.1
Delay (s)	43.4	35.0		35.4	34.5		4.5	14.0	4.4	31.9	39.4	4.4
Level of Service	D	C		D	C		A	B	A	C	D	A
Approach Delay (s)		40.7			34.9			13.6			38.2	
Approach LOS		D			C			B			D	

Intersection Summary		
HCM Average Control Delay	28.0	HCM Level of Service C
HCM Volume to Capacity ratio	0.95	
Actuated Cycle Length (s)	100.0	Sum of lost time (s) 10.0
Intersection Capacity Utilization	80.8%	ICU Level of Service D
Analysis Period (min)	15	

c Critical Lane Group


































HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

Weekday AM Peak Hour
 2031 Total Traffic - Alternative 1

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1805	1599	3312	1615	1703	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.07	1.00
Satd. Flow (perm)	1805	1599	3312	1615	130	3471
Volume (vph)	88	134	1890	186	211	1964
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	91	138	1948	192	218	2025
RTOR Reduction (vph)	0	118	0	81	0	0
Lane Group Flow (vph)	91	20	1948	111	218	2025
Heavy Vehicles (%)	0%	1%	9%	0%	6%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases	8		2		6	
Actuated Green, G (s)	10.9	10.9	47.3	47.3	61.7	61.7
Effective Green, g (s)	12.4	12.4	50.2	50.2	64.6	64.6
Actuated g/C Ratio	0.14	0.14	0.58	0.58	0.74	0.74
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	257	228	1911	932	266	2577
v/s Ratio Prot	c0.05		c0.59		0.09	c0.58
v/s Ratio Perm		0.01		0.07	0.52	
v/c Ratio	0.35	0.09	1.02	0.12	0.82	0.79
Uniform Delay, d1	33.7	32.4	18.4	8.4	26.6	6.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	25.6	0.3	16.8	2.5
Delay (s)	34.5	32.5	44.0	8.6	43.4	9.4
Level of Service	C	C	D	A	D	A
Approach Delay (s)	33.3		40.8			12.7
Approach LOS	C		D			B
Intersection Summary						
HCM Average Control Delay			26.8	HCM Level of Service		C
HCM Volume to Capacity ratio			0.90			
Actuated Cycle Length (s)			87.0	Sum of lost time (s)	15.0	
Intersection Capacity Utilization			84.8%	ICU Level of Service	E	
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 13: Dundas St & Highway 6





















Weekday AM Peak Hour
 2031 Total Traffic - Alternative 1

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	 		 	  			  	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	4988	1417	3367	3438	1482	3183	4759	1583	1612	4848	1442
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1687	4988	1417	3367	3438	1482	3183	4759	1583	1612	4848	1442
Volume (vph)	216	699	503	512	459	116	419	1763	353	126	2221	132
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	220	713	513	522	468	118	428	1799	360	129	2266	135
RTOR Reduction (vph)	0	0	137	0	0	89	0	0	196	0	0	47
Lane Group Flow (vph)	220	713	376	522	468	29	428	1799	164	129	2266	88
Heavy Vehicles (%)	7%	4%	14%	4%	5%	9%	10%	9%	2%	12%	7%	12%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	12.5	24.2	24.2	14.5	26.2	26.2	12.5	46.5	46.5	11.0	45.0	45.0
Effective Green, g (s)	12.0	27.0	27.0	14.0	29.0	29.0	12.0	48.5	48.5	10.5	47.0	47.0
Actuated g/C Ratio	0.10	0.22	0.22	0.12	0.24	0.24	0.10	0.40	0.40	0.09	0.39	0.39
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	169	1122	319	393	831	358	318	1923	640	141	1899	565
v/s Ratio Prot	0.13	0.14		c0.16	0.14		c0.13	0.38		0.08	c0.47	
v/s Ratio Perm			c0.27			0.02			0.10			0.06
v/c Ratio	1.30	0.64	1.18	1.33	0.56	0.08	1.35	0.94	0.26	0.91	1.19	0.15
Uniform Delay, d1	54.0	42.0	46.5	53.0	39.9	35.2	54.0	34.3	23.8	54.3	36.5	23.6
Progression 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
Incremental Delay, d2	172.1	0.9	107.9	164.4	0.5	0.0	175.2	10.1	1.0	49.9	92.5	0.6
Delay (s)	226.1	42.9	154.4	217.4	40.5	35.2	229.2	44.3	24.7	104.2	129.0	24.2
Level of Service	F	D	F	F	D	D	F	D	C	F	F	C
Approach Delay (s)		110.3			123.2			72.2			122.1	
Approach LOS		F			F			E			F	
Intersection Summary												
HCM Average Control Delay			103.2				HCM Level of Service			F		
HCM Volume to Capacity ratio			1.23									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		20.0			
Intersection Capacity Utilization			101.2%				ICU Level of Service		G			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 15: Northcliffe Ave & Highway 6

















Weekday AM Peak Hour
 2031 Total Traffic - Alternative 1

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt		0.90			1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		1.00			0.96	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1681			1719	1538	1770	3223	1553	1736	3278		
Flt Permitted		0.98			0.15	1.00	0.07	1.00	1.00	0.07	1.00		
Satd. Flow (perm)		1653			260	1538	126	3223	1553	124	3278		
Volume (vph)	26	113	456	119	20	380	91	2588	75	140	3293	25	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	27	116	470	123	21	392	94	2668	77	144	3395	26	
RTOR Reduction (vph)	0	64	0	0	0	65	0	0	17	0	0	0	
Lane Group Flow (vph)	0	549	0	0	144	327	94	2668	60	144	3421	0	
Heavy Vehicles (%)	8%	4%	0%	7%	0%	5%	2%	12%	4%	4%	10%	12%	
Turn Type	Perm			Perm		Perm	pm+pt		Perm	pm+pt			
Protected Phases		4			8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)		28.5			28.5	28.5	61.1	56.1	56.1	61.1	56.1		
Effective Green, g (s)		30.0			30.0	30.0	62.0	59.0	59.0	62.0	59.0		
Actuated g/C Ratio		0.28			0.28	0.28	0.58	0.55	0.55	0.58	0.55		
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9		
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0		
Lane Grp Cap (vph)		463			73	431	119	1777	856	117	1807		
v/s Ratio Prot							0.02	0.83		c0.03	c1.04		
v/s Ratio Perm		0.33			c0.55	0.21	0.43		0.04	0.68			
v/c Ratio		1.19			1.97	0.76	0.79	1.50	0.07	1.23	1.89		
Uniform Delay, d1		38.5			38.5	35.2	10.0	24.0	11.2	54.2	24.0		
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2		103.6			483.0	7.5	26.6	228.6	0.2	157.8	403.9		
Delay (s)		142.1			521.5	42.7	36.6	252.6	11.4	212.0	427.9		
Level of Service		F			F	D	D	F	B	F	F		
Approach Delay (s)		142.1			171.3			238.9			419.2		
Approach LOS		F			F			F			F		
Intersection Summary													
HCM Average Control Delay		311.4										HCM Level of Service	F
HCM Volume to Capacity ratio		1.90											
Actuated Cycle Length (s)		107.0										Sum of lost time (s)	15.0
Intersection Capacity Utilization		157.3%										ICU Level of Service	H
Analysis Period (min)		15											

c Critical Lane Group

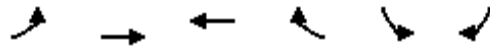
HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

2031 Total Traffic - Alternative 1
 Weekday AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	6	114	23	16	82	6	4	104	13	6	99	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	139	28	20	100	7	5	127	16	7	121	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)												
pX, platoon unblocked												
vC, conflicting volume	337	288	121	377	280	135	121			143		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	337	288	121	377	280	135	121			143		
tC, single (s)	7.1	7.1	6.5	7.2	7.3	6.2	4.1			4.6		
tC, 2 stage (s)												
tF (s)	3.5	4.6	3.6	3.6	4.8	3.3	2.2			2.7		
p0 queue free %	99	74	97	95	80	99	100			99		
cM capacity (veh/h)	518	527	860	429	507	919	1479			1193		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	174	127	148	128								
Volume Left	7	20	5	7								
Volume Right	28	7	16	0								
cSH	562	506	1479	1193								
Volume to Capacity	0.31	0.25	0.00	0.01								
Queue Length 95th (m)	10.0	7.5	0.1	0.1								
Control Delay (s)	14.3	14.5	0.3	0.5								
Lane LOS	B	B	A	A								
Approach Delay (s)	14.3	14.5	0.3	0.5								
Approach LOS	B	B										
Intersection Summary												
Average Delay			7.7									
Intersection Capacity Utilization			25.7%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 136: Concession 11 East & Site Driveway













2031 Total Traffic - Alternative 1
 Weekday AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	101	33	31	0	1	73
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	36	34	0	1	79
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	34				289	34
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34				289	34
tC, single (s)	4.8				6.4	7.2
tC, 2 stage (s)						
tF (s)	2.8				3.5	4.2
p0 queue free %	91				100	90
cM capacity (veh/h)	1240				643	826
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	110	36	34	0	1	79
Volume Left	110	0	0	0	1	0
Volume Right	0	0	0	0	0	79
cSH	1240	1700	1700	1700	643	826
Volume to Capacity	0.09	0.02	0.02	0.00	0.00	0.10
Queue Length 95th (m)	2.2	0.0	0.0	0.0	0.0	2.4
Control Delay (s)	8.2	0.0	0.0	0.0	10.6	9.8
Lane LOS	A				B	A
Approach Delay (s)	6.2		0.0		9.8	
Approach LOS					A	
Intersection Summary						
Average Delay			6.5			
Intersection Capacity Utilization			22.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis
 1: 401 WB-Ramps & Highway 6

2031 Total Traffic - Alternative 1
 Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1332	1521	1743	1452	1601	1792
Flt Permitted	0.95	1.00	1.00	1.00	0.38	1.00
Satd. Flow (perm)	1332	1521	1743	1452	638	1792
Volume (vph)	205	802	609	936	225	1467
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	211	827	628	965	232	1512
RTOR Reduction (vph)	0	0	0	252	0	0
Lane Group Flow (vph)	211	827	628	713	232	1512
Heavy Vehicles (%)	31%	5%	9%	10%	9%	6%
Turn Type		Free		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		Free		2	6	
Actuated Green, G (s)	12.2	88.0	63.5	63.5	63.5	63.5
Effective Green, g (s)	13.0	88.0	65.0	65.0	65.0	65.0
Actuated g/C Ratio	0.15	1.00	0.74	0.74	0.74	0.74
Clearance Time (s)	5.8		6.5	6.5	6.5	6.5
Vehicle Extension (s)	3.0		5.5	5.5	4.5	4.5
Lane Grp Cap (vph)	197	1521	1287	1073	471	1324
v/s Ratio Prot	c0.16		0.36			c0.84
v/s Ratio Perm		0.54		0.49	0.36	
v/c Ratio	1.07	0.54	0.49	0.66	0.49	1.14
Uniform Delay, d1	37.5	0.0	4.7	5.9	4.7	11.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	84.3	1.4	1.3	3.2	3.7	73.4
Delay (s)	121.8	1.4	6.0	9.2	8.4	84.9
Level of Service	F	A	A	A	A	F
Approach Delay (s)	25.9		7.9			74.7
Approach LOS	C		A			E
Intersection Summary						
HCM Average Control Delay			38.8		HCM Level of Service	D
HCM Volume to Capacity ratio			1.13			
Actuated Cycle Length (s)			88.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			96.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 3: 401 EB-Ramps & Highway 6

2031 Total Traffic - Alternative 1
 Weekday PM Peak Hour






















Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.3	3.6	3.6	3.5
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1255	1452	1212	1743	1681	1426
Flt Permitted	0.95	1.00	0.09	1.00	1.00	1.00
Satd. Flow (perm)	1255	1452	116	1743	1681	1426
Volume (vph)	64	1189	135	1745	1042	453
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	66	1226	139	1799	1074	467
RTOR Reduction (vph)	0	26	0	0	0	229
Lane Group Flow (vph)	66	1200	139	1799	1074	238
Heavy Vehicles (%)	39%	10%	44%	9%	13%	12%
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			6
Actuated Green, G (s)	8.0	36.2	69.7	69.7	37.5	37.5
Effective Green, g (s)	8.8	36.0	71.2	71.2	39.0	39.0
Actuated g/C Ratio	0.10	0.40	0.79	0.79	0.43	0.43
Clearance Time (s)	5.8	4.0	4.0	6.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0	3.0	4.5	4.5	4.5
Lane Grp Cap (vph)	123	661	423	1379	728	618
v/s Ratio Prot	0.05	c0.55	0.10	1.03	c0.64	
v/s Ratio Perm		0.28	0.16			0.17
v/c Ratio	0.54	1.82	0.33	1.30	1.48	0.39
Uniform Delay, d1	38.7	27.0	24.7	9.4	25.5	17.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.4	373.0	0.5	142.4	221.3	1.8
Delay (s)	43.1	400.0	25.2	151.8	246.8	19.2
Level of Service	D	F	C	F	F	B
Approach Delay (s)	381.8			142.8	177.8	
Approach LOS	F			F	F	

Intersection Summary			
HCM Average Control Delay	218.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	136.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			















HCM Signalized Intersection Capacity Analysis
5: Badenoch St & Highway 6

2031 Total Traffic - Alternative 1
Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0			5.0	5.0		5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Frt		0.98			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.96			0.96	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1804			1827	1597		1663		1745	1742	
Flt Permitted		0.73			0.74	1.00		1.00		0.05	1.00	
Satd. Flow (perm)		1364			1415	1597		1663		83	1742	
Volume (vph)	25	5	4	59	15	33	0	1292	29	41	2173	15
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	27	5	4	63	16	35	0	1374	31	44	2312	16
RTOR Reduction (vph)	0	4	0	0	0	31	0	1	0	0	0	0
Lane Group Flow (vph)	0	32	0	0	79	4	0	1404	0	44	2328	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	14%	7%	0%	9%	0%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		10.1			10.1	10.1		87.3		87.3	87.3	
Effective Green, g (s)		11.3			11.3	11.3		88.7		88.7	88.7	
Actuated g/C Ratio		0.10			0.10	0.10		0.81		0.81	0.81	
Clearance Time (s)		6.2			6.2	6.2		6.4		6.4	6.4	
Vehicle Extension (s)		3.0			3.0	3.0		4.5		4.5	4.5	
Lane Grp Cap (vph)		140			145	164		1341		67	1405	
v/s Ratio Prot								0.84			c1.34	
v/s Ratio Perm		0.02			c0.06	0.00				0.53		
v/c Ratio		0.23			0.54	0.02		1.05		0.66	1.66	
Uniform Delay, d1		45.4			46.9	44.4		10.6		4.4	10.6	
Progression Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.9			4.1	0.1		38.0		40.7	298.8	
Delay (s)		46.2			51.0	44.4		48.6		45.1	309.4	
Level of Service		D			D	D		D		D	F	
Approach Delay (s)		46.2			49.0			48.6			304.5	
Approach LOS		D			D			D			F	
Intersection Summary												
HCM Average Control Delay		203.2										F
HCM Volume to Capacity ratio		1.53										
Actuated Cycle Length (s)		110.0						10.0				
Intersection Capacity Utilization		132.2%										H
Analysis Period (min)		15										
c Critical Lane Group												

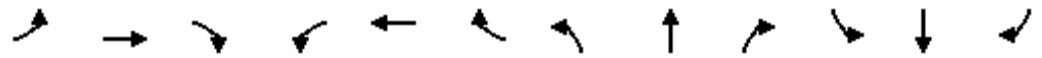
HCM Signalized Intersection Capacity Analysis
7: Carlisle Rd & Highway 6

2031 Total Traffic - Alternative 1
Weekday PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.5	3.6	3.5	3.3	3.6
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1728	1581	3539	1597	1745	3438
Flt Permitted	0.95	1.00	1.00	1.00	0.09	1.00
Satd. Flow (perm)	1728	1581	3539	1597	171	3438
Volume (vph)	368	224	1746	141	137	2430
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	396	241	1877	152	147	2613
RTOR Reduction (vph)	0	120	0	79	0	0
Lane Group Flow (vph)	396	121	1877	73	147	2613
Heavy Vehicles (%)	1%	1%	2%	0%	0%	5%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	19.9	19.9	35.1	35.1	45.1	45.1
Effective Green, g (s)	20.9	20.9	38.0	38.0	48.0	48.0
Actuated g/C Ratio	0.26	0.26	0.48	0.48	0.61	0.61
Clearance Time (s)	6.0	6.0	7.9	7.9	4.0	7.9
Vehicle Extension (s)	3.0	3.0	5.5	5.5	3.0	5.5
Lane Grp Cap (vph)	458	419	1704	769	204	2092
v/s Ratio Prot	c0.23		0.53		0.05	c0.76
v/s Ratio Perm		0.08		0.05	0.39	
v/c Ratio	0.86	0.29	1.10	0.10	0.72	1.25
Uniform Delay, d1	27.7	23.1	20.5	11.1	37.8	15.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.5	0.4	55.2	0.2	11.8	116.2
Delay (s)	43.2	23.5	75.6	11.4	49.6	131.7
Level of Service	D	C	E	B	D	F
Approach Delay (s)	35.7		70.8			127.3
Approach LOS	D		E			F
Intersection Summary						
HCM Average Control Delay			95.4		HCM Level of Service	F
HCM Volume to Capacity ratio			1.13			
Actuated Cycle Length (s)			78.9		Sum of lost time (s)	10.0
Intersection Capacity Utilization			95.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
102: Concession 11 East & Highway 6

2031 Total Traffic - Alternative 1
Weekday PM Peak Hour


























Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↕	↕	↕	↕	↕↕	↕	↕	↕↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Total Lost time (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt		0.87		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1662		1385	1900	913	1694	3312	1183	914	3406	1597
Flt Permitted		1.00		0.72	1.00	1.00	0.06	1.00	1.00	0.06	1.00	1.00
Satd. Flow (perm)		1662		1049	1900	913	106	3312	1183	56	3406	1597
Volume (vph)	0	4	48	43	5	64	58	1672	31	53	2451	4
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	4	53	47	5	70	64	1837	34	58	2693	4
RTOR Reduction (vph)	0	4	0	0	0	63	0	0	5	0	0	0
Lane Group Flow (vph)	0	53	0	47	5	7	64	1837	29	58	2693	4
Heavy Vehicles (%)	0%	0%	0%	26%	0%	75%	3%	9%	35%	91%	6%	0%
Turn Type	Perm			Perm		Perm	Perm		Perm	pm+pt		Perm
Protected Phases		4			8			2		1		6
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		9.2		9.2	9.2	9.2	66.4	66.4	66.4	78.8	78.8	78.8
Effective Green, g (s)		10.2		10.2	10.2	10.2	67.4	67.4	67.4	79.8	79.8	79.8
Actuated g/C Ratio		0.10		0.10	0.10	0.10	0.67	0.67	0.67	0.80	0.80	0.80
Clearance Time (s)		6.0		6.0	6.0	6.0	6.0	6.0	6.0	4.0	6.0	6.0
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		170		107	194	93	71	2232	797	108	2718	1274
v/s Ratio Prot		0.03			0.00			0.55		0.04	c0.79	
v/s Ratio Perm				c0.04		0.01	0.60		0.02	0.39		0.00
v/c Ratio		0.31		0.44	0.03	0.08	0.90	0.82	0.04	0.54	0.99	0.00
Uniform Delay, d1		41.7		42.2	40.4	40.6	13.5	11.9	5.4	16.7	9.7	2.0
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.1		2.9	0.1	0.4	81.6	3.6	0.1	5.1	15.2	0.0
Delay (s)		42.7		45.1	40.5	41.0	95.2	15.5	5.5	21.7	25.0	2.0
Level of Service		D		D	D	D	F	B	A	C	C	A
Approach Delay (s)		42.7			42.5			18.0			24.9	
Approach LOS		D			D			B			C	

Intersection Summary

HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Concession 6 E & Highway 6















Weekday PM Peak Hour
2031 Total Traffic - Alternative 1

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1770	1710		1752	1732		1805	3282	1615	1671	3312	1538	
Flt Permitted	0.68	1.00		0.74	1.00		0.07	1.00	1.00	0.13	1.00	1.00	
Satd. Flow (perm)	1259	1710		1357	1732		124	3282	1615	220	3312	1538	
Volume (vph)	83	23	9	99	58	58	9	1487	58	26	2328	107	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	86	24	9	103	60	60	9	1549	60	27	2425	111	
RTOR Reduction (vph)	0	3	0	0	23	0	0	0	17	0	0	31	
Lane Group Flow (vph)	86	30	0	103	97	0	9	1549	43	27	2425	80	
Heavy Vehicles (%)	2%	9%	0%	3%	3%	0%	0%	10%	0%	8%	9%	5%	
Turn Type	Perm			Perm			Perm		Perm	Perm		Perm	
Protected Phases		4			8			2				6	
Permitted Phases	4			8			2		2	6		6	
Actuated Green, G (s)	12.1	12.1		12.1	12.1		58.2	58.2	58.2	58.2	58.2	58.2	
Effective Green, g (s)	13.9	13.9		13.9	13.9		61.1	61.1	61.1	61.1	61.1	61.1	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.72	0.72	0.72	0.72	0.72	0.72	
Clearance Time (s)	6.8	6.8		6.8	6.8		7.9	7.9	7.9	7.9	7.9	7.9	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0	4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	206	280		222	283		89	2359	1161	158	2381	1106	
v/s Ratio Prot		0.02			0.06			0.47			c0.73		
v/s Ratio Perm	0.07			c0.08			0.07		0.03	0.12		0.05	
v/c Ratio	0.42	0.11		0.46	0.34		0.10	0.66	0.04	0.17	1.02	0.07	
Uniform Delay, d1	31.9	30.3		32.2	31.5		3.6	6.4	3.5	3.8	11.9	3.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	0.2		1.5	0.7		2.3	1.4	0.1	2.3	23.2	0.1	
Delay (s)	33.3	30.4		33.7	32.2		5.9	7.8	3.5	6.2	35.2	3.7	
Level of Service	C	C		C	C		A	A	A	A	D	A	
Approach Delay (s)		32.5			32.9			7.6			33.5		
Approach LOS		C			C			A			C		
Intersection Summary													
HCM Average Control Delay			24.2				HCM Level of Service				C		
HCM Volume to Capacity ratio			0.92										
Actuated Cycle Length (s)			85.0				Sum of lost time (s)			10.0			
Intersection Capacity Utilization			84.8%				ICU Level of Service			E			
Analysis Period (min)			15										

c Critical Lane Group


































HCM Signalized Intersection Capacity Analysis
 11: Parkside Dr & Highway 6

Weekday PM Peak Hour
 2031 Total Traffic - Alternative 1

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1599	3374	1615	1787	3471
Flt Permitted	0.95	1.00	1.00	1.00	0.08	1.00
Satd. Flow (perm)	1770	1599	3374	1615	157	3471
Volume (vph)	469	270	1724	136	286	2103
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	510	293	1874	148	311	2286
RTOR Reduction (vph)	0	168	0	75	0	0
Lane Group Flow (vph)	510	125	1874	73	311	2286
Heavy Vehicles (%)	2%	1%	7%	0%	1%	4%
Turn Type	Perm		Perm pm+pt			
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Actuated Green, G (s)	19.5	19.5	40.1	40.1	53.1	53.1
Effective Green, g (s)	21.0	21.0	43.0	43.0	56.0	56.0
Actuated g/C Ratio	0.24	0.24	0.49	0.49	0.64	0.64
Clearance Time (s)	6.5	6.5	7.9	7.9	3.0	7.9
Vehicle Extension (s)	3.0	3.0	5.0	5.0	1.5	5.0
Lane Grp Cap (vph)	427	386	1668	798	251	2234
v/s Ratio Prot	c0.29		0.56		0.11	c0.66
v/s Ratio Perm		0.08		0.05	c0.68	
v/c Ratio	1.19	0.32	1.12	0.09	1.24	1.02
Uniform Delay, d1	33.0	27.1	22.0	11.7	41.7	15.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	108.4	0.5	64.1	0.2	136.8	25.2
Delay (s)	141.4	27.6	86.1	11.9	178.5	40.7
Level of Service	F	C	F	B	F	D
Approach Delay (s)	99.9		80.7			57.2
Approach LOS	F		F			E
Intersection Summary						
HCM Average Control Delay			72.3		HCM Level of Service	E
HCM Volume to Capacity ratio			1.20			
Actuated Cycle Length (s)			87.0		Sum of lost time (s)	10.0
Intersection Capacity Utilization			102.0%		ICU Level of Service	G
Analysis Period (min)			15			
c Critical Lane Group						

HCM Signalized Intersection Capacity Analysis
 13: Dundas St & Highway 6

Weekday PM Peak Hour
 2031 Total Traffic - Alternative 1

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  		 	 		 	  			  	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.91	1.00	0.97	0.95	1.00	0.97	0.91	1.00	1.00	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	5085	1553	3433	3574	1583	3335	4715	1583	1752	4715	1468
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	5085	1553	3433	3574	1583	3335	4715	1583	1752	4715	1468
Volume (vph)	146	466	494	518	826	216	458	1564	451	194	2303	179
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	152	485	515	540	860	225	477	1629	470	202	2399	186
RTOR Reduction (vph)	0	0	140	0	0	139	0	0	168	0	0	71
Lane Group Flow (vph)	152	485	375	540	860	86	477	1629	302	202	2399	115
Heavy Vehicles (%)	3%	2%	4%	2%	1%	2%	5%	10%	2%	3%	10%	10%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	6.5	23.5	23.5	9.5	26.5	26.5	9.0	34.4	34.4	12.8	38.2	38.2
Effective Green, g (s)	6.0	26.3	26.3	9.0	29.3	29.3	8.5	36.4	36.4	12.3	40.2	40.2
Actuated g/C Ratio	0.06	0.25	0.25	0.09	0.28	0.28	0.08	0.35	0.35	0.12	0.39	0.39
Clearance Time (s)	4.5	7.8	7.8	4.5	7.8	7.8	4.5	7.0	7.0	4.5	7.0	7.0
Vehicle Extension (s)	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	1.5	1.5
Lane Grp Cap (vph)	101	1286	393	297	1007	446	273	1650	554	207	1823	567
v/s Ratio Prot	0.09	0.10		c0.16	c0.24		c0.14	0.35		0.12	c0.51	
v/s Ratio Perm			c0.24			0.05			0.19			0.08
v/c Ratio	1.50	0.38	0.95	1.82	0.85	0.19	1.75	0.99	0.54	0.98	1.32	0.20
Uniform Delay, d1	49.0	32.1	38.2	47.5	35.3	28.4	47.8	33.6	27.1	45.7	31.9	21.2
Progression 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
Incremental Delay, d2	271.7	0.1	33.0	381.2	6.9	0.1	351.0	19.3	3.8	54.9	146.2	0.8
Delay (s)	320.7	32.2	71.3	428.7	42.2	28.5	398.8	52.9	31.0	100.6	178.1	22.0
Level of Service	F	C	E	F	D	C	F	D	C	F	F	C
Approach Delay (s)		87.7			168.7			112.9			162.1	
Approach LOS		F			F			F			F	





















Intersection Summary

HCM Average Control Delay	137.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	104.0	Sum of lost time (s)	25.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Northcliffe Ave & Highway 6

















Weekday PM Peak Hour
2031 Total Traffic - Alternative 1

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95		
Frt		0.91			1.00	0.85	1.00	1.00	0.85	1.00	1.00		
Flt Protected		1.00			0.97	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)		1710			1775	1568	1805	3374	1524	1787	3371		
Flt Permitted		0.91			0.57	1.00	0.07	1.00	1.00	0.07	1.00		
Satd. Flow (perm)		1563			1037	1568	131	3374	1524	123	3371		
Volume (vph)	13	60	127	168	123	424	217	1987	141	309	3339	28	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	14	65	138	183	134	461	236	2160	153	336	3629	30	
RTOR Reduction (vph)	0	59	0	0	0	83	0	0	41	0	0	0	
Lane Group Flow (vph)	0	158	0	0	317	378	236	2160	112	336	3659	0	
Heavy Vehicles (%)	0%	0%	2%	7%	0%	3%	0%	7%	6%	1%	7%	0%	
Turn Type	Perm			Perm		Perm	pm+pt		Perm	pm+pt			
Protected Phases		4			8		5	2		1	6		
Permitted Phases	4			8		8	2		2	6			
Actuated Green, G (s)		25.5			25.5	25.5	61.1	55.1	55.1	67.1	58.1		
Effective Green, g (s)		27.0			27.0	27.0	62.0	58.0	58.0	68.0	61.0		
Actuated g/C Ratio		0.25			0.25	0.25	0.58	0.54	0.54	0.64	0.57		
Clearance Time (s)		6.5			6.5	6.5	3.0	7.9	7.9	3.0	7.9		
Vehicle Extension (s)		3.0			3.0	3.0	1.5	5.0	5.0	1.5	5.0		
Lane Grp Cap (vph)		394			262	396	138	1829	826	187	1922		
v/s Ratio Prot							0.06	0.64		c0.12	c1.09		
v/s Ratio Perm		0.10			c0.31	0.24	0.92		0.07	1.02			
v/c Ratio		0.40			1.21	0.95	1.71	1.18	0.14	1.80	1.90		
Uniform Delay, d1		33.3			40.0	39.4	12.4	24.5	12.1	52.2	23.0		
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2		0.7			124.5	33.4	348.4	87.4	0.3	379.1	408.5		
Delay (s)		33.9			164.5	72.8	360.8	111.9	12.4	431.3	431.5		
Level of Service		C			F	E	F	F	B	F	F		
Approach Delay (s)		33.9			110.2			129.0			431.5		
Approach LOS		C			F			F			F		
Intersection Summary													
HCM Average Control Delay		284.6										HCM Level of Service	F
HCM Volume to Capacity ratio		1.74											
Actuated Cycle Length (s)		107.0										Sum of lost time (s)	15.0
Intersection Capacity Utilization		149.3%										ICU Level of Service	H
Analysis Period (min)		15											

c Critical Lane Group

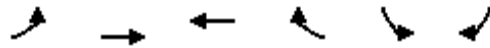
HCM Unsignalized Intersection Capacity Analysis
 126: Concession 11 East & Centre Rd

2031 Total Traffic - Alternative 1
 Weekday PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	9	69	15	33	111	6	34	129	21	5	156	5
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	9	73	16	35	117	6	36	136	22	5	164	5
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	461	407	167	448	398	147	169			158		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	461	407	167	448	398	147	169			158		
tC, single (s)	7.1	7.4	6.2	7.1	7.1	6.5	4.1			4.5		
tC, 2 stage (s)												
tF (s)	3.5	4.8	3.3	3.5	4.5	3.6	2.2			2.6		
p0 queue free %	98	82	98	92	74	99	97			100		
cM capacity (veh/h)	400	412	883	436	451	824	1420			1220		
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	98	158	194	175								
Volume Left	9	35	36	5								
Volume Right	16	6	22	5								
cSH	449	456	1420	1220								
Volume to Capacity	0.22	0.35	0.03	0.00								
Queue Length 95th (m)	6.2	11.6	0.6	0.1								
Control Delay (s)	15.2	17.0	1.6	0.3								
Lane LOS	C	C	A	A								
Approach Delay (s)	15.2	17.0	1.6	0.3								
Approach LOS	C	C										
Intersection Summary												
Average Delay			7.3									
Intersection Capacity Utilization			43.4%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 136: Concession 11 East & Site Driveway

2031 Total Traffic - Alternative 1
 Weekday PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶	↷	↶	↷
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	61	33	62	0	3	89
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	36	67	0	3	97
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	67				236	67
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	67				236	67
tC, single (s)	5.0				6.4	6.8
tC, 2 stage (s)						
tF (s)	3.0				3.5	3.9
p0 queue free %	94				100	89
cM capacity (veh/h)	1110				712	847

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	66	36	67	0	3	97
Volume Left	66	0	0	0	3	0
Volume Right	0	0	0	0	0	97
cSH	1110	1700	1700	1700	712	847
Volume to Capacity	0.06	0.02	0.04	0.00	0.00	0.11
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.1	2.9
Control Delay (s)	8.4	0.0	0.0	0.0	10.1	9.8
Lane LOS	A				B	A
Approach Delay (s)	5.5		0.0		9.8	
Approach LOS					A	

Intersection Summary						
Average Delay			5.7			
Intersection Capacity Utilization		20.0%		ICU Level of Service		A
Analysis Period (min)			15			

Queues
102: Concession 11 East & Highway 6

2021 Total Traffic - Alternative 1
Weekday AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↖	↖	↖	↖	↕↕	↖	↖	↕↕	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Storage Length (m)	0.0		0.0	30.0		30.0	300.0		30.0	275.0		25.0
Storage Lanes	0		0	1		1	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			50			80				80
Link Distance (m)		146.8			1232.8			853.3				1590.7
Travel Time (s)		8.8			88.8			38.4				71.6
Volume (vph)	1	2	49	22	0	69	16	1587	45	70	1577	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	45%	0%	88%	6%	10%	33%	84%	14%	0%
Lane Group Flow (vph)	0	55	0	23	0	73	17	1671	47	74	1660	0
v/c Ratio		0.22		0.18		0.34	0.14	0.79	0.06	0.44	0.66	
Control Delay		23.4		34.3		7.4	13.8	19.0	6.2	16.0	6.8	
Queue Delay		0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		23.4		34.3		7.4	13.8	19.0	6.2	16.0	6.8	
Queue Length 50th (m)		4.5		3.2		0.0	1.1	106.1	1.5	2.6	58.2	
Queue Length 95th (m)		14.3		9.7		5.6	5.7	#183.1	6.9	12.4	81.3	
Internal Link Dist (m)		122.8			1208.8			829.3			1566.7	
Turn Bay Length (m)				30.0		30.0	300.0		30.0	275.0		
Base Capacity (vph)		511		274		332	120	2109	780	169	2499	
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		0.11		0.08		0.22	0.14	0.79	0.06	0.44	0.66	

Intersection Summary

Area Type: Other

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

Queue shown is maximum after two cycles.

Queues
102: Concession 11 East & Highway 6

2021 Total Traffic - Alternative 1
Weekday PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↖	↗	↖	↖	↕↕	↖	↖	↕↕	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Storage Length (m)	0.0		0.0	30.0		30.0	300.0		30.0	275.0		25.0
Storage Lanes	0		0	1		1	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			50			80			80	
Link Distance (m)		146.8			1232.8			853.3			1590.7	
Travel Time (s)		8.8			88.8			38.4			71.6	
Volume (vph)	0	3	43	41	4	62	52	1371	29	52	2010	3
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	24%	0%	77%	2%	9%	38%	92%	6%	0%
Lane Group Flow (vph)	0	50	0	45	4	68	57	1507	32	57	2209	3
v/c Ratio		0.20		0.28	0.01	0.42	0.47	0.59	0.04	0.85	0.83	0.00
Control Delay		28.8		34.3	27.8	26.8	23.0	6.3	2.2	95.9	12.5	3.3
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		28.8		34.3	27.8	26.8	23.0	6.3	2.2	95.9	12.5	3.3
Queue Length 50th (m)		6.2		6.2	0.5	5.0	2.8	46.3	0.4	5.3	104.9	0.1
Queue Length 95th (m)		14.6		m14.7	m2.9	m15.9	#23.3	79.2	2.8	#22.2	#218.4	0.8
Internal Link Dist (m)		122.8			1208.8			829.3			1566.7	
Turn Bay Length (m)				30.0		30.0	300.0		30.0	275.0		25.0
Base Capacity (vph)		501		322	570	293	122	2573	904	67	2647	1241
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.10		0.14	0.01	0.23	0.47	0.59	0.04	0.85	0.83	0.00

Intersection Summary

Area Type: Other

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

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
102: Concession 11 East & Highway 6

2031 Total Traffic - Alternative 1
Weekday AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕		↖	↗	↖	↖	↕↕	↖	↖	↕↕	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Storage Length (m)	0.0		0.0	30.0		30.0	300.0		30.0	275.0		25.0
Storage Lanes	0		0	1		1	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			50			80				80
Link Distance (m)		146.8			1232.8			853.3				1590.7
Travel Time (s)		8.8			88.8			38.4				71.6
Volume (vph)	1	2	54	23	0	70	18	1935	46	71	1922	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	0%	0%	43%	0%	87%	11%	10%	33%	83%	14%	0%
Lane Group Flow (vph)	0	60	0	24	0	74	19	2037	48	75	2023	0
v/c Ratio		0.32		0.24		0.40	0.16	0.94	0.06	0.44	0.79	
Control Delay		32.8		37.5		9.6	14.3	28.1	6.5	15.6	9.4	
Queue Delay		0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		32.8		37.5		9.6	14.3	28.1	6.5	15.6	9.4	
Queue Length 50th (m)		7.3		3.4		0.0	1.2	~162.2	1.6	2.2	78.5	
Queue Length 95th (m)		17.4		10.0		6.4	6.5	#247.0	7.2	12.8	138.6	
Internal Link Dist (m)		122.8			1208.8			829.3			1566.7	
Turn Bay Length (m)				30.0		30.0	300.0		30.0	275.0		
Base Capacity (vph)		502		277		330	119	2170	801	171	2557	
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		0.12		0.09		0.22	0.16	0.94	0.06	0.44	0.79	

Intersection Summary

Area Type: Other

~ 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.

Queues
102: Concession 11 East & Highway 6

2031 Total Traffic - Alternative 1
Weekday PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5	3.3	3.6	3.5
Storage Length (m)	0.0		0.0	30.0		30.0	300.0		30.0	275.0		25.0
Storage Lanes	0		0	1		1	1		1	1		1
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Leading Detector (m)	9.0	9.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Trailing Detector (m)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (k/h)		60			50			80			80	
Link Distance (m)		146.8			1232.8			853.3			1590.7	
Travel Time (s)		8.8			88.8			38.4			71.6	
Volume (vph)	0	4	48	43	5	64	58	1672	31	53	2451	4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	26%	0%	75%	3%	9%	35%	91%	6%	0%
Lane Group Flow (vph)	0	57	0	47	5	70	64	1837	34	58	2693	4
v/c Ratio		0.28		0.37	0.02	0.40	0.73	0.79	0.04	0.46	0.96	0.00
Control Delay		40.7		48.4	37.6	17.0	65.7	17.5	5.7	24.3	22.2	2.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		40.7		48.4	37.6	17.0	65.7	17.5	5.7	24.3	22.2	2.8
Queue Length 50th (m)		9.6		8.6	0.9	0.0	7.8	128.4	1.1	2.0	~216.3	0.1
Queue Length 95th (m)		20.5		m19.2	m4.0	m12.3	#24.4	#232.6	5.6	14.2	#344.2	0.9
Internal Link Dist (m)		122.8			1208.8			829.3			1566.7	
Turn Bay Length (m)				30.0		30.0	300.0		30.0	275.0		25.0
Base Capacity (vph)		402		252	456	272	88	2333	838	126	2794	1310
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.14		0.19	0.01	0.26	0.73	0.79	0.04	0.46	0.96	0.00

Intersection Summary

Area Type: Other

~ Volume exceeds capacity, queue is theoretically infinite.

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