October 9, 2020

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RE: Silvercreek Junction, City of Guelph
Transportation Update and Response to City Comments

Dear Carlo:

1.0 INTRODUCTION

BA Group is retained by Silvercreek Guelph Developments Limited to provide transportation advisory services for the proposed plan of subdivision (the "Proposal") for the lands located at 35 & 40 Silvercreek Parkway South (the "Site").

An application was previously submitted to the City of Guelph in November 2019 (the "2019 Proposal"). BA Group prepared a Traffic Impact Study, dated November 14, 2019, which accompanied the application (the "2019 TIS").

Comments were received from the City of Guelph in July 2020. Subsequently, an amended application is being submitted. This letter provides an update to the transportation considerations where applicable, as well as responses to the transportation related comments and will serve as an addendum to the 2019 TIS. Should additional background information on the transportation considerations of the proposal be required, reference should be made to the 2019 TIS.

In summary, this addendum primarily addresses the following issues:

1. **Traffic Analysis** – Updates the traffic analysis to reflect the reduction in the number of residential units proposed. With the reduced number of residential units and no change in the commercial gross floor area proposed, all intersections continue to operate at acceptable levels of service and within capacity.

2. **Traffic Calming** – The functional road design and concept plan illustrate a number of features including a centre median, pedestrian crossover and on-street parking which clearly communicate to a driver that they have entered an urban area which requires greater awareness of their surroundings and reduced travel speeds. There is also ample room provided within the right-of-way for additional

traffic calming measures that could be considered when the detailed design of Silvercreek Parkway is undertaken. Additional information is provided in **Section 6.1**.

3. **Sight Distance** – A sight distance assessment has been undertaken to confirm that the sight distance requirements for the Silvercreek Parkway / Street A / Street C intersection meets the TAC requirements. For southbound vehicles coming from the future underpass, sight distance requirements to potential traffic signal heads have also been confirmed to be satisfied.

4. **Intersection Control** – Two-way stop control has been recommended for the intersections of Street A / Street C and Street E / Street D with Silvercreek Parkway. This recommendation is based on satisfactory traffic operations being achieved with this form of intersection control and that signal warrants are not satisfied. Given that these intersections are standard four-leg intersections without unusual spacing or configurations and with appropriate sight distances, other forms of control such as roundabouts are not necessary. Traffic calming is provided through other design features and roundabouts can create a more complex environment for pedestrians and cyclists to navigate.

2.0 DEVELOPMENT PROPOSAL

The development statistics of the current Proposal are compared against the 2019 Proposal in **Table 1**. Access arrangements remain consistent with the 2019 Proposal, with two two-way stop controlled intersections proposed to Silvercreek Parkway. A reduced copy of the plan (not to scale) is provided in **Appendix A**.

TABLE 1 COMPARISON OF DEVELOPMENT STATS

		2019 Proposal	Current Proposal	Change
Residential	Apartments	575 units	590 units	+15 units
	Townhouses	202 units	163 units	-39 units
	Total	**777 units**	**753 units**	**-24 units**
Commercial		6,500 m^2 (69,965 ft^2)	6,500 m^2 (69,965 ft^2)	-

3.0 TRAFFIC ANALYSIS UPDATE

3.1 TRAFFIC VOLUMES

3.1.1 Overview

As discussed in **Section 2.0**, the current proposal represents a decrease of 24 residential units compared with the 2019 proposal. As such, an update has been undertaken to the traffic analysis. Assumed existing and proposed lane configurations and traffic control remain consistent with the 2019 TIS and are reproduced in **Figure 1** and **Figure 2** respectively.

The analysis update assumes existing traffic volumes and future background traffic volumes remain unchanged from the 2019 TIS. Further details on the derivation of existing traffic volumes and future background traffic volumes can be found in Section 3.4 and Section 5.1 of the 2019 TIS respectively.

For convenience, the existing traffic volumes are reproduced in **Figure 3**, whilst the future background traffic volumes are reproduced in **Figure 4**, **Figure 5** and **Figure 6** for the 2021, 2026 and 2031 analysis horizon-years respectively.

3.1.2 Site Vehicle Trip Generation

The updated site vehicle trip generation for the Proposal is provided in **Table 2** and a comparison with the projected trip generation associated with the 2019 Proposal is provided in **Table 3**. The vehicle trip generation rates remain consistent with those adopted in the 2019 TIS.

Based on the foregoing, the site is expected to generate 470, 635, and 715 net new trips, two-way, in the weekday AM and PM peak hours and the Saturday midday peak hour, respectively. This represents an approximate 49% and 56% reduction in the net new trips generated from the previous 2012 concept plan in the weekday PM peak hour and Saturday mid-day peak hour, respectively. Compared with the 2019 proposal, the current proposal is projected to generate in the order of 15-20 less net new two-way vehicle trips.

TABLE 2 SITE TRIP GENERATION

Land Use	Size	AM Peak Hour			PM Peak Hour			Sat. Peak Hour		
		In	Out	Total	In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise)[1]	*Rate (trips per unit)*	*0.11*	*0.35*	*0.46*	*0.35*	*0.21*	*0.56*	*0.34*	*0.36*	*0.70*
	163 units	20	55	75	55	35	90	55	60	115
Multifamily Housing (Mid-Rise)[2]	*Rate (trips per unit)*	*0.09*	*0.27*	*0.36*	*0.27*	*0.17*	*0.44*	*0.22*	*0.22*	*0.44*
	590 units	50	160	210	160	100	260	130	130	260
Commercial[3]	*Rate (trips per 1,000 ft^2)*	*1.66*	*1.01*	*2.67*	*2.86*	*3.10*	*5.96*	*3.47*	*3.20*	*6.67*
	6,500 m^2 GFA (69,965 ft^2)	115	70	185	200	215	415	240	225	465
Commercial Interactions	10% reduction	--	--	--	-20	-20	-40	-25	-20	-45
Net Commercial		115	70	185	180	195	375	215	205	420
Pass-by	25% PM 20% Sat.	--	--	--	-45	-45	-90	-40	-40	-80
Net New Trips		**185**	**285**	**470**	**350**	**285**	**635**	**360**	**355**	**715**
Silvercreek (2012) Phase 1, 2 & 3 (Option 1) Net New Trips		--	--	--	610	635	1,245	835	775	1,610
Difference					-260	-350	-610	-475	-420	-895

Notes:
1. ITE Land Use Code 220. Sat Inbound/Outbound split is as per ITE Land Use Code 221
2. ITE Land Use Code 221
3. ITE Land Use Code 820 Fitted Curve

TABLE 3 SITE TRIP GENERATION COMPARISON

Proposal	Net New Two-way Vehicle Trips		
	AM Peak Hour	PM Peak Hour	Sat. Peak Hour
2019 Proposal	485	655	735
Current Proposal	470	635	715
Change	**-15**	**-20**	**-20**

3.1.3 Site Vehicle Trip Distribution

The adopted site trip distribution remains consistent with the 2019 TIS and is reproduced in **Table 4**. The updated primary site traffic volumes and pass-by site traffic volumes are shown in **Figure 7** and **Figure 8** respectively.

TABLE 4 TRIP DISTRIBUTION

Direction	Road	Commercial	Residential
North	Hanlon Expressway	10%	15%
	Silvercreek Parkway	10%	10%
	Edinburgh Road	15%	15%
East	Paisley Road	10%	10%
	Waterloo Avenue	5%	5%
	Wellington Street	5%	5%
South	Hanlon Expressway	15%	15%
	Edinburgh Road	5%	5%
West	Wellington Street	15%	15%
	Paisley Road	10%	5%
Total		**100%**	**100%**

3.1.4 Future Total Traffic Volumes

The updated future total traffic volumes are shown in **Figure 9**, **Figure 10** and **Figure 11** for the 2021, 2026 and 2031 analysis horizon-years respectively.

3.1.5 Westwood Road Interchange Scenario

Consistent with the 2019 TIS and as requested by the City, an additional scenario for the 2031 horizon year has been analyzed assuming the grade separation of the Hanlon Expressway and Paisley Road and a full interchange provided at Westwood Road with the Hanlon Expressway.

The analysis focuses on the changes expected at the Silvercreek Parkway / Paisley Road intersection as a result, with the 2031 future background, site, and future total traffic volumes illustrated in **Figure 11**. It is noted that some refinements were made from the 2019 TIS traffic forecasts to direct additional traffic to / from the potential Westwood Road interchange.

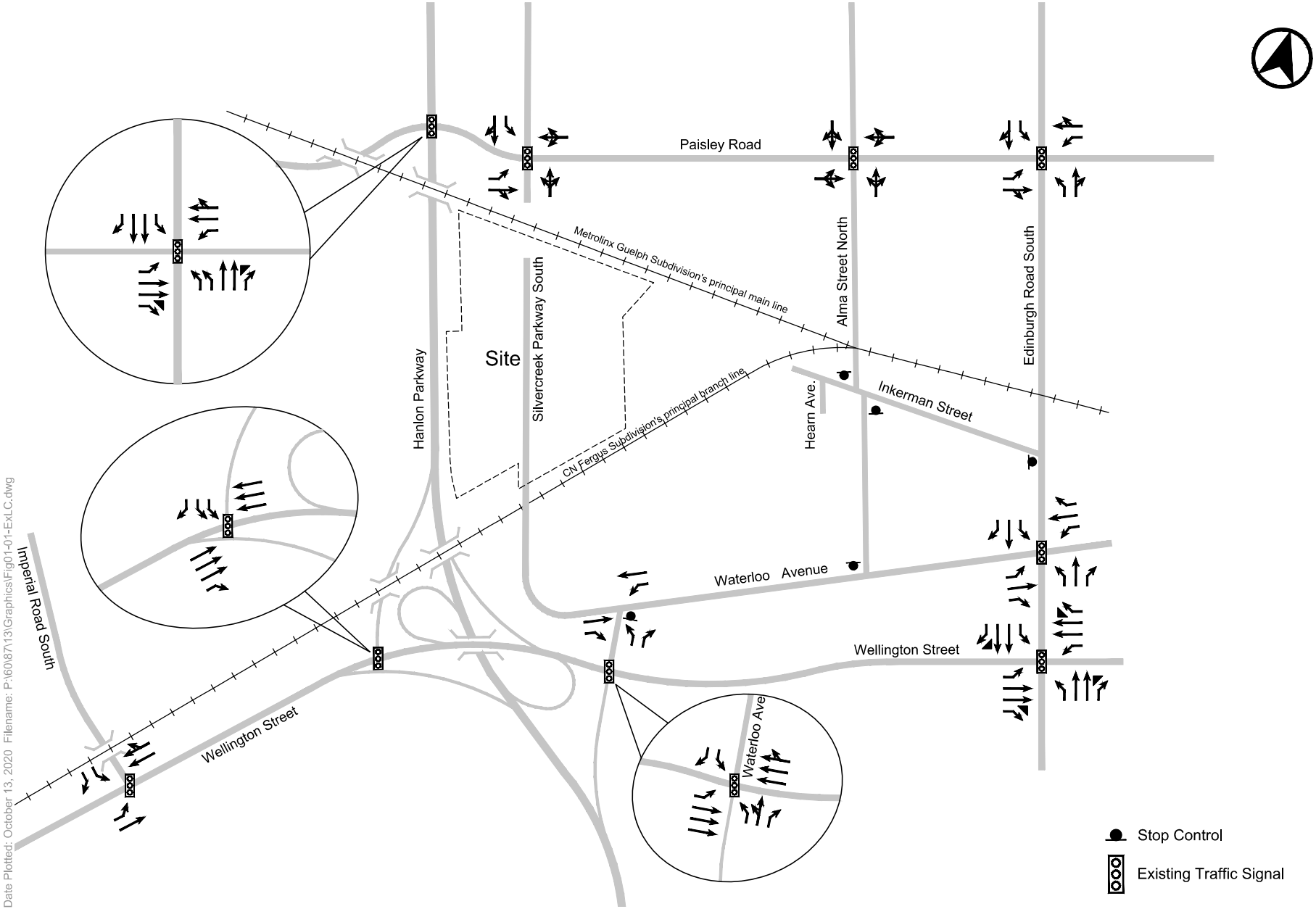


FIGURE 1 EXISTING LANE CONFIGURATIONS AND TRAFFIC CONTROL

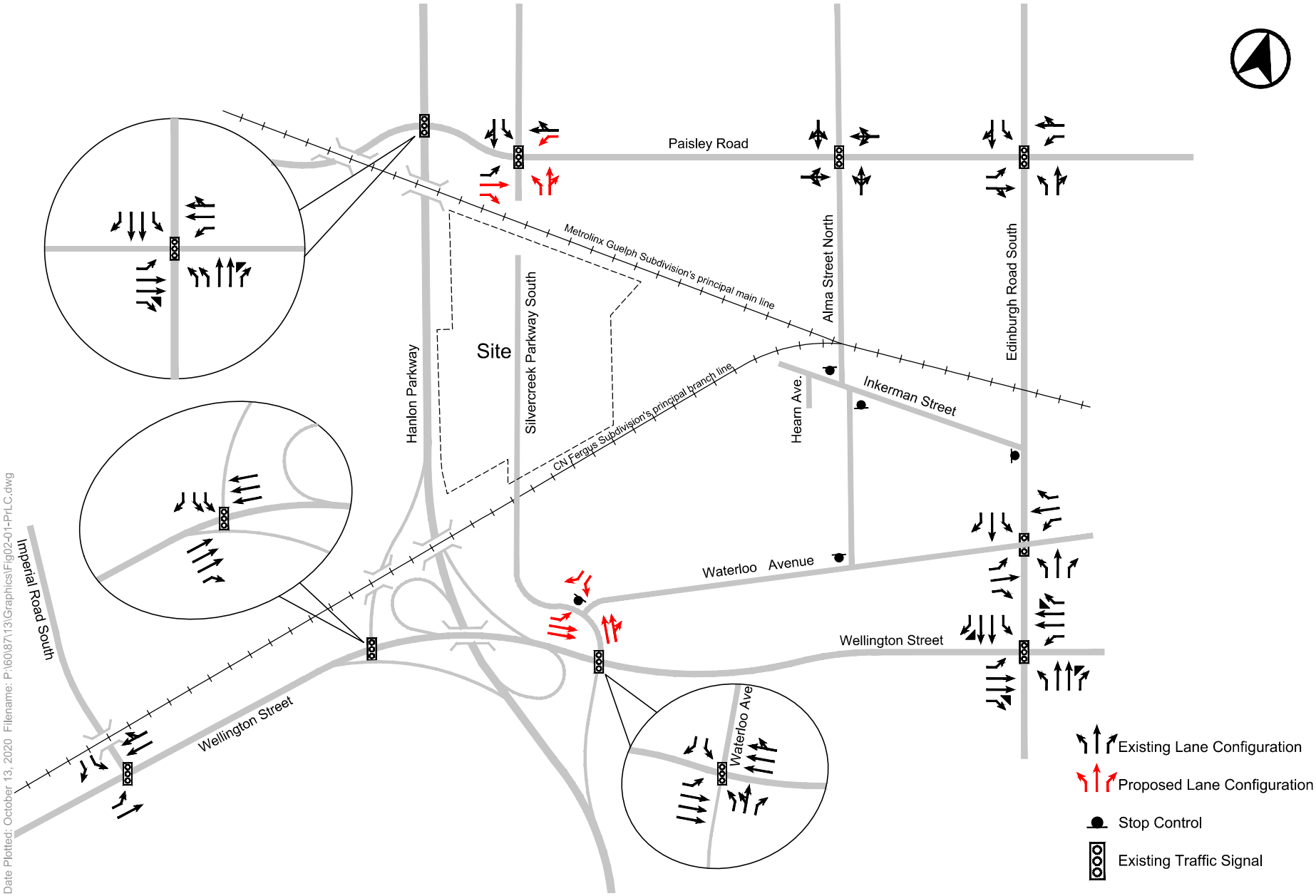
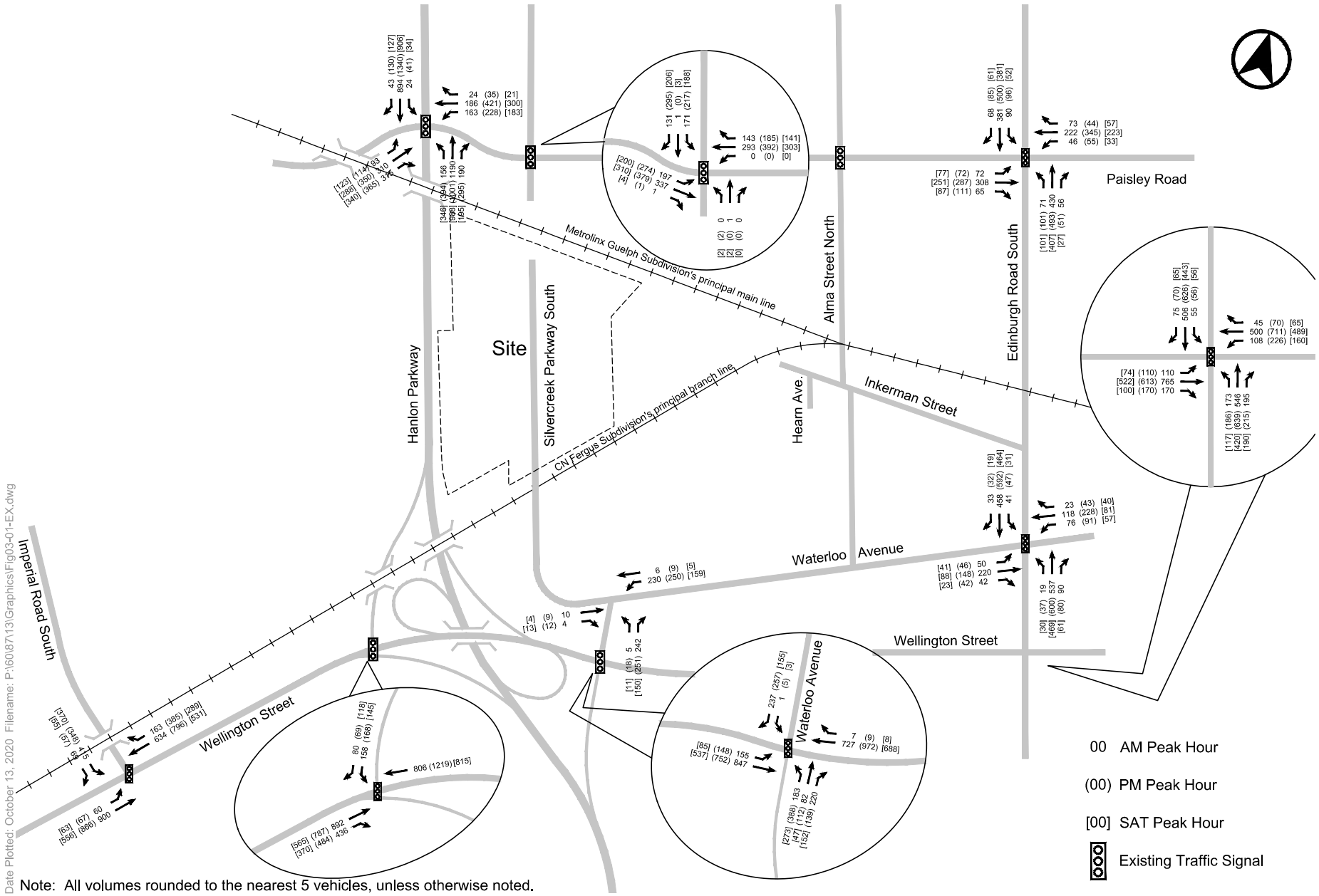


FIGURE 2 PROPOSED LANE CONFIGURATIONS AND TRAFFIC CONTROL



Note: All volumes rounded to the nearest 5 vehicles, unless otherwise noted.

FIGURE 3 EXISTING TRAFFIC VOLUMES

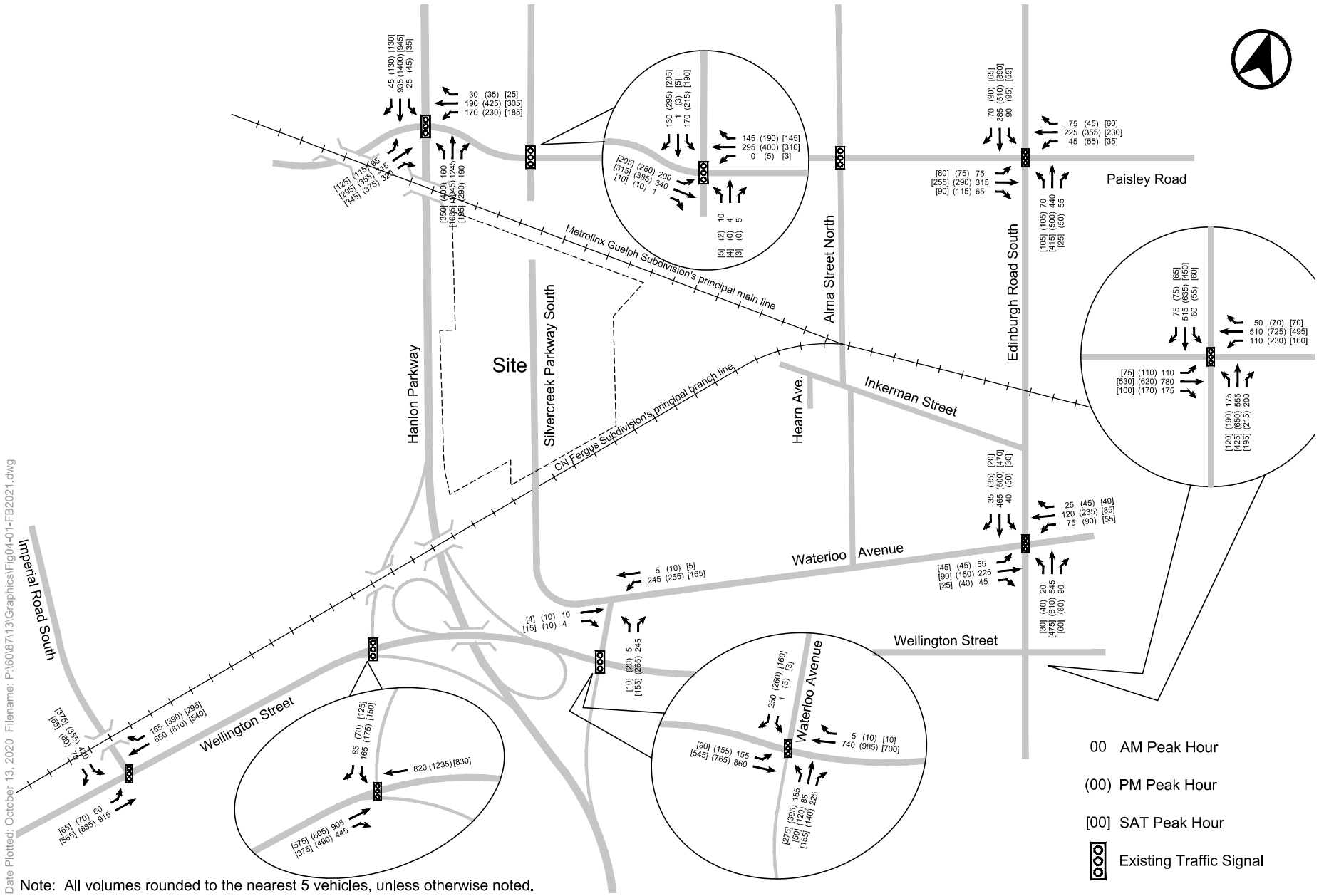


FIGURE 4 2021 FUTURE BACKGROUND TRAFFIC VOLUMES

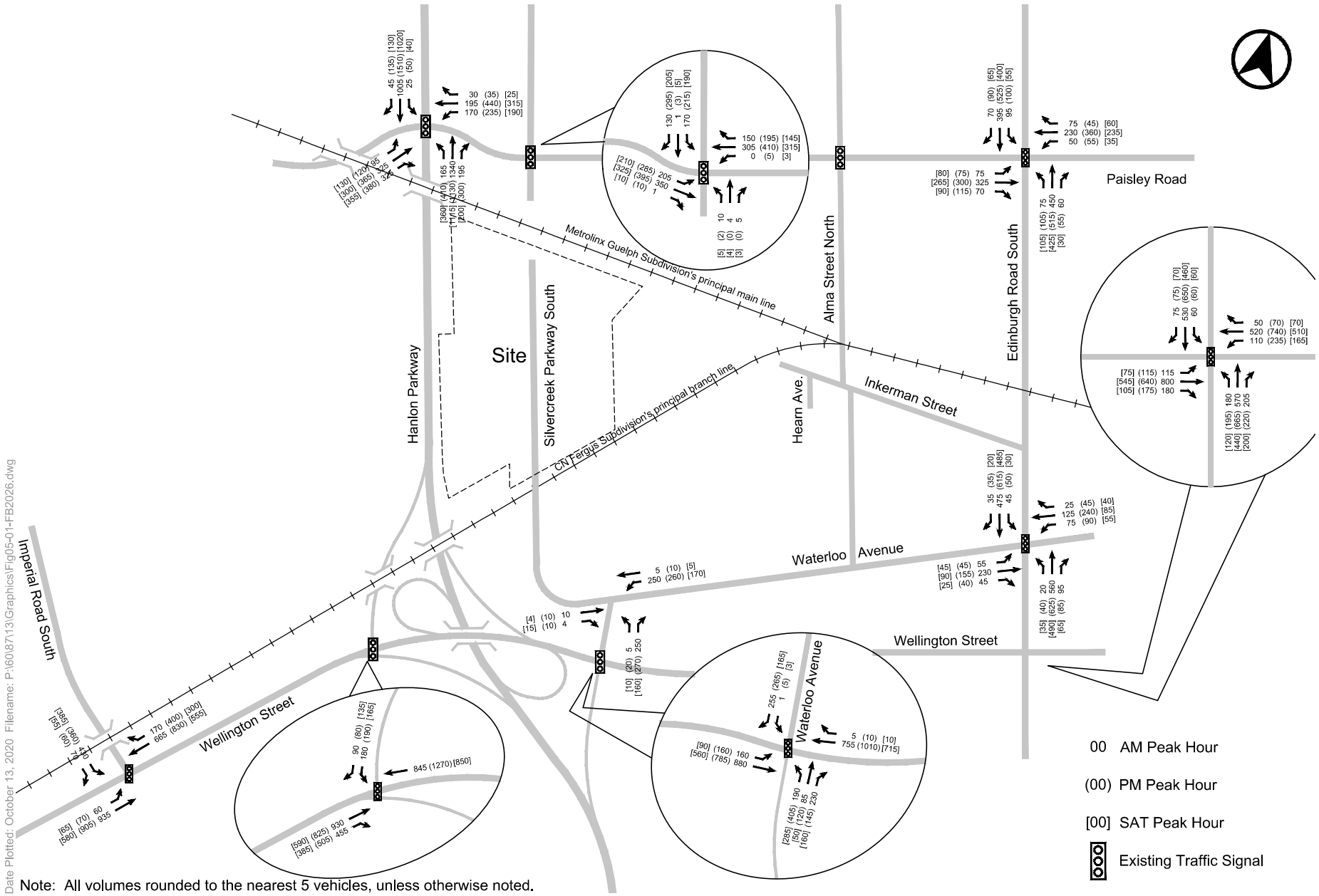
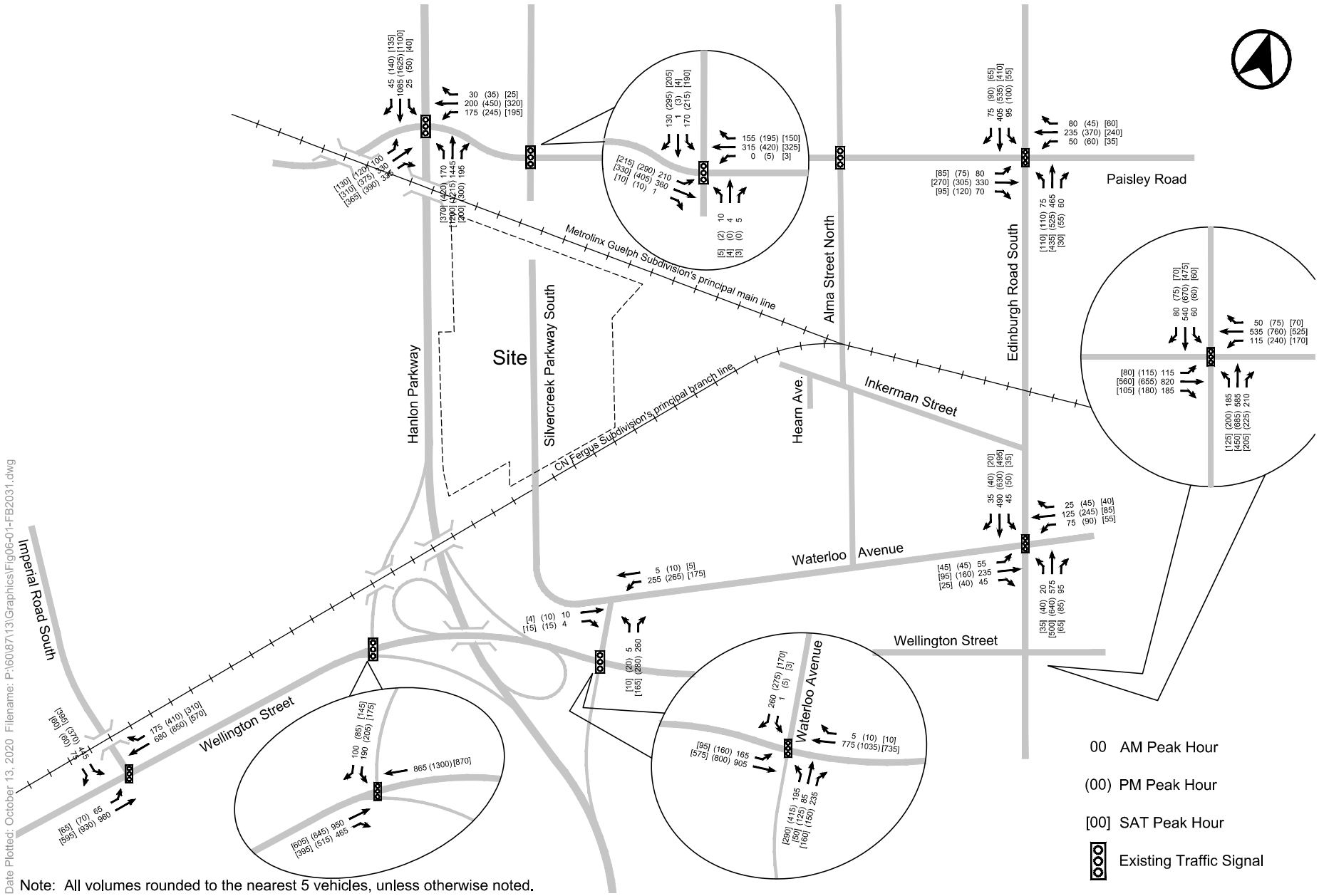


FIGURE 5 2026 FUTURE BACKGROUND TRAFFIC VOLUMES



Note: All volumes rounded to the nearest 5 vehicles, unless otherwise noted.

FIGURE 6 2031 FUTURE BACKGROUND TRAFFIC VOLUMES

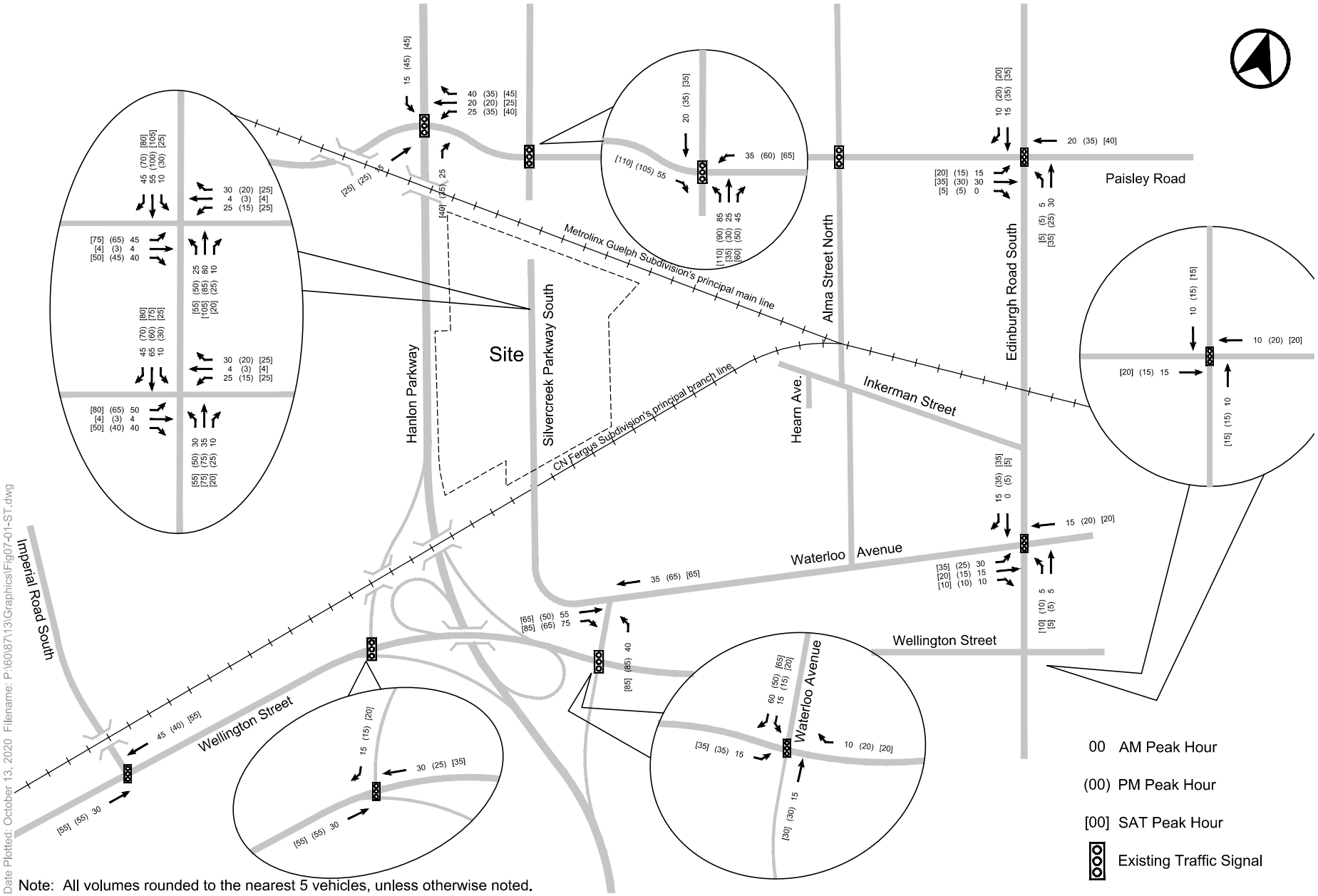
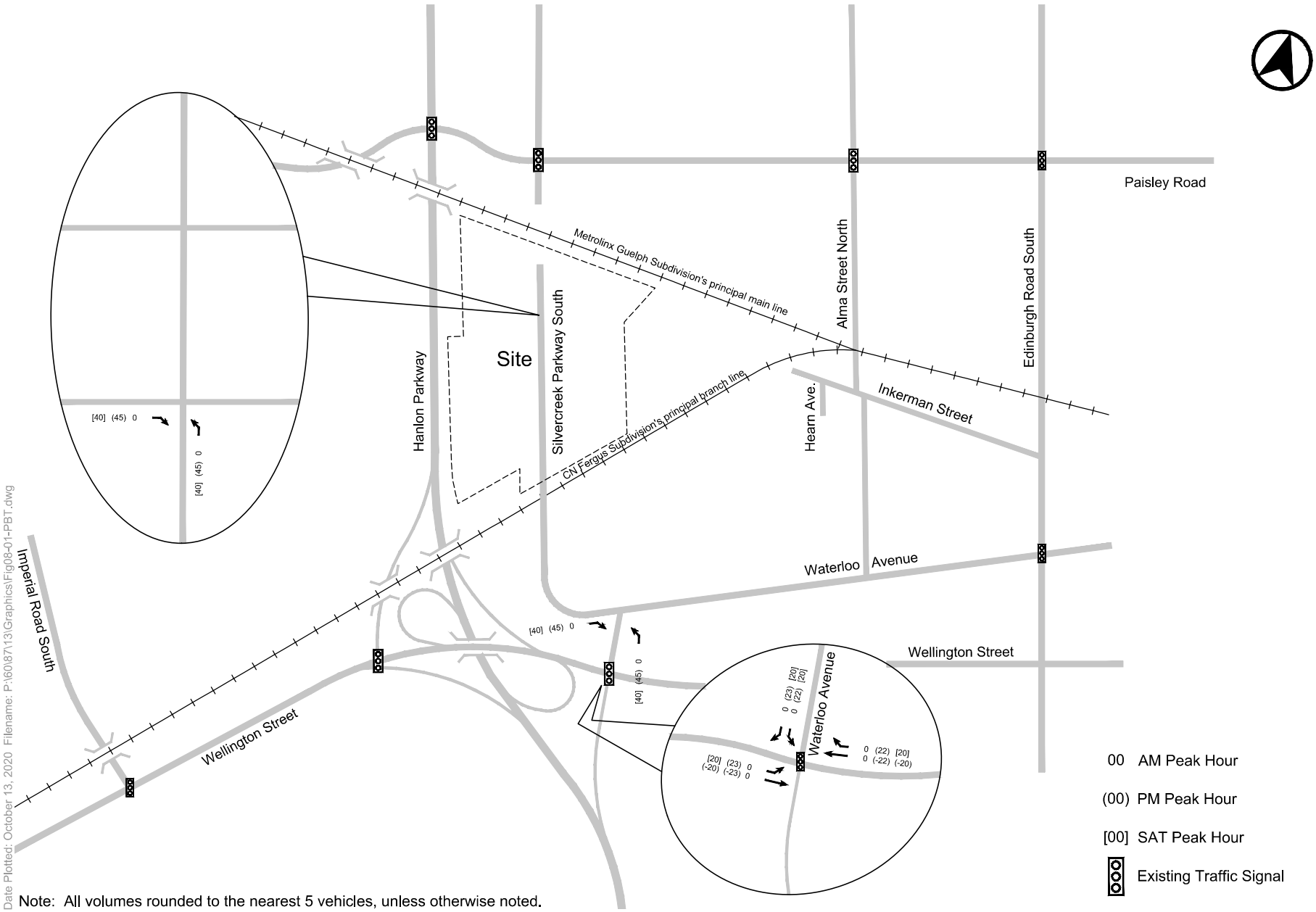


FIGURE 7 PRIMARY SITE TRAFFIC VOLUMES



Note: All volumes rounded to the nearest 5 vehicles, unless otherwise noted.

Date Plotted: October 13, 2020 Filename: P:\60\87\13\Graphics\Fig08-01-PBT.dwg

FIGURE 8 PASS-BY SITE TRAFFIC VOLUMES

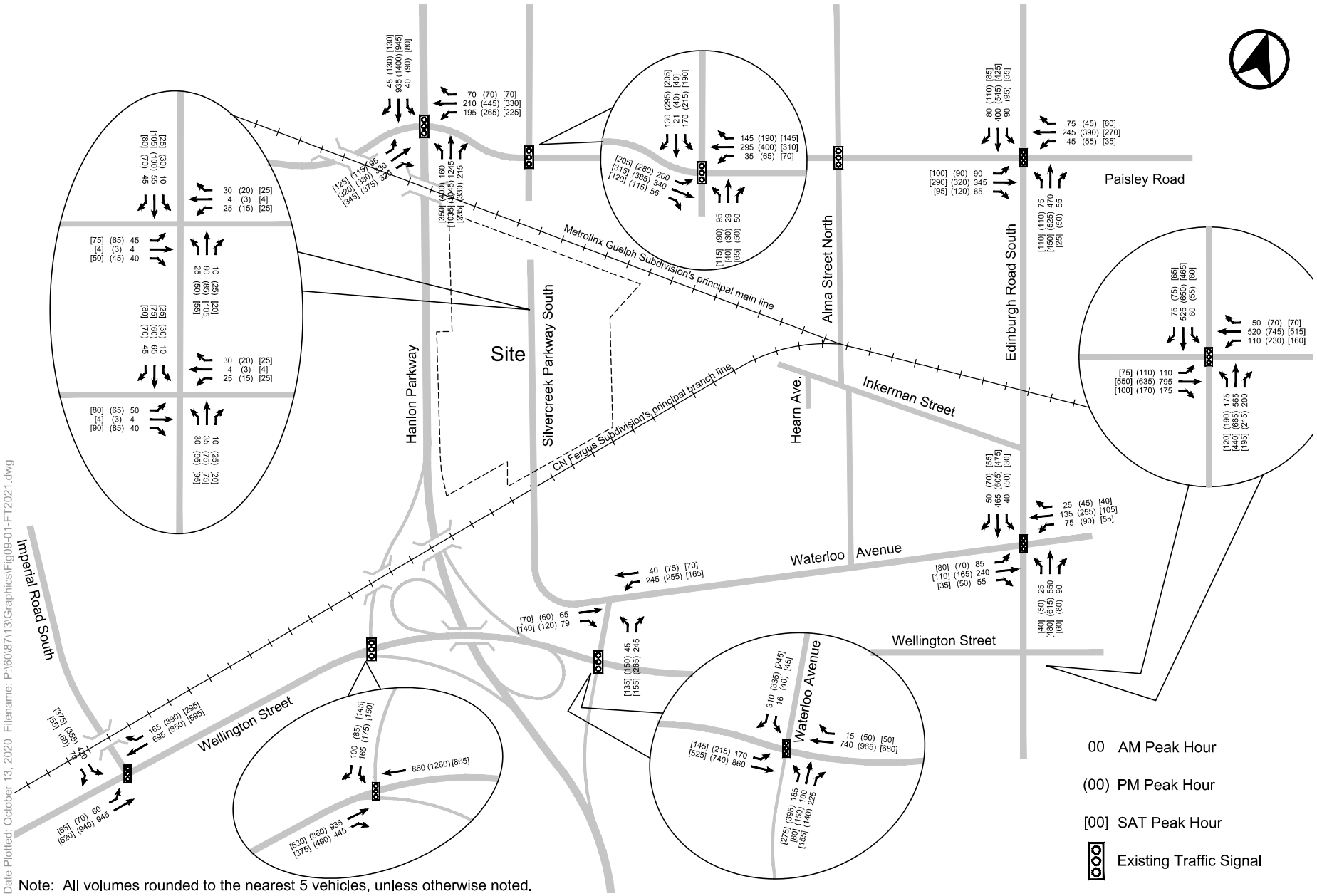


FIGURE 9 2021 FUTURE TOTAL TRAFFIC VOLUMES

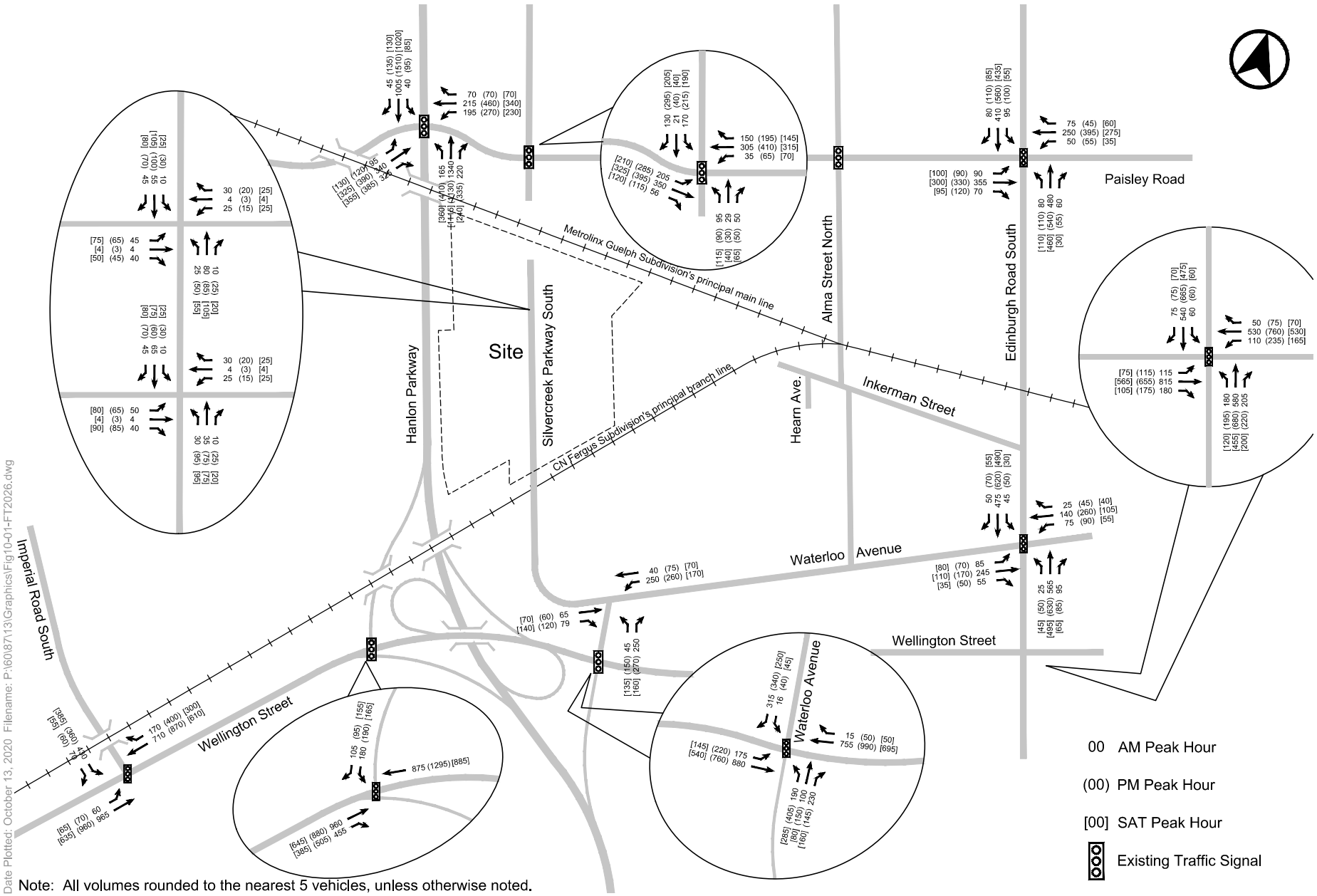
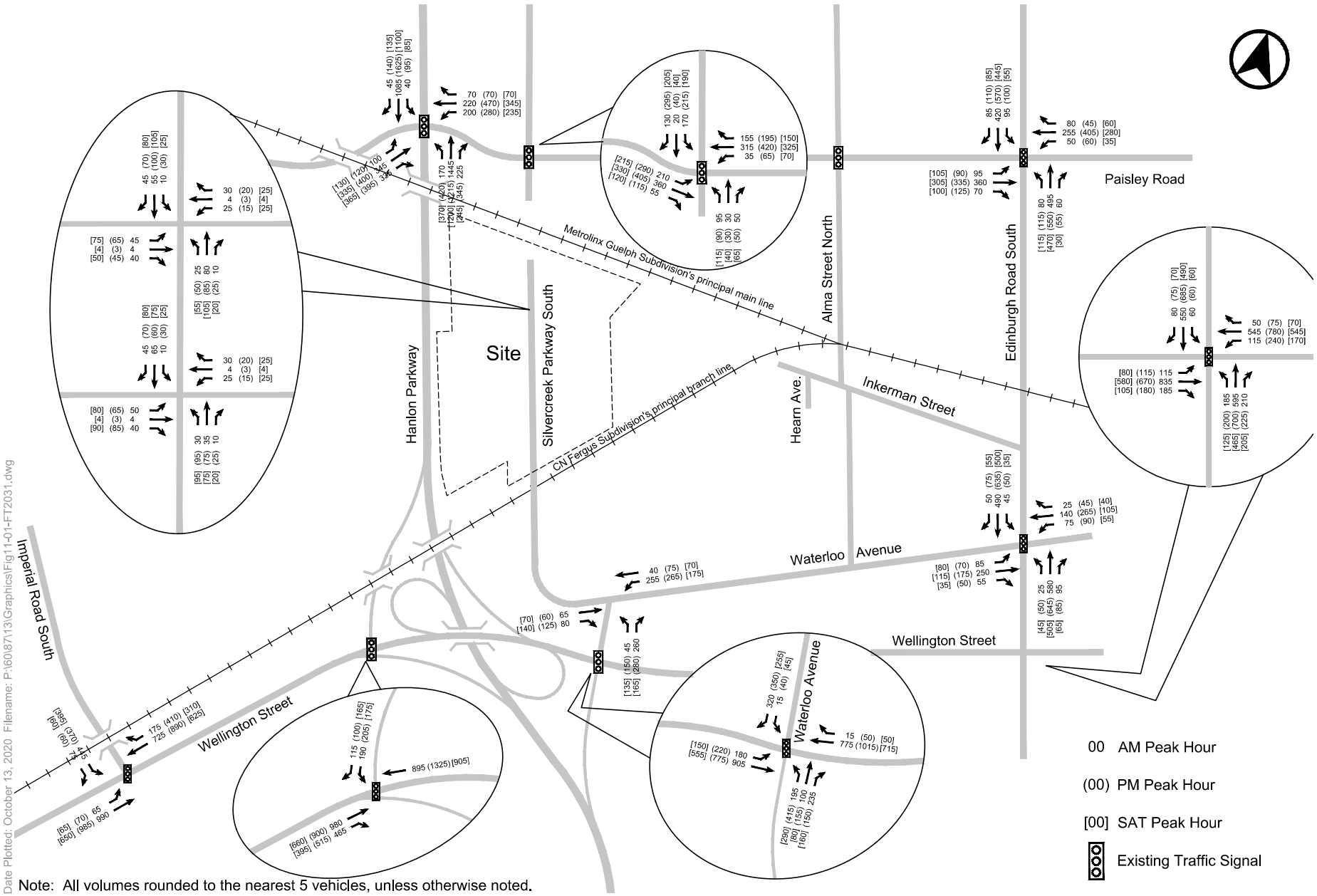
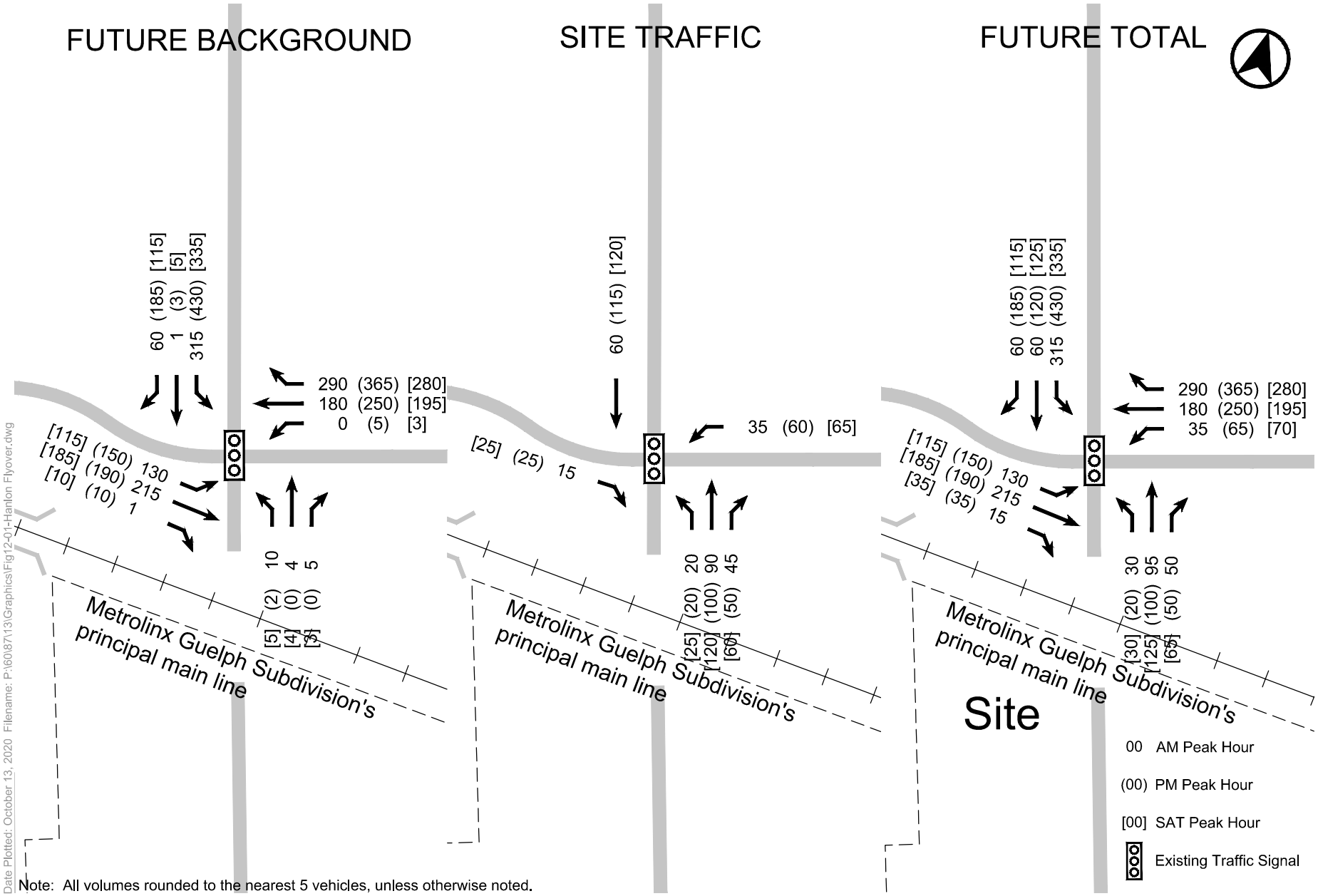


FIGURE 10 2026 FUTURE TOTAL TRAFFIC VOLUMES



Note: All volumes rounded to the nearest 5 vehicles, unless otherwise noted.

FIGURE 11 2031 FUTURE TOTAL TRAFFIC VOLUMES



Note: All volumes rounded to the nearest 5 vehicles, unless otherwise noted.

FIGURE 12 WESTWOOD INTERCHANGE SCENARIO - 2031 SILVERCREEK & PAISLEY TRAFFIC VOLUMES

3.2 OPERATIONS ANALYSIS

3.2.1 Overview

Based on the updated future total traffic volumes, an updated traffic operations analysis has been undertaken. The methodology remains consistent with Section 6.1 of the 2019 TIS.

Whilst existing and future background analysis results remain unchanged, these have been reproduced in this report for ease of comparison between the scenarios. Overall, the results of the updated analysis remain generally consistent with those reported in the 2019 TIS.

The complete Synchro results for the updated future total scenarios are attached in **Appendix B**.

3.2.2 Signalized Intersections

3.2.2.1 Base Scenario

The operations analysis results for the signalized intersections within the study area are provided in **Table 5** through to **Table 7** for the existing and 2021 horizon-year, 2026 horizon-year and 2031 horizon-year scenarios respectively.

The results remain generally consistent with those reported in the 2019 TIS, with all intersections projected to operate at acceptable levels of service and within capacity.

At the Hanlon Expressway / Paisley Road intersection during the PM peak hour for all future total horizon-years, the overall intersection, the eastbound through movement, the shared westbound through/right movement and the southbound through movement are projected to operate with a v/c ratio greater than 0.85, although within capacity. The westbound and northbound left turn movements are projected to operate with a v/c ratio greater than 0.90 but within capacity. Furthermore, for the future total 2031 horizon-year, while Synchro reports the overall intersection v/c ratio as overcapacity at 1.01, this is illogical as all individual movements operate within albeit approaching capacity (v/c of 0.99 or less). Nevertheless, this value has been for reported as it appears in the Synchro report for completeness. These results remain consistent with the analysis as reported in the 2019 TIS.

TABLE 5 EXISTING AND 2021 HORIZON YEAR SIGNALIZED INTERSECTION ANALYSIS

Intersection	Existing Conditions		2021 Background Traffic		2021 Total Traffic	
	LOS	v/c	LOS	v/c	LOS	v/c
Edinburgh Rd & Wellington St W	C (C) [C]	0.64 (0.69) [0.43]	C (C) [C]	0.66 (0.70) [0.44]	C (C) [C]	0.67 (0.72) [0.45]
Waterloo Ave & Wellington St W	C (C) [C]	0.36 (0.47) [0.31]	C (C) [C]	0.37 (0.48) [0.32]	C (C) [C]	0.38 (0.54) [0.35]
Hanlon Expwy & Wellington St W	B (B) [A]	0.38 (0.35) [0.26]	B (B) [A]	0.39 (0.36) [0.27]	B (B) [A]	0.40 (0.38) [0.29]
Wellington St W & Imperial Rd	B (B) [B]	0.70 (0.67) [0.52]	B (B) [B]	0.71 (0.69) [0.53]	B (B) [B]	0.73 (0.73) [0.56]
Hanlon Expwy & Paisley Rd	C (D) [D]	0.65 (0.88) [0.62]	D (D) [D]	0.67 (0.88) [0.65]	D (E) [D]	0.70 (0.92) [0.69]
Waterloo Ave & Edinburgh Rd	C (B) [B]	0.61 (0.60) [0.40]	C (B) [B]	0.62 (0.61) [0.40]	C (C) [B]	0.64 (0.63) [0.43]
Edinburgh Rd & Paisley Rd	B (C) [B]	0.63 (0.67) [0.55]	B (C) [B]	0.62 (0.69) [0.54]	B (C) [B]	0.66 (0.75) [0.61]
Silvercreek Pkwy & Paisley Rd	B (C) [B]	0.55 (0.85) [0.60]	B (B) [B]	0.55 (0.71) [0.55]	B (C) [C]	0.56 (0.76) [0.58]

Notes:
1. AM (PM) [SAT]

TABLE 6 2026 HORIZON YEAR SIGNALIZED INTERSECTION ANALYSIS

Movement	2026 Background Traffic		2026 Total Traffic	
	LOS	v/c	LOS	v/c
Edinburgh Rd & Wellington St W	C (C) [C]	0.68 (0.73) [0.46]	C (C) [C]	0.69 (0.75) [0.47]
Waterloo Ave & Wellington St W	C (C) [C]	0.39 (0.49) [0.32]	C (C) [C]	0.39 (0.56) [0.36]
Hanlon Expwy & Wellington St W	B (B) [A]	0.41 (0.38) [0.28]	B (B) [A]	0.41 (0.39) [0.30]
Wellington St W & Imperial Rd	B (B) [B]	0.73 (0.71) [0.55]	B (B) [B]	0.74 (0.74) [0.57]
Hanlon Expwy & Paisley Rd	D (E) [D]	0.71 (0.92) [0.68]	D (E) [D]	0.74 (0.97) [0.73]
Waterloo Ave & Edinburgh Rd	C (B) [B]	0.63 (0.63) [0.42]	C (C) [B]	0.66 (0.65) [0.44]
Edinburgh Rd & Paisley Rd	B (C) [B]	0.64 (0.71) [0.56]	C (C) [B]	0.68 (0.77) [0.63]
Silvercreek Pkwy & Paisley Rd	B (C) [B]	0.56 (0.72) [0.55]	B (C) [C]	0.57 (0.78) [0.58]

Notes:
1. AM (PM) [SAT]

TABLE 7 2031 HORIZON YEAR SIGNALIZED INTERSECTION ANALYSIS

Movement	2031 Background Traffic		2031 Total Traffic	
	LOS	v/c	LOS	v/c
Edinburgh Rd & Wellington St W	C (C) [C]	0.70 (0.76) [0.48]	C (C) [C]	0.71 (0.78) [0.49]
Waterloo Ave & Wellington St W	C (C) [C]	0.38 (0.50) [0.33]	C (C) [C]	0.40 (0.57) [0.36]
Hanlon Expwy & Wellington St W	B (B) [A]	0.42 (0.39) [0.29]	B (B) [A]	0.43 (0.41) [0.31]
Wellington St W & Imperial Rd	B (B) [B]	0.76 (0.74) [0.56]	B (B) [B]	0.78 (0.77) [0.58]
Hanlon Expwy & Paisley Rd	D (E) [D]	0.76 (0.97) [0.72]	D (E) [D]	0.79 (1.01) [0.74]
Waterloo Ave & Edinburgh Rd	C (B) [B]	0.65 (0.64) [0.43]	C (C) [B]	0.67 (0.66) [0.45]
Edinburgh Rd & Paisley Rd	B (C) [B]	0.66 (0.72) [0.57]	C (C) [B]	0.70 (0.78) [0.64]
Silvercreek Pkwy & Paisley Rd	B (B) [B]	0.57 (0.76) [0.56]	B (C) [C]	0.59 (0.80) [0.60]

Notes:
1. AM (PM) [SAT]

3.2.2.2 Westwood Road Interchange Scenario

The results for the updated Westwood Road Interchange scenario at the Silvercreek Parkway / Paisley Road intersection are provided in **Table 8**.

In the 2031 future background and total traffic scenarios, all movements and the intersection overall operate at acceptable levels of service and within capacity. From a capacity perspective, the changes in traffic volumes due to a full movement interchange at Westwood Road with the Hanlon Expressway as projected by this study could be accommodated at the Silvercreek Parkway / Paisley Road intersection. However, additional information about the interchange design would be required to confirm the traffic assignments.

TABLE 8 2031 HORIZON YEAR – WESTWOOD INTERCHANGE, SIGNALIZED INTERSECTION ANALYSIS

Movement	2031 Background Traffic		2031 Total Traffic	
	LOS	v/c	LOS	v/c
Silvercreek Parkway & Paisley Road	C (C) [C]	0.67 (0.86) [0.63]	C (D) [C]	0.74 (0.96) [0.74]

Notes:
1. AM (PM) [SAT]

3.2.3 Unsignalized Intersections

3.2.3.1 Existing Intersection Configurations

The operations analysis results for the unsignalized intersections within the study area are provided within **Table 9** through to **Table 11** for the existing and 2021 horizon-year, 2026 horizon-year and 2031 horizon-year scenarios respectively.

The results remain generally consistent with those reported in the 2019 TIS, with all intersections projected to operate at acceptable levels of service and within capacity.

TABLE 9 EXISTING AND 2021 HORIZON YEAR UNSIGNALIZED INTERSECTION ANALYSIS

Intersection	Existing Conditions		2021 Background Traffic		2021 Total Traffic	
	LOS	v/c	LOS	v/c	LOS	v/c
Waterloo Avenue & Silvercreek Parkway						
WBL	A (A) [A]	0.16 (0.19) [0.12]	A (A) [A]	0.17 (0.17) [0.11]	A (A) [A]	0.19 (0.20) [0.13]
NBLR	A (B) [A]	0.26 (0.29) [0.17]	A (A) [A]	0.25 (0.27) [0.16]	B (C) [B]	0.27 (0.50) [0.32]
Silvercreek Parkway & North Driveway						
EBLRT	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	B (B) [B]	0.13 (0.21) [0.25]
WBLRT	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	B (B) [B]	0.08 (0.06) [0.10]
NBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	A (A) [A]	0.02 (0.04) [0.04]
SBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	A (A) [A]	0.01 (0.02) [0.02]
Silvercreek Parkway & South Driveway						
EBLRT	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	B (B) [B]	0.13 (0.26) [0.32]
WBLRT	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	A (B) [B]	0.08 (0.07) [0.11]
NBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	A (A) [A]	0.02 (0.07) [0.07]
SBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	A (A) [A]	0.01 (0.02) [0.02]

Notes:
1. AM (PM) [SAT]

TABLE 10 2026 HORIZON YEAR UNSIGNALIZED INTERSECTION ANALYSIS

Movement	2026 Background Traffic		2026 Total Traffic	
	LOS	v/c	LOS	v/c
Waterloo Avenue & Silvercreek Parkway				
WBL	A (A) [A]	0.17 (0.18) [0.12]	A (A) [A]	0.19 (0.21) [0.14]
NBLR	A (A) [A]	0.26 (0.27) [0.16]	B (C) [B]	0.28 (0.51) [0.33]
Silvercreek Parkway & North Driveway				
EBLRT	-- (--) [--]	-- (--) [--]	B (B) [B]	0.13 (0.21) [0.25]
WBLRT	-- (--) [--]	-- (--) [--]	B (B) [B]	0.08 (0.06) [0.10]
NBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.02 (0.04) [0.04]
SBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.01 (0.02) [0.02]
Silvercreek Parkway & South Driveway				
EBLRT	-- (--) [--]	-- (--) [--]	B (B) [B]	0.13 (0.26) [0.32]
WBLRT	-- (--) [--]	-- (--) [--]	A (B) [B]	0.08 (0.07) [0.11]
NBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.02 (0.07) [0.07]
SBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.01 (0.02) [0.02]

Notes:
1. AM (PM) [SAT]

TABLE 11 2031 HORIZON YEAR UNSIGNALIZED INTERSECTION ANALYSIS

Movement	2031 Background Traffic		2031 Total Traffic	
	LOS	v/c	LOS	v/c
Waterloo Avenue & Silvercreek Parkway				
WBL	A (A) [A]	0.17 (0.18) [0.12]	A (A) [A]	0.20 (0.21) [0.14]
NBLR	A (B) [A]	0.27 (0.28) [0.17]	B (C) [B]	0.29 (0.52) [0.34]
Silvercreek Parkway & North Driveway				
EBLRT	-- (--) [--]	-- (--) [--]	B (B) [B]	0.13 (0.21) [0.25]
WBLRT	-- (--) [--]	-- (--) [--]	B (B) [B]	0.08 (0.06) [0.10]
NBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.02 (0.04) [0.04]
SBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.01 (0.02) [0.02]
Silvercreek Parkway & South Driveway				
EBLRT	-- (--) [--]	-- (--) [--]	B (B) [B]	0.13 (0.26) [0.32]
WBLRT	-- (--) [--]	-- (--) [--]	A (B) [B]	0.08 (0.07) [0.11]
NBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.02 (0.07) [0.07]
SBL	-- (--) [--]	-- (--) [--]	A (A) [A]	0.01 (0.02) [0.02]

Notes:
1. AM (PM) [SAT]

3.2.3.2 Silvercreek Parkway at Waterloo Avenue Intersection Realignment

Consistent with the 2019 TIS, an analysis has been undertaken which considers a potential reconfiguration of the Silvercreek Parkway at Waterloo Avenue intersection such that the northbound and eastbound approaches are free-flowing and only the westbound approach is under stop control. The results of the analysis are summarized in **Table 12**. For the purposes of the analysis, the eastbound Silvercreek Parkway approach has been renamed as the southbound approach.

As shown, all movements are expected to operate at acceptable levels of service and within capacity under this potential reconfiguration, consistent with the results reported in the 2019 TIS.

TABLE 12 REALIGNED SILVERCREEK PARKWAY AT WATERLOO AVENUE ANALYSIS RESULTS

Movement	2021 Total Traffic		2026 Total Traffic		2031 Total Traffic	
	LOS	v/c	LOS	v/c	LOS	v/c
WBL	C (C) [C]	0.47 (0.59) [0.36]	C (C) [C]	0.49 (0.61) [0.37]	C (C) [C]	0.50 (0.63) [0.39]
WBR	A (B) [A]	0.05 (0.10) [0.09]	A (B) [A]	0.05 (0.11) [0.09]	A (B) [A]	0.05 (0.11) [0.09]
SBL	A (A) [A]	0.06 (0.06) [0.06]	A (A) [A]	0.06 (0.06) [0.06]	A (A) [A]	0.06 (0.06) [0.06]

Notes:
1. AM (PM) [SAT]
2. Silvercreek Parkway eastbound approach renamed to the southbound approach for purposes of analysis.

3.2.4 Queue Lengths

The key queue lengths at critical study area intersections, along with the available storage are summarized in **Table 13**. The results remain generally consistent with those reported in the 2019 TIS.

TABLE 13 QUEUE LENGTHS

Intersection	Movement	95th %ile Queue (m)			Available Storage (m)
		2021 Total Traffic	2026 Total Traffic	2031 Total Traffic	
Hanlon Expressway and Paisley Road	WBL	78 (#118) [91]	78 (#125) [93]	81 (#133) [95]	40 m
	WBTR	61 (#138) [93]	62 (#147) [#100]	64 (#148) [#102]	160 m
Silvercreek Parkway and Paisley Road	EBL	25 (35) [25]	25 (#41) [26]	26 (#41) [27]	160 m
	EBT	48 (54) [43]	50 (56) [45]	51 (58) [46]	160 m
Waterloo Avenue and Wellington Street West	SBL	10 (17) [19]	10 (18) [19]	9 (18) [19]	90 m
	SBR	19 (19) [17]	19 (19) [17]	19 (19) [17]	90 m
Waterloo Avenue and Silvercreek Parkway (Existing configuration)	NB	9 (23) [11]	9 (24) [12]	10 (25) [12]	90m
Waterloo Avenue and Silvercreek Parkway (Realigned configuration)	Free-flow – No queueing expected				

Notes:
1. AM (PM) [SAT]
2. Signalized intersection queues based on Synchro queue reports.
3. #95th percentile queue volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

At the Hanlon Expressway at Paisley Road intersection, in all of the peak hours, the westbound left turn movement 95th percentile queue exceeds the available storage length in all of the peak hours. However, it should be noted that this condition is experienced in the existing conditions and all future background traffic scenarios. The shared westbound through/right turn movement queue extends short of Silvercreek Parkway in the 2026 and 2031 future total traffic scenarios in the PM peak hour. Given that this intersection is effectively operating at capacity, no meaningful changes to the signal timings can be made to reduce these queue lengths. This is consistent with the conclusions of the analysis within the 2019 TIS.

Under the existing configuration at Silvercreek Parkway / Waterloo Avenue, northbound queues are projected to fit within the available storage space. Under the potential realigned configuration, northbound would operate free flow and therefore, no queues are expected.

3.2.5 Signal Justification Warrants

Signal justification warrants have been completed for the 2031 total traffic scenario for the two driveways to Silvercreek Parkway. The results are summarized in **Table 14** with the detailed worksheets attached for reference in **Appendix C**.

Consistent with the 2019 TIS, neither of the Silvercreek Parkway intersections with site driveways meet the signal justification warrants in the 2031 horizon year. Consequently, it is proposed that these intersections remain unsignalized but designed to protect for potential future signalization.

TABLE 14 2031 TOTAL TRAFFIC – SIGNAL JUSTIFICATION

Intersection	Justification 1A	Justification 1B	Justification 2A	Justification 2B	Justification 3	Justified?
Silvercreek Parkway & North Driveway	55%	71%	38%	85%	NO	NO
Silvercreek Parkway & South Driveway	57%	85%	37%	85%	NO	NO

4.0 GRADE SEPARATION

A memo was prepared by BA Group which reviewed whether based on the current Proposal, a grade separation is warranted for the Metrolinx Guelph Subdivision, Kitchener Line rail crossing across Silvercreek Parkway South, located at the north end of the Site. The memo is attached in **Appendix D** and concluded that a grade separation is not warranted.

5.0 SIGHT DISTANCE ASSESSMENT OF STREET A / STREET C

5.1 ROAD LAYOUT AND PROFILE

The Site is bound by the north rail crossing associated with the Metrolinx Guelph Subdivision, Kitchener Line to the north and by the south rail crossing associated with the Canadian National Railway (CN) Fergus Subdivision Line to the south.

A rail underpass is proposed at the north rail crossing in the 2012 Silvercreek EA. As a result, the vertical profile of Silvercreek Parkway South in the vicinity of and through the site is proposed to be altered, as illustrated in the recommended solution for Silvercreek Parkway South from Paisley Road to Waterloo Street in the 2012 Silvercreek EA.

The Silvercreek Parkway South / Street A / Street C intersection is located 195.9 metres south of the railway right-of-way (centre to centre).

5.2 SIGHT DISTANCE REQUIREMENTS

5.2.1 Two-Way Stop Control

Sight distance requirements for intersections are detailed in Section 9.9 of the *Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads*. It outlines adjustment factors for sight distance based on approach grade. For a grade of 3% or less, no adjustment factor should be applied. As the grade of Silvercreek Parkway South in the vicinity of Street A / Street C is proposed to be less than 3%, no adjustment factor was applied. A design speed of 60 kilometres per hour was assumed, as per the 2012 Silvercreek EA.

The critical sight distance requirement is for Case B1 (left turn from the minor road at intersections with stop control on the minor road) with a required sight distance of 130 metres. This information is summarized below **Table 15** with the sight distance figures in plan and profile attached in **Appendix E**.

TABLE 15 TAC SIGHT DISTANCE ASSESSMENT

Case		Required Sight Distance	Satisfied?
Case B – Intersections with stop control on the minor road	B1 – Left turn from the minor road	130 m	YES

Notes:
1, Based on approach grade of less than 3% (as per the design for Silvercreek Parkway S), design speed of 60 km/h (as per the 2012 Silvercreek EA).
2. Sight distances shown graphically in **Appendix E**.

The sight distance assessment concludes that the required sight distance for the critical condition of 130 metres given the proposed two-way stop control is provided.

5.2.2 Traffic Signal Control

The City has requested that an additional sight distance assessment be undertaken in the event that the intersection of Silvercreek Parkway South / Street A / Street C was under traffic signal control. The minimum

distance requirements from which signals must be clearly visible are detailed in Table 25 of the Ministry of Transportation's *Ontario Traffic Manual (OTM) Book 12 – Traffic Signals*. Based on an assumed 85th percentile speed of 60 kilometres per hour, the signal must be clearly visible from a minimum of 110 metres.

As illustrated in the sight distance figure in **Appendix E**, a signal head located at a minimum height of 2.75 metres would clearly be visible from beyond 110 metres. Moreover, if the traffic signal head was located higher at 5.0 metres or a stop sign was provided with standard height between 1.5 and 2.5 metres, the sight distance would still be provided as there are no visual obstructions.

Consequently, the sight distance assessment concludes that the required sight distance of 110 metres to the traffic signal head is provided if the intersection was to operate under traffic signal control.

6.0 ROAD AND INTERSECTION DESIGN

6.1 SILVERCREEK PARKWAY SOUTH DESIGN

A reduced concept plan (not to scale) is attached in **Appendix A**. The functional design of Silvercreek Parkway South is attached in **Appendix E**. These plans illustrate a number of important features along Silvercreek Parkway South that will ensure that it safely accommodates travel for all modes of travel including cyclists, pedestrians and motor vehicles. These include:

- **Separated Cycle Tracks** – Separated cycle tracks are shown on both sides of Silvercreek Parkway South. In the vicinity of the Urban Square where on-street parking is provided, the cycle tracks will run between the sidewalk and on-street parking with an appropriate buffer. As proposed in the 2012 Silvercreek Parkway EA, the cycle tracks in the northbound direction (uphill) have a more gentle profile to traverse for greater accessibility while the southbound direction (downhill) follows the road profile.

- **Multi-Use Path** – A multi-use path is provided on the east side of Silvercreek Parkway South which will accommodate a range of active transportation uses including pedestrians and recreational cyclists.

- **On-Street Parking** – A modest amount of on-street parking is provided in the vicinity of the Neighbourhood Park and the Urban Square such that it does not interfere with the operation of bus stops and traffic operations at intersections. Drivers will drive more slowly in the presence of on-street parking as they watch for vehicles making parking manoeuvers.

- **Centre Median** – The centre median is provided through the area where on-street parking is provided. This improves safety by separating the northbound and southbound directions of the roadway as well as providing a refuge for pedestrians crossing mid-block.

- **Pedestrian Crossover** – A pedestrian crossover is proposed on the south side of the intersection of Silvercreek Parkway / Street A / Street C. This actuated crossing will provide pedestrians with a protected crossing of Silvercreek Parkway South. It is located in close proximity to the bus stops, Neighbourhood Park and Urban Square.

- **Two-Way Stop Control with Left Turn Lanes** – At the intersections of Street A / Street C and Street E / Street D, two-way stop control is proposed where the minor streets operate under stop control and Silvercreek Parkway South is free-flowing. Auxiliary left turn lanes are provided in the northbound and southbound directions.

Additionally, there are opportunities for pavement treatments, gateway features and signage along Silvercreek Parkway South as motorists enter the community.

These features communicate to drivers that they are entering an urban community that provides facilities for and accommodates pedestrians, cyclists and motor vehicles. This creates a traffic calming effect where motor vehicles reduce their speeds and become more conscientious of other road users.

It is important to recognize that the primary purpose of these plans is to demonstrate that these critical features can fit within the road right-of-ways proposed and sufficient space has been allocated. These designs are conceptual in nature and subject to further refinement and discussion with the City.

6.2 STREET A / STREET C INTERSECTION CONTROL

The City has requested that the intersection of Silvercreek Parkway South / Street A / Street C be considered as a roundabout on the basis of traffic calming and sightlines. It is currently proposed to operate as a two-way stop controlled intersection with the minor streets under stop control and Silvercreek Parkway South free-flowing.

We have reviewed this request and do not believe that a roundabout would be an appropriate form of intersection control at this intersection for the following reasons:

1. As discussed in **Section 3.2**, this intersection will operate at good levels of service and well within capacity under two-way stop control.

2. As discussed in **Section 5.0**, all of the required sight distances are provided whether the intersection operates under two-way stop control or in the unlikely event that it needed to be signalized.

3. As discussed in **Section 6.1**, a number of features have been incorporated into the concept plan that will provide the appropriate traffic calming for Silvercreek Parkway South.

4. The provision of a roundabout creates a more complicated and challenging environment for pedestrians, particularly visually impaired pedestrians to cross the road approaches. The proposed two-way stop control allows for the implementation of a pedestrian crossover which afford pedestrians a greater level of protection.

5. The provision of a roundabout creates a more complicated and challenging environment for cyclists. A roundabout design would need to consider the integration of the cycle tracks on both sides of Silvercreek Parkway South, the multi-use path on the east side and the sidewalk on the west side.

6. The City of Guelph does not have specific warrants or thresholds when roundabouts should be considered. Some municipalities such as the Town of Milton recommend consideration of a roundabout when a traffic signal is being considered (i.e. the signal justification warrant has been met). In this situation, the intersection does not meet the warrants for traffic signals. /

7.0 CONCLUSIONS

Based on the preceding technical analysis, the follow conclusions have been reached:

1. The Proposal contemplates 24 fewer residential units than the previous 2019 Proposal but maintains the same amount of commercial gross floor area.

2. The Proposal generates 15 fewer trips in the weekday morning peak hour and 20 fewer trips in the weekday afternoon and Saturday mid-day peak hours than the previous 2019 Proposal.

3. Given that the Proposal generates fewer trips than the 2019 Proposal, all of the Study Area intersections are continued to be expected to operate at acceptable levels of service and within capacity for the 2021, 2026 and 2031 horizon years.

4. In reviewing the grade separation criteria for the Metrolinx Guelph Subdivision, Kitchener Line rail crossing across Silvercreek Parkway South at the north end of the Site, none of the grade separation criteria are met.

5. A sight distance assessment for the Silvercreek Parkway South / Street A / Street C intersection finds that the required sight distances are provided for the proposed two-way stop control and if the intersection were to operate under traffic signal control or all-way stop control.

6. A conceptual design for Silvercreek Parkway South has been prepared which incorporates a number of features that provide for all modes of travel including pedestrians, cyclists and motor vehicles and create a traffic calming effect.

7. The two-way stop control proposed for the intersection of Silvercreek Parkway South / Street A / Street C is the most appropriate control given the intersection operations and surrounding context. A roundabout is not recommended.

Sincerely,
BA Consulting Group Ltd.

Steven Kwan, P.Eng.
Associate

cc:
Astrid Clos, Astrid J. Clos Planning Consultants
Luke Richardson, BA Group

APPENDIX A:
Reduced Scale Plan of Subdivision and Concept Plan

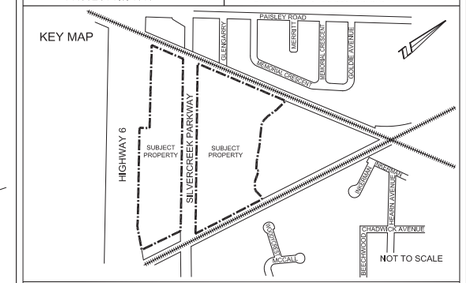
ASTRID J. CLOS
PLANNING CONSULTANTS

423 Woolwich Street, Suite 201
Guelph, Ontario N1H 3X3
Email: astrid.clos@ajcplanning.ca
Phone: (519) 836-7526 (836-PLAN)

DRAFT PLAN OF SUBDIVISION
23T-19001
SILVERCREEK JUNCTION

DATE: OCTOBER 8, 2020	SCALE 1:1,000
PROJECT No. 1016	DRAWN BY : G.K.S. / A.R.N.

KEY MAP



LEGAL DESCRIPTION

PART OF LOTS 21 AND 22, DIVISION 'A'
PART OF LOTS 2 AND 3, CONCESSION 1, DIVISION 'E'
ALL OF LOT 10 AND PART OF LOTS 7,8,9,11,12, D & E WEST SIDE OF GUELPH & GALT RAILWAY AND PART OF NAPOLEON STREET (CLOSED BY INSTRUMENT BS12480), REGISTERED PLAN 52
CITY OF GUELPH

NOTES

1. TOPOGRAPHIC INFORMATION PROVIDED BY BURNSIDE.

LAND USE SCHEDULE

DESCRIPTION	BLOCKS	UNITS	AREA (ha.)
Apartment	1-3	297	2.76
Townhouse	4-16	163	4.00
Mixed Use	17-19	293	2.30
Park	21-22	-	2.59
Open Space	20,23	-	0.41
Stormwater Management	24	-	1.72
Roads	-	-	2.74
TOTAL	24	753	16.52

ADDITIONAL INFORMATION

(UNDER SECTION 51(17) OF THE PLANNING ACT)

INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,g,j and i ARE AS SHOWN ON DRAFT PLAN.

h) Municipal Water
i) Silty Sand
k) Municipal Sewer

OWNER'S CERTIFICATE

I AUTHORIZE ASTRID J. CLOS, PLANNING CONSULTANTS TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION.

JACK EISENBERGER, ASO
SILVERCREEK GUELPH DEVELOPMENTS LIMITED — NOVEMBER 18, 2019 (DATE)

JACK EISENBERGER, ASO
2089248 ONTARIO INC. — NOVEMBER 18, 2019 (DATE)

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE CORRECTLY SHOWN.

JEFFREY E. BUISMAN O.L.S.
Van Harten Surveying Inc. — NOVEMBER 12, 2019 (DATE)

Oct 8, 2020-4:37:45 PM (19342-10)
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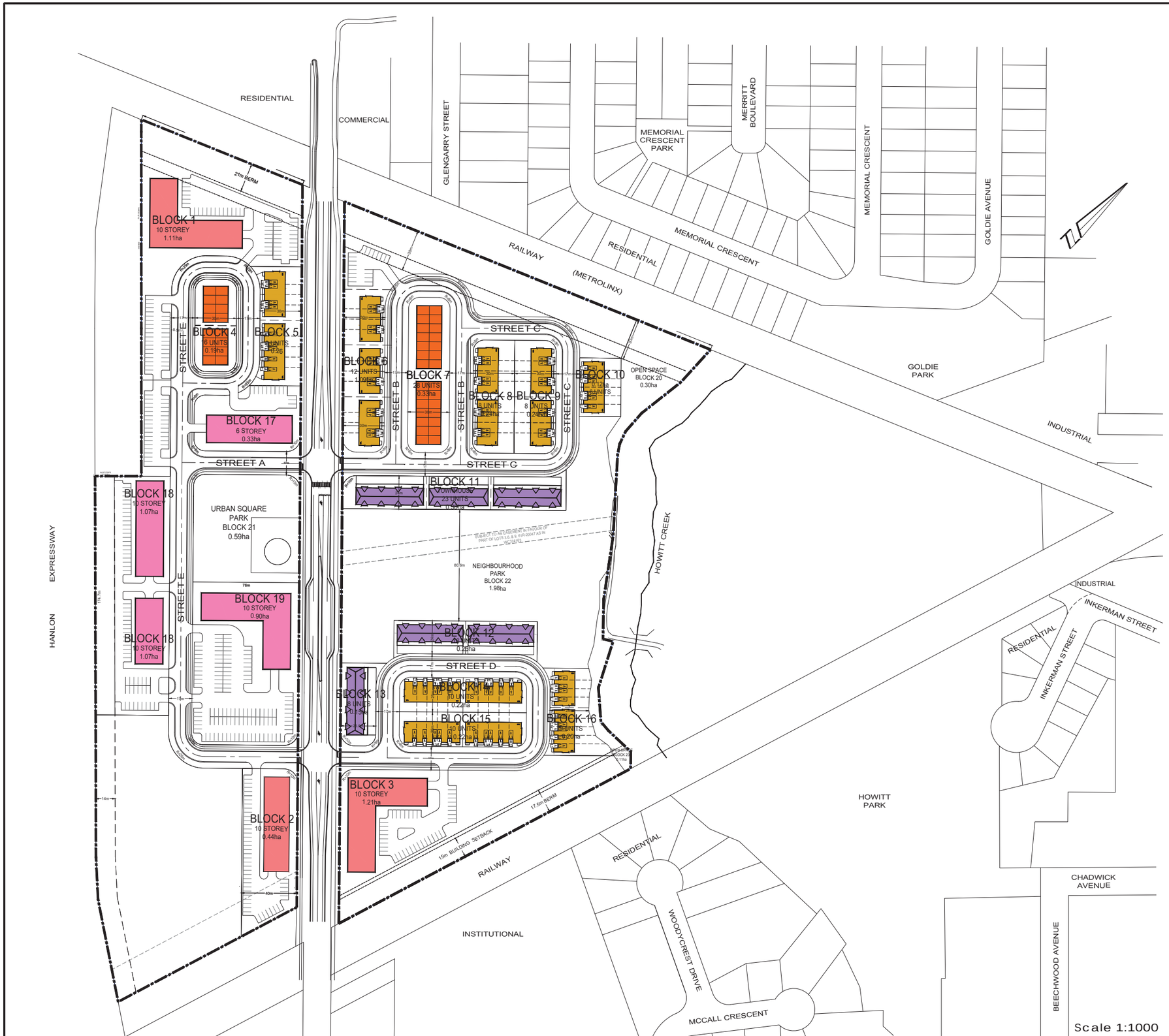


Legend

- Apartment Building- 10 Storey
- Mixed Use - 10 Storey
- Street Townhouses
- Back to Back Townhouses
- Through Townhouses

METRIC

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

No.	Description	City	Date	By

Revision

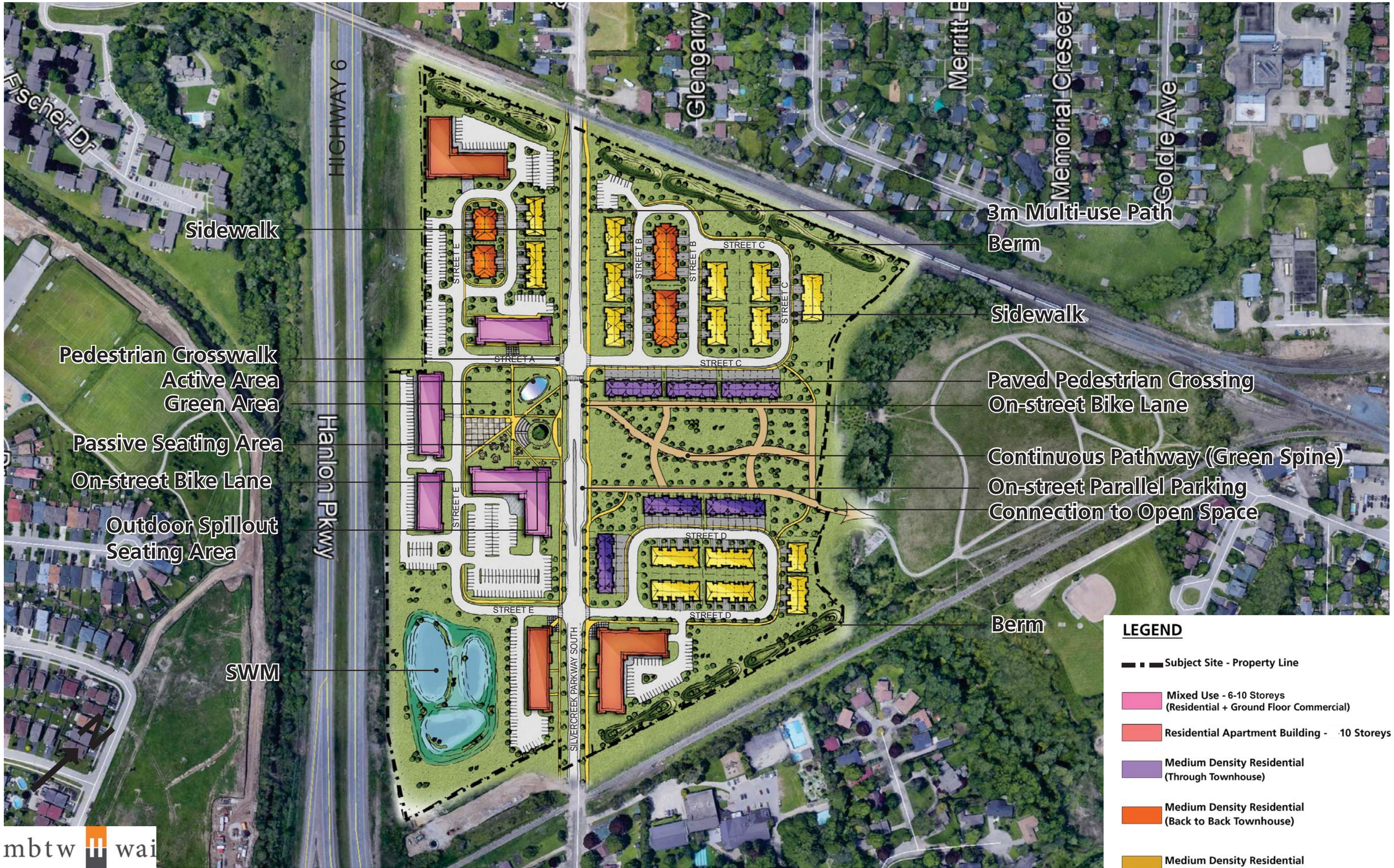
Title:

SILVERCREEK DRAFT PLAN OF SUBDIVISION

Scale: 1:1000	NOTE: Elevations Shown hereon relate to Canadian Geodetic Datum	Date: October 13, 2020 (YY-MM-DD)	
Job #: FDG173		Dwg #: A1.0	

mbtw wai

CITY FILE: TECH XX XXXXXX XXX



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October 2020

APPENDIX B:
Synchro Outputs

BA Consulting Group Ltd.
300 – 45 St. Clair Ave. W
Toronto ON M4V 1K9
TEL 416 961 7110
EMAIL bagroup@bagroup.com

Synchro Results for Signalized Intersections

	Existing		Future Background 2021		Future Total 2021		Future Background 2026		Future Total 2026		Future Background 2031		Future Total 2031	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
1						**Edinburgh Rd & Wellington St W**								
EBL	0.37 (0.50) [0.30]	B (C) [C]	0.37 (0.50) [0.30]	B (C) [C]	0.37 (0.51) [0.30]	B (C) [C]	0.38 (0.53) [0.30]	B (C) [C]	0.38 (0.53) [0.30]	B (C) [C]	0.38 (0.53) [0.32]	B (C) [C]	0.38 (0.54) [0.33]	B (C) [C]
EBT	0.77 (0.64) [0.68]	C (C) [C]	0.78 (0.64) [0.68]	C (C) [C]	0.78 (0.64) [0.69]	C (C) [C]	0.78 (0.65) [0.69]	C (C) [C]	0.78 (0.65) [0.70]	C (C) [C]	0.78 (0.65) [0.70]	C (C) [C]	0.78 (0.65) [0.70]	C (C) [C]
WBL	0.56 (0.87) [0.65]	C (D) [C]	0.58 (0.87) [0.66]	C (D) [C]	0.58 (0.88) [0.66]	C (D) [C]	0.58 (0.91) [0.68]	C (E) [C]	0.58 (0.90) [0.69]	C (D) [C]	0.61 (0.92) [0.71]	C (E) [C]	0.61 (0.92) [0.71]	C (E) [C]
WBT	0.51 (0.70) [0.60]	C (C) [C]	0.51 (0.71) [0.60]	C (C) [C]	0.52 (0.71) [0.61]	C (C) [C]	0.51 (0.71) [0.61]	C (C) [C]	0.52 (0.72) [0.61]	C (C) [C]	0.52 (0.72) [0.61]	C (C) [C]	0.52 (0.72) [0.62]	C (C) [C]
NBL	0.51 (0.46) [0.22]	B (B) [B]	0.53 (0.48) [0.23]	B (B) [B]	0.55 (0.49) [0.24]	B (B) [B]	0.57 (0.50) [0.24]	B (B) [B]	0.58 (0.51) [0.24]	C (B) [B]	0.60 (0.53) [0.25]	C (B) [B]	0.62 (0.54) [0.26]	C (B) [B]
NBT	0.51 (0.47) [0.27]	C (C) [B]	0.53 (0.48) [0.27]	C (C) [B]	0.54 (0.50) [0.29]	C (C) [B]	0.55 (0.50) [0.29]	C (C) [B]	0.57 (0.52) [0.30]	C (C) [B]	0.58 (0.53) [0.30]	C (C) [B]	0.60 (0.55) [0.31]	C (C) [B]
SBL	0.20 (0.16) [0.11]	B (B) [B]	0.22 (0.17) [0.12]	B (B) [B]	0.23 (0.17) [0.13]	B (B) [B]	0.23 (0.19) [0.13]	B (B) [B]	0.24 (0.19) [0.13]	B (B) [B]	0.24 (0.19) [0.13]	B (B) [B]	0.25 (0.20) [0.13]	B (B) [B]
SBT	0.56 (0.54) [0.30]	C (C) [B]	0.57 (0.56) [0.31]	C (C) [B]	0.59 (0.59) [0.32]	C (C) [B]	0.61 (0.59) [0.32]	C (C) [B]	0.63 (0.62) [0.34]	C (C) [B]	0.64 (0.63) [0.34]	C (C) [B]	0.66 (0.66) [0.35]	C (C) [B]
Overall	**0.64 (0.69) [0.43]**	**C (C) [C]**	**0.66 (0.70) [0.44]**	**C (C) [C]**	**0.67 (0.72) [0.45]**	**C (C) [C]**	**0.68 (0.73) [0.46]**	**C (C) [C]**	**0.69 (0.75) [0.47]**	**C (C) [C]**	**0.70 (0.76) [0.48]**	**C (C) [C]**	**0.71 (0.78) [0.49]**	**C (C) [C]**
2						**Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W**								
EBL	0.36 (0.36) [0.17]	B (B) [B]	0.36 (0.38) [0.18]	B (B) [B]	0.40 (0.53) [0.30]	B (C) [B]	0.38 (0.40) [0.18]	B (B) [B]	0.42 (0.55) [0.30]	B (C) [B]	0.40 (0.40) [0.20]	B (B) [B]	0.44 (0.56) [0.32]	B (C) [B]
EBT	0.33 (0.26) [0.19]	B (B) [B]	0.33 (0.27) [0.19]	B (B) [B]	0.33 (0.26) [0.18]	B (B) [B]	0.34 (0.28) [0.20]	B (B) [B]	0.34 (0.27) [0.19]	B (B) [B]	0.35 (0.28) [0.20]	B (B) [B]	0.35 (0.27) [0.19]	B (B) [B]
WBTR	0.41 (0.50) [0.36]	C (C) [C]	0.42 (0.51) [0.36]	C (C) [C]	0.42 (0.52) [0.38]	C (C) [C]	0.43 (0.52) [0.37]	C (C) [C]	0.43 (0.54) [0.38]	C (C) [C]	0.44 (0.54) [0.38]	C (C) [C]	0.44 (0.55) [0.39]	C (C) [C]
NBL	0.28 (0.48) [0.31]	C (D) [C]	0.29 (0.50) [0.32]	C (D) [C]	0.30 (0.52) [0.34]	C (D) [D]	0.29 (0.50) [0.32]	C (D) [D]	0.31 (0.53) [0.35]	C (D) [D]	0.30 (0.52) [0.33]	C (D) [D]	0.31 (0.55) [0.35]	C (D) [D]
NBLT	0.27 (0.47) [0.31]	C (D) [C]	0.28 (0.49) [0.31]	C (D) [C]	0.29 (0.52) [0.34]	C (D) [D]	0.29 (0.50) [0.32]	C (D) [D]	0.30 (0.53) [0.35]	C (D) [D]	0.29 (0.52) [0.33]	C (D) [D]	0.31 (0.54) [0.35]	C (D) [D]
NBR	0.15 (0.09) [0.10]	B (B) [B]	0.32 (0.09) [0.10]	D (B) [B]	0.15 (0.09) [0.10]	B (B) [C]	0.34 (0.09) [0.10]	D (B) [C]	0.16 (0.09) [0.10]	B (B) [C]	0.16 (0.10) [0.10]	B (B) [B]	0.16 (0.10) [0.10]	B (B) [B]
SBL	0.00 (0.02) [0.01]	C (C) [C]	0.00 (0.02) [0.01]	C (C) [C]	0.05 (0.15) [0.13]	C (C) [C]	0.00 (0.02) [0.01]	C (C) [C]	0.05 (0.16) [0.13]	C (C) [C]	0.00 (0.02) [0.01]	C (C) [C]	0.04 (0.16) [0.13]	C (C) [C]
SBR	0.16 (0.17) [0.10]	C (C) [C]	0.17 (0.17) [0.10]	C (C) [C]	0.22 (0.22) [0.16]	C (C) [C]	0.18 (0.17) [0.11]	C (C) [C]	0.22 (0.22) [0.16]	C (C) [C]	0.18 (0.18) [0.11]	C (C) [C]	0.22 (0.23) [0.16]	C (C) [C]
Overall	**0.36 (0.47) [0.31]**	**C (C) [C]**	**0.37 (0.48) [0.32]**	**C (C) [C]**	**0.38 (0.54) [0.35]**	**C (C) [C]**	**0.39 (0.49) [0.32]**	**C (C) [C]**	**0.39 (0.56) [0.36]**	**C (C) [C]**	**0.38 (0.50) [0.33]**	**C (C) [C]**	**0.40 (0.57) [0.36]**	**C (C) [C]**
3						**Hanlon Expressway & Wellington St W**								
EBTR	0.55 (0.50) [0.29]	B (B) [A]	0.56 (0.51) [0.29]	B (B) [A]	0.57 (0.54) [0.31]	B (B) [A]	0.57 (0.53) [0.30]	B (B) [A]	0.59 (0.55) [0.32]	B (B) [A]	0.59 (0.54) [0.31]	B (B) [A]	0.60 (0.57) [0.33]	B (B) [A]
WBT	0.34 (0.49) [0.27]	B (B) [A]	0.34 (0.50) [0.28]	B (B) [A]	0.35 (0.51) [0.29]	B (B) [A]	0.35 (0.51) [0.28]	B (B) [A]	0.36 (0.52) [0.30]	B (B) [A]	0.36 (0.53) [0.29]	B (B) [A]	0.37 (0.54) [0.30]	B (B) [A]
SBL	0.14 (0.14) [0.20]	C (C) [C]	0.15 (0.15) [0.21]	C (C) [C]	0.15 (0.15) [0.21]	C (C) [C]	0.16 (0.16) [0.23]	C (C) [C]	0.16 (0.16) [0.23]	C (C) [C]	0.17 (0.18) [0.24]	C (C) [C]	0.17 (0.18) [0.24]	C (C) [C]
SBR	0.06 (0.05) [0.08]	B (B) [A]	0.06 (0.05) [0.09]	B (B) [A]	0.07 (0.06) [0.10]	B (B) [A]	0.07 (0.06) [0.09]	B (B) [A]	0.08 (0.07) [0.11]	B (B) [A]	0.07 (0.06) [0.10]	B (B) [A]	0.08 (0.07) [0.11]	B (B) [A]
Overall	**0.38 (0.35) [0.26]**	**B (B) [A]**	**0.39 (0.36) [0.27]**	**B (B) [A]**	**0.40 (0.38) [0.29]**	**B (B) [A]**	**0.41 (0.38) [0.28]**	**B (B) [A]**	**0.41 (0.39) [0.30]**	**B (B) [A]**	**0.42 (0.39) [0.29]**	**B (B) [A]**	**0.43 (0.41) [0.31]**	**B (B) [A]**

Synchro Results for Signalized Intersections

4	**Wellington St W & Imperial Rd**													
	0.64		0.65		0.68		0.67		0.70		0.71		0.74	
	(0.63)	B (B)	(0.66)	B (B)	(0.71)	B (B)	(0.69)	B (B)	(0.74)	B (B)	(0.72)	B (B)	(0.77)	B (B)
EBLT	[0.40]	[B]	[0.41]	[B]	[0.45]	[B]	[0.42]	[B]	[0.46]	[B]	[0.44]	[B]	[0.48]	[B]
	0.44		0.45		0.48		0.47		0.50		0.49		0.51	
	(0.59)	B (B)	(0.61)	B (B)	(0.63)	B (B)	(0.63)	B (B)	(0.65)	B (B)	(0.65)	B (B)	(0.67)	B (B)
WBTR	[0.40]	[B]	[0.41]	[B]	[0.45]	[B]	[0.43]	[B]	[0.46]	[B]	[0.44]	[B]	[0.48]	[B]
	0.81		0.82		0.82		0.83		0.83		0.84		0.84	
	(0.76)	D (C)	(0.76)	D (C)	(0.76)	D (C)	(0.76)	D (C)	(0.76)	D (C)	(0.77)	D (C)	(0.77)	D (C)
SBL	[0.77]	[C]	[0.77]	[C]	[0.77]	[C]	[0.78]	[C]	[0.78]	[C]	[0.79]	[C]	[0.79]	[C]
	0.05		0.05		0.05		0.05		0.05		0.05		0.05	
	(0.04)	B (C)	(0.04)	B (C)	(0.04)	B (C)	(0.04)	B (C)	(0.04)	B (C)	(0.04)	B (C)	(0.04)	B (C)
SBR	[0.04]	[C]	[0.04]	[C]	[0.04]	[C]	[0.04]	[C]	[0.04]	[C]	[0.04]	[C]	[0.04]	[C]
	0.70		**0.71**		**0.73**		**0.73**		**0.74**		**0.76**		**0.78**	
	(0.67)	**B (B)**	**(0.69)**	**B (B)**	**(0.73)**	**B (B)**	**(0.71)**	**B (B)**	**(0.74)**	**B (B)**	**(0.74)**	**B (B)**	**(0.77)**	**B (B)**
Overall	**[0.52]**	**[B]**	**[0.53]**	**[B]**	**[0.56]**	**[B]**	**[0.55]**	**[B]**	**[0.57]**	**[B]**	**[0.56]**	**[B]**	**[0.58]**	**[B]**

	Existing		Future Background 2021		Future Total 2021		Future Background 2026		Future Total 2026		Future Background 2031		Future Total 2031	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
5	**Hanlon Expressway & Paisley Rd**													
	0.70		0.37		0.38		0.37		0.38		0.38		0.39	
	(0.92)	E (F)	(0.55)	D (E)	(0.57)	D (E)	(0.57)	D (E)	(0.60)	D (E)	(0.56)	D (E)	(0.60)	D (E)
EBL	[0.87]	[F]	[0.50]	[E]	[0.53]	[E]	[0.52]	[E]	[0.56]	[E]	[0.52]	[E]	[0.56]	[E]
	0.74		0.77		0.79		0.79		0.81		0.79		0.81	
	(0.72)	E (E)	(0.82)	E (F)	(0.86)	E (F)	(0.84)	E (F)	(0.87)	E (F)	(0.85)	E (F)	(0.88)	E (F)
EBT	[0.59]	[E]	[0.74]	[E]	[0.77]	[E]	[0.74]	[E]	[0.77]	[E]	[0.76]	[E]	[0.79]	[E]
	0.58		0.62		0.70		0.63		0.70		0.65		0.72	
	(0.71)	D (D)	(0.82)	D (E)	(0.93)	E (F)	(0.84)	D (E)	(0.95)	E (F)	(0.87)	D (E)	(0.98)	E (F)
WBL	[0.57]	[D]	[0.66]	[E]	[0.77]	[E]	[0.67]	[E]	[0.79]	[E]	[0.70]	[E]	[0.81]	[E]
	0.24		0.42		0.49		0.42		0.50		0.43		0.50	
	(0.45)	D (D)	(0.81)	E (E)	(0.86)	E (E)	(0.84)	E (E)	(0.88)	E (F)	(0.83)	E (E)	(0.88)	E (E)
WBTR	[0.33]	[D]	[0.68]	[E]	[0.75]	[E]	[0.70]	[E]	[0.77]	[E]	[0.70]	[E]	[0.77]	[E]
	0.20		0.44		0.42		0.45		0.43		0.46		0.25	
	(0.89)	B (E)	(0.89)	E (F)	(0.93)	E (F)	(0.91)	E (F)	(0.96)	E (F)	(0.92)	E (F)	(0.97)	C (F)
NBL	[0.46]	[C]	[0.79]	[E]	[0.82]	[E]	[0.81]	[E]	[0.84]	[F]	[0.82]	[E]	[0.52]	[D]
	0.63		0.65		0.67		0.70		0.73		0.76		0.79	
	(0.57)	C (C)	(0.57)	C (C)	(0.60)	C (C)	(0.62)	C (C)	(0.65)	C (C)	(0.66)	C (C)	(0.69)	C (C)
NBT	[0.55]	[C]	[0.55]	[C]	[0.58]	[C]	[0.59]	[C]	[0.62]	[C]	[0.64]	[C]	[0.67]	[C]
	0.50		0.48		0.53		0.48		0.54		0.48		0.53	
	(0.59)	E (F)	(0.53)	E (F)	(0.79)	F (F)	(0.59)	F (F)	(0.83)	F (F)	(0.59)	F (F)	(0.82)	F (F)
SBL	[0.50]	[E]	[0.44]	[E]	[0.70]	[F]	[0.48]	[E]	[0.75]	[F]	[0.49]	[E]	[0.75]	[F]
	0.54		0.57		0.59		0.62		0.63		0.67		0.68	
	(0.82)	C (D)	(0.87)	C (D)	(0.88)	C (D)	(0.95)	C (D)	(0.95)	C (D)	(0.99)	C (E)	(0.99)	C (E)
SBT	[0.54]	[C]	[0.57]	[C]	[0.58]	[C]	[0.62]	[C]	[0.63]	[C]	[0.67]	[C]	[0.68]	[C]
	0.03		0.03		0.03		0.03		0.03		0.03		0.03	
	(0.08)	B (C)	(0.08)	B (C)	(0.08)	C (C)	(0.09)	B (C)	(0.09)	C (C)	(0.09)	B (C)	(0.09)	C (C)
SBR	[0.08]	[C]	[0.08]	[C]	[0.08]	[C]	[0.08]	[C]	[0.08]	[C]	[0.09]	[C]	[0.09]	[C]
	0.65		**0.67**		**0.70**		**0.71**		**0.74**		**0.76**		**0.79**	
	(0.88)	**C (D)**	**(0.88)**	**D (D)**	**(0.92)**	**D (E)**	**(0.92)**	**D (E)**	**(0.97)**	**D (E)**	**(0.97)**	**D (E)**	**(1.01)**	**D (E)**
Overall	**[0.62]**	**[D]**	**[0.65]**	**[D]**	**[0.69]**	**[D]**	**[0.68]**	**[D]**	**[0.73]**	**[D]**	**[0.72]**	**[D]**	**[0.74]**	**[D]**
6	**Waterloo Ave & Edinburgh Rd**													
	0.21		0.23		0.34		0.23		0.34		0.22		0.33	
	(0.33)	C (C)	(0.32)	C (C)	(0.50)	C (C)	(0.32)	C (C)	(0.50)	C (C)	(0.32)	C (C)	(0.50)	C (C)
EBL	[0.30]	[D]	[0.33]	[D]	[0.57]	[D]	[0.33]	[D]	[0.57]	[D]	[0.32]	[D]	[0.55]	[D]
	0.70		0.70		0.72		0.71		0.72		0.71		0.72	
	(0.46)	D (C)	(0.45)	D (C)	(0.49)	D (C)	(0.46)	D (C)	(0.50)	D (C)	(0.47)	D (C)	(0.50)	D (C)
EBTR	[0.47]	[D]	[0.47]	[D]	[0.54]	[D]	[0.47]	[D]	[0.54]	[D]	[0.49]	[D]	[0.55]	[D]
	0.56		0.55		0.55		0.55		0.55		0.55		0.55	
	(0.43)	D (C)	(0.42)	D (C)	(0.42)	C (C)	(0.42)	D (C)	(0.42)	C (C)	(0.41)	C (C)	(0.42)	C (C)
WBL	[0.41]	[D]	[0.39]	[D]	[0.39]	[D]	[0.39]	[D]	[0.39]	[D]	[0.39]	[D]	[0.39]	[D]
	0.36		0.36		0.38		0.37		0.38		0.36		0.38	
	(0.69)	C (D)	(0.70)	C (D)	(0.70)	C (D)	(0.70)	C (D)	(0.71)	C (D)	(0.70)	C (D)	(0.71)	C (D)
WBTR	[0.45]	[D]	[0.46]	[D]	[0.52]	[D]	[0.46]	[D]	[0.52]	[D]	[0.45]	[D]	[0.50]	[D]
	0.04		0.05		0.06		0.05		0.06		0.05		0.06	
	(0.09)	B (A)	(0.10)	B (A)	(0.14)	B (A)	(0.10)	B (A)	(0.15)	B (A)	(0.11)	B (A)	(0.16)	B (A)
NBL	[0.05]	[A]	[0.05]	[A]	[0.07]	[A]	[0.06]	[A]	[0.08]	[A]	[0.06]	[A]	[0.08]	[A]
	0.58		0.59		0.61		0.61		0.63		0.63		0.65	
	(0.57)	C (B)	(0.59)	C (B)	(0.60)	C (B)	(0.61)	C (B)	(0.62)	C (B)	(0.62)	C (B)	(0.64)	C (B)
NBTR	[0.39]	[A]	[0.39]	[A]	[0.41]	[A]	[0.41]	[A]	[0.42]	[A]	[0.42]	[A]	[0.43]	[A]
	0.12		0.12		0.13		0.14		0.15		0.15		0.16	
	(0.13)	A (A)	(0.15)	A (A)	(0.15)	A (A)	(0.15)	A (A)	(0.16)	A (A)	(0.16)	A (A)	(0.17)	A (A)
SBL	[0.05]	[A]	[0.05]	[A]	[0.05]	[A]	[0.05]	[A]	[0.06]	[A]	[0.06]	[A]	[0.07]	[A]

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	0.45		0.46		0.49		0.47		0.50		0.49		0.52	
	(0.52)	A (A)	(0.53)	A (B)	(0.58)	B (B)	(0.55)	A (B)	(0.60)	B (B)	(0.57)	B (B)	(0.62)	B (B)
SBTR	[0.35]	[A]	[0.36]	[A]	[0.40]	[A]	[0.37]	[A]	[0.41]	[A]	[0.37]	[A]	[0.42]	[A]
	0.61		**0.62**		**0.64**		**0.63**		**0.66**		**0.65**		**0.67**	
	(0.60)	**C (B)**	**(0.61)**	**C (B)**	**(0.63)**	**C (C)**	**(0.63)**	**C (B)**	**(0.65)**	**C (C)**	**(0.64)**	**C (B)**	**(0.66)**	**C (C)**
Overall	**[0.40]**	**[B]**	**[0.40]**	**[B]**	**[0.43]**	**[B]**	**[0.42]**	**[B]**	**[0.44]**	**[B]**	**[0.43]**	**[B]**	**[0.45]**	**[B]**
8						**Edinburgh Rd & Paisley Rd**								
	0.29		0.31		0.40		0.32		0.41		0.35		0.44	
	(0.37)	B (C)	(0.41)	B (C)	(0.58)	C (C)	(0.42)	B (C)	(0.60)	C (C)	(0.44)	C (C)	(0.63)	C (D)
EBL	[0.27]	[C]	[0.29]	[C]	[0.42]	[C]	[0.30]	[C]	[0.43]	[C]	[0.32]	[C]	[0.46]	[C]
	0.68		0.69		0.74		0.72		0.77		0.73		0.78	
	(0.69)	C (C)	(0.70)	C (C)	(0.76)	C (C)	(0.72)	C (C)	(0.78)	C (C)	(0.74)	C (C)	(0.80)	C (C)
EBTR	[0.58]	[C]	[0.59]	[C]	[0.66]	[C]	[0.61]	[C]	[0.68]	[C]	[0.63]	[C]	[0.70]	[C]
	0.23		0.23		0.27		0.27		0.31		0.28		0.32	
	(0.30)	C (C)	(0.31)	C (C)	(0.36)	C (C)	(0.32)	C (C)	(0.38)	C (C)	(0.37)	C (C)	(0.44)	C (C)
WBL	[0.14]	[B]	[0.16]	[B]	[0.18]	[B]	[0.16]	[B]	[0.19]	[B]	[0.17]	[B]	[0.20]	[C]
	0.52		0.53		0.57		0.54		0.58		0.56		0.60	
	(0.67)	C (C)	(0.69)	C (C)	(0.75)	C (C)	(0.70)	C (C)	(0.76)	C (C)	(0.72)	C (C)	(0.78)	C (C)
WBTR	[0.48]	[C]	[0.50]	[C]	[0.57]	[C]	[0.51]	[C]	[0.58]	[C]	[0.51]	[C]	[0.59]	[C]
	0.20		0.21		0.25		0.24		0.27		0.25		0.28	
	(0.40)	B (B)	(0.46)	B (B)	(0.58)	B (C)	(0.48)	B (B)	(0.62)	B (C)	(0.52)	B (C)	(0.68)	B (C)
NBL	[0.27]	[B]	[0.31]	[B]	[0.37]	[B]	[0.31]	[B]	[0.38]	[B]	[0.34]	[B]	[0.41]	[B]
	0.61		0.57		0.61		0.59		0.63		0.61		0.64	
	(0.67)	B (B)	(0.62)	B (B)	(0.65)	B (B)	(0.64)	B (B)	(0.67)	B (B)	(0.66)	B (B)	(0.68)	B (B)
NBTR	[0.53]	[B]	[0.49]	[B]	[0.53]	[B]	[0.51]	[B]	[0.55]	[B]	[0.52]	[B]	[0.56]	[B]
	0.35		0.32		0.35		0.35		0.38		0.37		0.40	
	(0.41)	B (B)	(0.37)	B (B)	(0.40)	B (B)	(0.41)	B (B)	(0.45)	B (B)	(0.43)	B (B)	(0.46)	B (B)
SBL	[0.16]	[B]	[0.16]	[B]	[0.17]	[B]	[0.17]	[B]	[0.18]	[B]	[0.17]	[B]	[0.19]	[B]
	0.53		0.53		0.56		0.54		0.58		0.56		0.59	
	(0.66)	B (B)	(0.68)	B (B)	(0.74)	B (C)	(0.70)	B (B)	(0.76)	B (C)	(0.71)	B (B)	(0.77)	B (C)
SBTR	[0.50]	[B]	[0.51]	[B]	[0.58]	[B]	[0.53]	[B]	[0.59]	[B]	[0.54]	[B]	[0.60]	[B]
	0.63		**0.62**		**0.66**		**0.64**		**0.68**		**0.66**		**0.70**	
	(0.67)	**B (C)**	**(0.69)**	**B (C)**	**(0.75)**	**B (C)**	**(0.71)**	**B (C)**	**(0.77)**	**C (C)**	**(0.72)**	**B (C)**	**(0.78)**	**C (C)**
Overall	**[0.55]**	**[B]**	**[0.54]**	**[B]**	**[0.61]**	**[B]**	**[0.56]**	**[B]**	**[0.63]**	**[B]**	**[0.57]**	**[B]**	**[0.64]**	**[B]**

	Existing		Future Background 2021		Future Total 2021		Future Background 2026		Future Total 2026		Future Background 2031		Future Total 2031		Westwood Interchange - Future Background 2031		Westwood Interchange - Future Total 2031	
	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS	V/C	LOS
10								**Silvercreek Pkwy & Paisley Rd**										
	0.43		0.38		0.39		0.43		0.41		0.45		0.43		0.30		0.43	
	(0.78)	A (C)	(0.54)	A (A)	(0.68)	A (B)	(0.63)	A (B)	(0.71)	A (B)	(0.61)	A (A)	(0.73)	A (B)	(0.64)	A (C)	(0.72)	B (C)
EBL	[0.49]	[A]	[0.35]	[A]	[0.42]	[A]	[0.36]	[A]	[0.43]	[A]	[0.41]	[A]	[0.45]	[A]	[0.26]	[A]	[0.39]	[B]
	0.34		0.31		0.31		0.34		0.32		0.34		0.33		0.21		0.26	
	(0.40)	A (A)	(0.34)	A (A)	(0.34)	A (A)	(0.38)	A (A)	(0.35)	A (A)	(0.33)	A (A)	(0.36)	A (A)	(0.21)	A (B)	(0.22)	B (B)
EBT	[0.32]	[A]	[0.28]	[A]	[0.29]	[A]	[0.28]	[A]	[0.30]	[A]	[0.31]	[A]	[0.30]	[A]	[0.17]	[A]	[0.22]	[B]
					0.04				0.04		0.00		0.04		0.00		0.01	
		-- (--) [--]		-- (--) [--]	(0.08)	A (A)		-- (--) [--]	(0.08)	A (A)	(0.01)	-- (--) [--]	(0.08)	A (A)	(0.01)	A (A)	(0.02)	B (B)
EBR	-- (--) [--]		-- (--) [--]		[0.08]	[A]	-- (--) [--]		[0.08]	[A]	[0.00]		[0.08]	[A]	[0.01]	[A]	[0.02]	[B]
					0.07				0.07		0.00		0.07		0.00		0.08	
		-- (--) [--]		-- (--) [--]	(0.14)	B (B)		-- (--) [--]	(0.15)	B (B)	(0.01)	-- (--) [--]	(0.15)	B (B)	(0.01)	A (B)	(0.15)	B (B)
WBL	-- (--) [--]		-- (--) [--]		[0.15]	[B]	-- (--) [--]		[0.15]	[B]	[0.00]		[0.15]	[B]	[0.00]	[B]	[0.17]	[B]
	0.57		0.50		0.51		0.56		0.53		0.58		0.55		0.58		0.72	
	(0.97)	B (E)	(0.67)	B (B)	(0.70)	B (C)	(0.77)	B (C)	(0.72)	B (C)	(0.68)	B (B)	(0.74)	B (C)	(0.88)	B (D)	(0.93)	C (D)
WBTR	[0.61]	[C]	[0.50]	[B]	[0.54]	[B]	[0.50]	[B]	[0.55]	[B]	[0.57]	[B]	[0.56]	[B]	[0.55]	[B]	[0.72]	[C]
					0.47				0.47		0.00		0.47		0.20		0.13	
		-- (--) [--]		-- (--) [--]	(0.47)	D (D)		-- (--) [--]	(0.47)	D (D)	(0.08)	A (D)	(0.47)	D (D)	(0.09)	D (D)	(0.11)	C (C)
NBL	-- (--) [--]		-- (--) [--]		[0.53]	[D]	-- (--) [--]		[0.53]	[D]	[0.00]	[A]	[0.53]	[D]	[0.10]	[D]	[0.13]	[C]
	0.00		0.25		0.29		0.09		0.29		0.25		0.29		0.16		0.59	
	(0.03)	C (C)	(0.07)	D (D)	(0.25)	D (D)	(0.01)	D (D)	(0.25)	D (D)	(0.00)	D (A)	(0.25)	D (D)	(0.00)	D (A)	(0.56)	D (D)
NBTR	[0.02]	[C]	[0.31]	[D]	[0.34]	[D]	[0.31]	[D]	[0.34]	[D]	[0.31]	[D]	[0.34]	[D]	[0.16]	[D]	[0.68]	[D]
			0.67		0.73		0.52		0.73		0.52		0.73		0.90		0.77	
		-- (--) [--]	(0.78)	D (D)	(0.84)	D (D)	(0.57)	C (C)	(0.84)	D (D)	(0.78)	C (D)	(0.84)	D (D)	(0.72)	E (C)	(0.96)	C (E)
SBL	-- (--) [--]		[0.70]	[D]	[0.67]	[D]	[0.70]	[D]	[0.67]	[D]	[0.53]	[C]	[0.67]	[D]	[0.85]	[D]	[0.78]	[C]
	0.58		0.10		0.24		0.10		0.24		0.10		0.23		0.05		0.20	
	(0.67)	C (C)	(0.21)	C (C)	(0.44)	D (D)	(0.21)	C (C)	(0.44)	D (D)	(0.02)	C (C)	(0.44)	D (D)	(0.13)	C (C)	(0.52)	C (C)
SBT	[0.62]	[C]	[0.16]	[C]	[0.37]	[D]	[0.16]	[C]	[0.37]	[D]	[0.15]	[C]	[0.37]	[D]	[0.09]	[C]	[0.43]	[C]
	0.55		**0.55**		**0.56**		**0.56**		**0.57**		**0.57**		**0.59**		**0.67**		**0.74**	
	(0.85)	**B (C)**	**(0.71)**	**B (B)**	**(0.76)**	**B (C)**	**(0.72)**	**B (C)**	**(0.78)**	**B (C)**	**(0.76)**	**B (B)**	**(0.80)**	**B (C)**	**(0.86)**	**C (C)**	**(0.96)**	**C (D)**
Overall	**[0.60]**	**[B]**	**[0.55]**	**[B]**	**[0.58]**	**[C]**	**[0.55]**	**[B]**	**[0.58]**	**[C]**	**[0.56]**	**[B]**	**[0.60]**	**[C]**	**[0.63]**	**[C]**	**[0.74]**	**[C]**

Synchro Results for Unsignalized Intersections

	Existing		Future Background 2021		Future Total 2021		Future Background 2026		Future Total 2026		Future Background 2031		Future Total 2031	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
7	**Waterloo Ave & Silvercreek Pkwy (Current Configuration)**													
WBL	7.7 (7.8) [7.6]	A (A) [A]	7.7 (7.7) [7.5]	A (A) [A]	8.2 (8.3) [8.1]	A (A) [A]	7.7 (7.8) [7.6]	A (A) [A]	8.2 (8.3) [8.1]	A (A) [A]	7.8 (7.8) [7.6]	A (A) [A]	8.2 (8.3) [8.1]	A (A) [A]
NBL	9.7 (10.1) [9.2]	A (B) [A]	9.7 (9.9) [9.1]	A (A) [A]	11.2 (16.1) [12.8]	B (C) [B]	9.7 (10.0) [9.1]	A (A) [A]	11.2 (16.4) [12.9]	B (C) [B]	9.8 (10.0) [9.2]	A (B) [A]	11.3 (16.6) [13.0]	B (C) [B]
7	**Waterloo Ave & Silvercreek Pkwy (Alternate Configuration)**													
WBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	17.1 (23.2) [16.2]	C (C) [C]	-- (--) [--]	-- (--) [--]	17.4 (23.9) [16.5]	C (C) [C]	-- (--) [--]	-- (--) [--]	17.8 (25.0) [16.8]	C (C) [C]
WBR	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	9.4 (10.1) [9.6]	A (B) [A]	-- (--) [--]	-- (--) [--]	9.4 (10.2) [9.6]	A (B) [A]	-- (--) [--]	-- (--) [--]	9.4 (10.2) [9.6]	A (B) [A]
SBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	8.0 (8.4) [8.0]	A (A) [A]	-- (--) [--]	-- (--) [--]	8.1 (8.4) [8.1]	A (A) [A]	-- (--) [--]	-- (--) [--]	8.1 (8.5) [8.1]	A (A) [A]
11	**Silvercreek Pkwy & North Access**													
EBLTR	-- (--) [--]	-- (--) [--]	0.0 (0.0) [0.0]	A (A) [A]	10.5 (12.5) [13.5]	B (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	10.5 (12.5) [13.5]	B (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	10.5 (12.5) [13.5]	B (B) [B]
WBLTR	-- (--) [--]	-- (--) [--]	0.0 (0.0) [0.0]	A (A) [A]	10.1 (10.9) [11.8]	B (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	10.1 (10.9) [11.8]	B (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	10.1 (10.9) [11.8]	B (B) [B]
NBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	7.5 (7.7) [7.7]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.5 (7.7) [7.7]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.5 (7.7) [7.7]	A (A) [A]
SBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	7.4 (7.5) [7.5]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.4 (7.5) [7.5]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.4 (7.5) [7.5]	A (A) [A]
12	**Silvercreek Pkwy & South Access**													
EBLTR	-- (--) [--]	-- (--) [--]	0.0 (0.0) [0.0]	A (A) [A]	10.5 (12.7) [13.7]	B (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	10.5 (12.7) [13.7]	B (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	10.5 (12.7) [13.7]	B (B) [B]
WBLTR	-- (--) [--]	-- (--) [--]	0.0 (0.0) [0.0]	A (A) [A]	9.9 (11.7) [12.6]	A (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	9.9 (11.7) [12.6]	A (B) [B]	0.0 (0.0) [0.0]	A (A) [A]	9.9 (11.7) [12.6]	A (B) [B]
NBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	7.5 (7.7) [7.8]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.5 (7.7) [7.8]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.5 (7.7) [7.8]	A (A) [A]
SBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	7.3 (7.5) [7.5]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.3 (7.5) [7.5]	A (A) [A]	-- (--) [--]	-- (--) [--]	7.3 (7.5) [7.5]	A (A) [A]

Synchro Queue Results for Signalized Intersections

	Existing		Future Background 2021		Future Total 2021		Future Background 2026		Future Total 2026		Future Background 2031		Future Total 2031	
	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile
1	**Edinburgh Rd & Wellington St W**													
EBL	12.6 (12.3) [9.2]	19.7 (20.2) [17.0]	12.5 (12.2) [9.3]	19.5 (20.0) [17.0]	12.4 (12.1) [9.2]	19.2 (19.7) [16.8]	12.9 (12.7) [9.2]	19.5 (20.5) [16.8]	12.7 (12.6) [9.1]	19.3 (20.3) [16.6]	12.7 (12.6) [9.8]	19.2 (20.3) [17.5]	12.4 (12.4) [9.7]	19.1 (20.0) [17.3]
EBT	73.6 (52.4) [47.5]	84.5 (63.5) [59.8]	74.9 (52.8) [48.2]	85.8 (63.9) [60.6]	76.4 (53.9) [50.0]	87.3 (65.0) [62.3]	76.8 (54.5) [49.5]	86.9 (65.6) [61.8]	78.2 (55.5) [51.3]	88.3 (66.6) [63.6]	78.6 (55.5) [50.8]	88.6 (66.6) [63.3]	78.9 (56.7) [52.6]	90.1 (67.6) [65.1]
WBL	12.3 (27.5) [20.9]	19.3 (#47.7) [32.5]	12.5 (27.8) [20.8]	19.6 (#48.9) [32.3]	12.4 (27.5) [20.6]	19.4 (#48.8) [31.9]	12.4 (28.2) [21.3]	19.1 (#51.7) [32.9]	12.3 (27.9) [21.1]	18.9 (#51.3) [32.5]	12.7 (28.6) [21.9]	19.4 (#53.5) [33.5]	12.4 (28.3) [21.7]	19.2 (#53.2) [33.1]
WBT	43.3 (63.0) [44.0]	52.1 (75.2) [55.8]	44.0 (64.1) [44.5]	52.7 (76.3) [56.4]	44.7 (65.8) [46.3]	53.4 (78.0) [58.3]	44.5 (65.3) [45.7]	52.7 (77.5) [57.6]	45.3 (67.0) [47.5]	53.4 (79.2) [59.4]	45.7 (67.0) [47.1]	53.7 (79.2) [59.0]	45.7 (68.7) [48.8]	54.3 (80.8) [60.8]
NBL	20.1 (17.7) [9.0]	38.6 (35.0) [19.6]	20.7 (18.3) [9.3]	39.4 (36.0) [20.2]	20.9 (18.6) [9.4]	#40.6 (36.4) [20.5]	21.5 (19.0) [9.4]	#47.2 (37.2) [20.5]	21.7 (19.3) [9.6]	#42.8 (37.6) [20.8]	22.5 (19.8) [10.0]	#46.5 (38.6) [21.6]	23.1 (20.1) [10.2]	#50.0 (39.1) [21.9]
NBT	47.3 (46.9) [25.2]	73.1 (73.4) [42.1]	48.9 (48.2) [25.8]	74.5 (75.4) [42.7]	50.3 (50.1) [27.1]	75.9 (78.1) [44.8]	51.0 (50.1) [27.0]	76.6 (78.4) [44.6]	52.5 (52.0) [28.4]	78.3 (80.9) [46.7]	53.2 (52.5) [28.0]	78.8 (81.6) [46.1]	55.5 (54.5) [29.3]	#81.7 (84.5) [48.1]
SBL	3.8 (3.9) [2.9]	7.7 (m7.6) [7.8]	4.2 (3.8) [3.2]	8.1 (m7.6) [8.1]	4.2 (3.9) [3.1]	8.5 (m8.6) [7.1]	4.4 (4.1) [3.3]	8.5 (m8.5) [8.4]	4.2 (4.2) [3.1]	m8.4 (m9.3) [7.2]	4.3 (4.1) [3.4]	8.4 (m8.7) [8.3]	4.3 (4.2) [3.1]	m8.1 (m9.5) [7.4]
SBT	50.2 (51.5) [30.8]	69.9 (66.0) [49.4]	51.6 (52.3) [31.4]	71.0 (67.7) [50.3]	53.3 (50.8) [33.2]	67.0 (72.0) [52.7]	54.2 (56.0) [32.4]	73.2 (70.2) [51.7]	55.9 (54.4) [34.1]	67.3 (#77.2) [54.2]	56.1 (60.1) [34.0]	71.4 (#78.0) [53.9]	57.7 (57.2) [35.6]	66.1 (#89.6) [56.4]
2	**Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W**													
EBL	18.7 (16.5) [9.2]	29.7 (26.8) [16.5]	18.7 (17.4) [9.7]	29.7 (28.0) [17.3]	20.7 (25.1) [16.1]	32.4 (38.1) [26.1]	19.3 (18.0) [9.7]	30.7 (28.6) [17.3]	21.4 (25.7) [16.1]	33.3 (39.5) [26.1]	20.0 (18.0) [10.3]	31.5 (28.6) [18.1]	22.1 (25.7) [16.8]	34.3 (41.5) [27.2]
EBT	45.2 (36.1) [24.6]	54.4 (44.1) [31.2]	46.1 (36.8) [25.0]	55.3 (44.9) [31.6]	46.1 (35.4) [23.9]	55.3 (43.3) [30.4]	47.5 (38.0) [25.7]	56.8 (46.2) [32.5]	47.5 (36.5) [24.7]	56.8 (44.7) [31.3]	49.1 (38.9) [26.5]	58.7 (47.1) [33.3]	49.1 (37.4) [25.4]	58.7 (45.6) [32.2]
WBTR	56.0 (73.2) [48.5]	68.3 (87.3) [59.8]	56.9 (74.5) [49.5]	69.3 (88.7) [61.0]	57.7 (76.3) [50.7]	70.3 (90.6) [62.3]	58.4 (76.9) [50.8]	70.9 (91.3) [62.4]	59.1 (78.6) [51.9]	71.8 (93.1) [63.6]	60.2 (79.4) [52.4]	73.0 (94.0) [64.2]	61.0 (81.0) [53.6]	74.0 (95.8) [65.7]
NBL	29.8 (57.5) [34.4]	49.0 (86.0) [55.4]	30.6 (59.8) [35.5]	50.3 (89.0) [56.8]	32.5 (63.2) [38.9]	52.6 (93.4) [61.2]	31.0 (60.8) [36.3]	50.8 (90.4) [57.7]	33.1 (65.0) [39.6]	53.4 (96.0) [62.4]	32.0 (62.4) [36.7]	52.1 (92.5) [58.3]	33.3 (67.0) [40.4]	54.0 (98.6) [63.2]
NBLT	30.9 (58.1) [35.0]	50.4 (86.6) [56.0]	31.3 (59.8) [35.5]	50.9 (88.9) [56.5]	33.3 (64.9) [39.2]	53.6 (95.6) [61.7]	32.3 (62.0) [37.1]	52.2 (91.8) [58.9]	34.1 (66.0) [40.9]	54.7 (97.0) [64.0]	32.5 (64.5) [37.8]	52.7 (94.8) [60.0]	35.0 (68.3) [41.4]	56.0 (99.8) [64.5]
NBR	0.0 (0.0) [0.0]	11.3 (9.0) [9.4]	24.7 (0.0) [0.0]	49.5 (9.1) [9.6]	0.0 (0.0) [0.0]	11.4 (9.1) [16.1]	27.5 (0.0) [0.0]	52.9 (9.2) [16.1]	0.0 (0.0) [0.0]	11.5 (9.2) [16.1]	0.0 (0.0) [0.0]	11.5 (9.5) [9.6]	0.0 (0.0) [0.0]	11.5 (9.5) [9.6]
SBL	0.2 (0.9) [0.6]	1.7 (4.2) [3.0]	0.2 (0.9) [0.6]	1.7 (4.2) [3.0]	3.3 (7.7) [8.7]	9.5 (17.4) [18.8]	0.2 (0.9) [0.6]	1.7 (4.2) [3.0]	3.3 (7.7) [8.7]	9.5 (17.5) [18.9]	0.2 (0.9) [0.6]	1.7 (4.2) [3.0]	3.0 (7.8) [8.7]	8.7 (17.5) [18.9]
SBR	0.0 (0.0) [0.0]	17.2 (17.2) [14.1]	0.0 (0.0) [0.0]	17.5 (17.4) [14.1]	0.0 (0.0) [0.0]	19.0 (19.0) [17.0]	0.0 (0.0) [0.0]	17.5 (17.3) [14.5]	0.0 (0.0) [0.0]	19.2 (19.4) [17.0]	0.0 (0.0) [0.0]	17.9 (17.7) [14.6]	0.0 (0.0) [0.0]	19.2 (19.3) [17.4]
3	**Hanlon Expressway & Wellington St W**													
EBTR	58.8 (51.6) [14.6]	72.6 (64.6) [20.6]	60.2 (53.5) [15.1]	74.5 (66.6) [21.2]	62.7 (57.9) [17.6]	77.3 (71.6) [24.1]	62.8 (55.7) [15.7]	77.5 (69.3) [22.0]	65.3 (60.3) [18.2]	80.4 (74.4) [25.1]	65.1 (57.9) [16.5]	80.0 (71.6) [22.8]	67.7 (62.6) [19.0]	83.0 (77.0) [26.1]
WBT	35.4 (59.2) [21.4]	44.6 (71.7) [27.8]	36.2 (60.3) [21.9]	45.6 (72.9) [28.3]	37.8 (62.0) [23.1]	47.4 (74.8) [29.7]	37.5 (62.7) [22.6]	47.1 (75.6) [29.2]	39.2 (64.3) [23.7]	48.9 (77.5) [30.5]	38.6 (64.7) [23.2]	48.4 (77.8) [29.9]	40.2 (66.4) [24.3]	50.2 (79.8) [31.3]
SBL	11.5 (12.3) [10.5]	19.0 (19.9) [18.4]	12.1 (12.8) [10.9]	19.8 (20.6) [19.0]	12.1 (12.8) [10.9]	19.8 (20.6) [19.0]	13.2 (13.9) [12.1]	21.2 (22.2) [20.6]	13.2 (13.9) [12.1]	21.2 (22.2) [20.6]	14.0 (15.2) [12.8]	22.3 (23.7) [21.5]	14.0 (15.2) [12.8]	22.3 (23.7) [21.5]
SBR	0.0 (0.0) [0.0]	7.4 (6.9) [5.9]	0.0 (0.0) [0.0]	7.6 (6.9) [6.1]	0.0 (0.0) [0.0]	8.1 (7.6) [6.5]	0.0 (0.0) [0.0]	7.8 (7.4) [6.3]	0.0 (0.0) [0.0]	8.3 (7.9) [6.7]	0.0 (0.0) [0.0]	8.1 (7.6) [6.5]	0.0 (0.0) [0.0]	8.6 (8.1) [6.9]
4	**Wellington St W & Imperial Rd**													
EBLT	55.6 (48.8) [27.4]	86.8 (85.2) [48.0]	57.3 (52.1) [28.5]	89.0 (90.7) [49.1]	60.3 (57.6) [31.8]	93.6 (#101.6) [54.5]	60.1 (54.8) [29.8]	91.9 (96.1) [50.6]	63.1 (60.5) [33.3]	96.7 (#118.4) [56.2]	65.0 (58.5) [31.1]	97.5 (#113.8) [52.1]	68.8 (64.6) [34.6]	103.8 (#125.4) [57.8]
WBTR	36.6 (52.7) [28.1]	57.5 (89.5) [50.3]	38.3 (54.9) [29.2]	59.4 (92.9) [51.7]	41.5 (58.8) [34.2]	64.1 (99.0) [58.8]	40.1 (57.8) [31.1]	61.3 (97.7) [53.7]	43.5 (61.9) [36.0]	66.2 (103.8) [60.9]	42.3 (61.2) [33.0]	63.1 (102.5) [56.0]	45.8 (65.5) [38.0]	68.2 (109.3) [63.3]
SBL	62.5 (52.5) [55.6]	89.7 (73.0) [76.7]	63.4 (53.4) [56.4]	91.3 (74.2) [78.3]	63.4 (53.4) [56.4]	91.3 (74.2) [78.3]	64.9 (54.0) [57.8]	94.0 (75.0) [80.5]	64.9 (54.0) [57.8]	94.0 (75.0) [80.5]	67.0 (55.6) [59.1]	98.4 (76.7) [83.1]	67.0 (55.6) [59.1]	98.4 (76.7) [83.1]
SBR	0.0 (0.0) [0.0]	7.9 (7.6) [7.2]	0.0 (0.0) [0.0]	7.9 (7.6) [7.2]	0.0 (0.0) [0.0]	7.9 (7.6) [7.2]	0.0 (0.0) [0.0]	7.9 (7.6) [7.2]	0.0 (0.0) [0.0]	7.9 (7.6) [7.2]	0.0 (0.0) [0.0]	8.3 (7.5) [7.5]	0.0 (0.0) [0.0]	8.3 (7.5) [7.5]

Synchro Queue Results for Signalized Intersections

	Existing		Future Background 2021		Future Total 2021		Future Background 2026		Future Total 2026		Future Background 2031		Future Total 2031	
	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile	50th Percentile	95th Percentile
5	**Hanlon Expressway & Paisley Rd**													
EBL	28.7 (39.2) [40.6]	52.0 (#84.6) [#83.5]	24.0 (30.6) [33.4]	41.3 (49.0) [52.2]	24.4 (30.6) [33.4]	41.3 (49.0) [52.2]	24.0 (32.0) [34.8]	41.3 (50.4) [54.4]	24.4 (32.0) [34.8]	41.3 (50.4) [54.4]	25.3 (31.4) [34.8]	43.0 (49.8) [54.4]	25.7 (31.4) [34.8]	43.0 (49.8) [54.4]
EBT	50.6 (60.9) [47.8]	71.1 (83.3) [67.5]	53.9 (65.5) [52.4]	75.2 (85.2) [71.1]	58.5 (70.7) [58.4]	79.0 (#95.3) [76.8]	56.0 (67.5) [53.5]	78.0 (87.5) [72.3]	60.4 (72.7) [59.4]	81.3 (#99.0) [78.1]	57.1 (68.9) [55.7]	79.0 (#90.1) [74.6]	61.6 (74.0) [61.4]	82.3 (#101.7) [80.4]
WBL	40.7 (60.3) [47.1]	61.9 (86.1) [69.6]	44.7 (65.5) [51.3]	68.8 (93.3) [75.2]	53.0 (77.2) [63.9]	78.4 (#118.0) [91.3]	44.7 (67.1) [52.8]	68.8 (#99.2) [77.2]	53.0 (78.9) [65.5]	78.4 (#125.1) [93.4]	46.4 (69.7) [54.3]	71.0 (#98.0) [79.2]	54.5 (81.6) [67.1]	80.7 (#133.1) [95.2]
WBTR	26.7 (65.8) [44.2]	38.4 (83.1) [58.7]	33.7 (82.1) [56.5]	50.6 (#115.4) [77.6]	42.2 (93.0) [69.0]	61.2 (#137.7) [92.5]	34.6 (85.5) [58.8]	51.5 (#124.3) [80.3]	43.2 (96.7) [71.3]	62.4 (#146.6) [#100.3]	35.7 (86.5) [59.7]	53.2 (#125.4) [81.4]	44.4 (97.6) [72.3]	63.7 (#147.6) [#102.1]
NBL	11.0 (45.3) [29.1]	19.5 (#81.3) [42.0]	25.9 (74.1) [61.2]	40.1 (#107.6) [#87.2]	26.6 (74.1) [63.0]	40.1 (#107.6) [#87.2]	26.9 (76.3) [63.5]	41.0 (#112.0) [#91.3]	27.5 (76.3) [65.1]	41.0 (#112.0) [#91.3]	27.9 (77.6) [65.8]	42.3 (#114.2) [#95.4]	13.8 (77.6) [33.5]	21.1 (#114.2) [44.1]
NBT	134.5 (121.4) [113.1]	184.1 (156.1) [146.3]	149.6 (130.3) [116.3]	199.7 (155.6) [153.6]	161.5 (132.8) [128.0]	199.7 (155.6) [153.6]	170.5 (147.6) [132.1]	224.8 (174.1) [170.6]	183.7 (149.5) [143.3]	224.8 (174.1) [170.6]	196.7 (162.5) [150.4]	255.3 (191.1) [190.4]	211.9 (164.8) [161.8]	255.3 (191.1) [190.4]
SBL	7.4 (13.8) [11.2]	18.8 (29.3) [25.0]	8.4 (15.7) [11.9]	20.2 (30.5) [25.5]	13.6 (32.3) [28.0]	28.2 (#64.6) [#54.5]	8.4 (17.8) [13.6]	20.2 (33.5) [28.0]	13.7 (34.2) [30.2]	28.2 (#69.6) [#60.3]	8.4 (17.4) [13.7]	20.2 (33.1) [28.0]	13.7 (33.8) [30.3]	28.2 (#68.9) [#60.3]
SBT	99.4 (206.1) [109.5]	136.8 (257.4) [140.9]	114.0 (236.3) [120.5]	152.2 (271.9) [152.6]	121.7 (236.3) [126.8]	152.2 (271.9) [152.6]	127.5 (270.3) [135.6]	168.2 (#324.6) [169.2]	136.0 (270.3) [141.7]	168.2 (#324.6) [169.2]	144.3 (296.4) [153.1]	187.3 (#354.1) [187.7]	153.8 (296.4) [159.2]	187.3 (#354.1) [187.7]
SBR	0.0 (0.0) [0.0]	0.0 (13.0) [12.4]	0.0 (0.0) [0.0]	0.0 (12.7) [12.7]	0.0 (0.0) [0.0]	0.0 (12.7) [12.7]	0.0 (0.0) [0.0]	0.0 (12.7) [12.7]	0.0 (0.0) [0.0]	0.0 (12.7) [12.7]	0.0 (0.0) [0.0]	0.0 (12.8) [12.7]	0.0 (0.0) [0.0]	0.0 (12.8) [12.7]
6	**Waterloo Ave & Edinburgh Rd**													
EBL	8.1 (7.3) [7.2]	16.3 (16.1) [16.4]	9.0 (7.1) [7.8]	17.7 (15.8) [17.6]	13.9 (11.5) [14.3]	24.6 (23.0) [27.4]	9.0 (7.1) [7.8]	17.7 (15.7) [17.6]	13.9 (11.5) [14.3]	24.5 (23.0) [27.4]	8.9 (7.1) [7.8]	17.5 (15.6) [17.6]	13.8 (11.4) [14.2]	24.3 (23.0) [27.2]
EBTR	45.6 (27.6) [15.9]	65.1 (43.5) [31.1]	46.9 (27.5) [16.5]	66.3 (43.1) [31.7]	50.7 (31.2) [21.1]	70.0 (47.1) [37.7]	47.7 (28.5) [16.5]	67.3 (44.2) [31.7]	51.6 (32.1) [21.1]	71.3 (48.3) [37.7]	48.6 (29.4) [17.5]	68.2 (45.0) [33.2]	52.4 (32.8) [22.2]	72.2 (48.9) [39.5]
WBL	13.5 (15.0) [10.2]	26.3 (27.2) [21.4]	13.3 (14.7) [9.8]	25.8 (26.4) [20.7]	13.1 (14.5) [9.7]	25.6 (26.2) [20.3]	13.3 (14.6) [9.8]	25.8 (26.4) [20.7]	13.1 (14.5) [9.7]	25.4 (26.2) [20.3]	13.2 (14.6) [9.8]	25.7 (26.3) [20.7]	13.0 (14.4) [9.6]	25.4 (26.1) [20.3]
WBTR	21.1 (44.6) [14.5]	34.4 (64.3) [30.3]	21.4 (46.1) [15.4]	34.6 (65.9) [31.4]	24.1 (49.6) [20.0]	37.3 (69.3) [36.6]	22.5 (46.9) [15.4]	35.9 (66.5) [31.4]	24.9 (50.4) [20.0]	38.2 (70.0) [36.6]	22.4 (47.9) [15.3]	35.7 (67.5) [31.2]	24.7 (51.3) [19.8]	37.9 (71.2) [36.4]
NBL	1.1 (1.4) [1.0]	m7.1 (m4.8) [2.9]	1.4 (1.5) [1.0]	m7.3 (m5.6) [2.9]	1.9 (1.9) [1.4]	m8.6 (m7.5) [4.1]	1.6 (1.5) [1.2]	m6.9 (m6.0) [3.2]	2.2 (1.9) [1.6]	m8.5 (m8.1) [4.7]	1.8 (1.5) [1.2]	m6.8 (m6.4) [3.1]	2.6 (1.9) [1.6]	m8.1 (m8.5) [5.6]
NBTR	78.5 (47.9) [24.5]	149.3 (105.0) [70.8]	82.2 (49.7) [25.1]	151.0 (108.9) [73.3]	85.1 (50.3) [25.8]	152.2 (111.8) [78.8]	89.5 (52.9) [26.9]	155.5 (116.2) [80.3]	92.2 (53.4) [27.2]	156.6 (119.4) [84.9]	95.2 (55.8) [27.9]	159.1 (122.0) [84.5]	100.9 (56.9) [28.5]	160.3 (125.2) [89.3]
SBL	2.8 (2.9) [1.2]	9.4 (9.6) [4.2]	2.7 (3.2) [1.2]	9.2 (10.6) [4.1]	2.9 (3.4) [1.3]	9.8 (11.1) [4.6]	3.2 (3.3) [1.2]	10.6 (10.8) [4.1]	3.4 (3.5) [1.3]	11.3 (11.4) [4.6]	3.2 (3.4) [1.4]	10.8 (11.1) [4.7]	3.4 (3.5) [1.5]	11.6 (11.7) [5.2]
SBTR	42.6 (53.8) [23.9]	83.1 (103.2) [45.9]	44.1 (56.3) [24.7]	86.4 (108.5) [47.7]	48.7 (65.0) [29.7]	95.1 (124.6) [58.7]	46.2 (59.1) [25.9]	89.7 (113.4) [49.3]	50.7 (67.7) [30.9]	98.7 (130.0) [60.8]	48.8 (62.5) [27.0]	94.7 (120.4) [51.6]	53.6 (72.0) [32.5]	104.2 (138.5) [62.9]
8	**Edinburgh Rd & Paisley Rd**													
EBL	9.6 (10.2) [10.2]	21.6 (22.9) [22.8]	10.1 (10.5) [10.6]	23.3 (25.4) [23.6]	12.4 (13.3) [13.8]	28.1 (#34.5) [30.1]	10.1 (10.5) [10.6]	23.3 (25.5) [23.7]	12.5 (13.4) [13.9]	m28.1 (#35.6) [30.3]	10.9 (10.6) [11.3]	24.9 (25.9) [25.0]	13.3 (13.5) [14.6]	m29.5 (#36.9) [32.1]
EBTR	52.4 (56.3) [45.3]	85.5 (92.6) [70.7]	57.1 (59.1) [47.6]	91.7 (95.2) [78.2]	63.3 (66.2) [55.2]	#105.1 (#110.8) [89.1]	60.0 (61.3) [49.4]	#98.6 (#100.4) [81.0]	66.5 (68.6) [57.4]	#111.1 (#115.1) [92.3]	61.3 (63.3) [51.2]	#100.7 (#104.4) [83.7]	67.5 (70.6) [59.3]	#112.9 (#118.5) [95.2]
WBL	5.3 (6.4) [3.6]	14.1 (16.6) [10.3]	5.2 (6.4) [3.9]	13.9 (16.8) [10.9]	5.3 (6.6) [4.0]	14.4 (17.7) [11.2]	5.8 (6.5) [3.9]	15.3 (17.0) [11.0]	5.9 (6.6) [4.0]	16.0 (18.0) [11.3]	5.8 (7.3) [4.0]	15.4 (18.8) [11.1]	5.9 (7.5) [4.0]	16.1 (20.3) [11.4]
WBTR	35.1 (51.6) [32.9]	59.6 (82.6) [55.7]	36.0 (53.5) [34.3]	61.0 (85.5) [57.9]	39.4 (60.0) [41.0]	66.0 (#104.0) [67.4]	36.8 (54.4) [35.3]	62.1 (86.9) [59.1]	40.3 (61.0) [41.8]	67.1 (#106.3) [68.7]	38.2 (56.2) [36.0]	64.2 (89.4) [60.2]	41.7 (62.7) [42.6]	69.3 (#109.8) [69.8]
NBL	5.5 (8.8) [8.2]	13.7 (22.5) [18.8]	5.9 (10.1) [9.2]	14.1 (25.6) [20.5]	6.5 (11.5) [10.0]	15.4 (#36.7) [22.8]	6.4 (10.3) [9.3]	15.2 (26.8) [20.7]	6.9 (11.8) [10.1]	16.5 (#38.7) [23.2]	6.5 (11.0) [9.8]	15.4 (29.3) [21.9]	7.0 (13.0) [10.8]	16.7 (#42.4) [24.9]
NBTR	54.9 (64.3) [46.9]	88.0 (102.1) [74.6]	51.1 (58.6) [42.9]	80.6 (91.4) [67.7]	55.9 (62.8) [47.8]	87.9 (98.0) [74.9]	53.3 (61.8) [44.8]	84.0 (96.5) [70.5]	58.2 (66.0) [49.8]	91.5 (102.8) [78.0]	55.5 (63.5) [46.2]	87.5 (99.1) [72.7]	60.6 (67.4) [51.1]	95.0 (105.6) [79.9]
SBL	8.2 (9.0) [4.2]	19.8 (22.5) [10.8]	8.1 (8.7) [4.4]	19.2 (20.9) [11.1]	8.2 (8.8) [4.5]	20.0 (21.8) [11.3]	8.7 (9.4) [4.5]	20.6 (23.1) [11.2]	8.8 (9.6) [4.5]	21.7 (24.3) [11.5]	8.7 (9.5) [4.5]	21.1 (23.6) [11.3]	8.9 (9.7) [4.5]	22.2 (24.9) [11.5]
SBTR	44.2 (63.8) [42.4]	70.6 (100.2) [67.5]	44.9 (66.2) [44.1]	71.5 (103.9) [69.9]	48.6 (75.9) [51.6]	77.4 (119.5) [81.7]	46.5 (69.0) [45.4]	73.9 (108.4) [72.1]	50.0 (79.0) [53.1]	79.5 (124.5) [83.6]	48.7 (70.7) [47.0]	77.3 (110.9) [74.2]	52.1 (81.0) [54.4]	82.8 (127.8) [86.0]

Synchro Queue Results for Signalized Intersections

	Existing		Future Background 2021		Future Total 2021		Future Background 2026		Future Total 2026		Future Background 2031		Future Total 2031		Westwood Interchange Future Background 2031		Westwood Interchange Future Total 2031	
	50th %ile	95th %ile	50th %ile	95th %ile	50th %ile	95th %ile	50th %ile	95th %ile	50th %ile	95th %ile	50th %ile	95th %ile	50th %ile	95th %ile	50th %ile	95th %ile	50th %ile	95th %ile
10									**Silvercreek Pkwy & Paisley Rd**									
EBL	9.2 (28.6) [10.6]	19.0 (#68.8) [21.2]	4.7 (7.0) [4.9]	20.5 (27.8) [20.2]	11.7 (18.3) [12.5]	24.7 (34.6) [25.1]	9.7 (14.2) [5.0]	21.8 (32.4) [20.6]	12.1 (18.8) [12.9]	25.4 (#41.0) [25.8]	9.3 (7.3) [9.5]	21.5 (24.9) [21.1]	12.4 (19.1) [13.2]	26.0 (#41.2) [26.5]	6.0 (10.8) [5.4]	18.8 (#33.0) [16.9]	12.4 (14.1) [11.4]	22.5 (#39.5) [20.9]
EBT	21.2 (29.5) [21.4]	38.4 (51.5) [37.9]	12.0 (14.3) [11.3]	40.7 (45.9) [36.4]	25.1 (30.5) [23.4]	47.9 (54.4) [43.1]	21.6 (25.5) [11.7]	43.2 (53.0) [37.7]	26.0 (31.5) [24.3]	49.5 (55.9) [44.6]	21.2 (14.8) [19.3]	43.5 (41.6) [38.4]	27.1 (32.6) [24.8]	51.3 (57.7) [45.5]	12.3 (15.5) [10.5]	33.1 (33.6) [28.2]	23.6 (19.8) [20.5]	39.1 (33.6) [34.4]
EBR	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	0.0 (0.0) [0.0]	3.8 (6.5) [6.7]	-- (--) [--]	-- (--) [--]	0.0 (0.0) [0.0]	3.8 (6.5) [6.7]	-- (--) [--]	-- (--) [--]	0.0 (0.0) [0.0]	3.7 (6.5) [6.7]	0.0 (0.0) [0.0]	0.0 (0.0) [0.0]	0.0 (0.0) [0.0]	0.0 (0.0) [0.0]
WBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	3.2 (6.9) [6.8]	10.0 (16.5) [17.5]	-- (--) [--]	-- (--) [--]	3.2 (7.0) [6.8]	10.0 (16.6) [17.3]	0.0 (0.3) [0.0]	0.0 (2.2) [0.0]	3.2 (7.3) [6.9]	10.0 (16.6) [17.4]	0.0 (0.5) [0.2]	0.0 (2.8) [2.0]	4.4 (8.1) [9.2]	11.2 (17.7) [19.5]
WBTR	54.6 (~126.3) [68.5]	79.8 (#142.1) [80.1]	29.5 (48.5) [31.2]	84.3 (126.8) [85.6]	49.3 (84.7) [52.8]	93.8 (#146.6) [97.2]	45.0 (73.5) [31.9]	90.9 (#158.1) [86.9]	52.0 (89.7) [53.6]	98.2 (#161.7) [97.7]	45.4 (57.5) [46.2]	92.1 (124.8) [91.7]	54.7 (95.7) [56.4]	102.6 (#166.3) [102.0]	40.0 (82.5) [40.8]	104.3 (#175.7) [100.5]	65.7 (100.0) [67.7]	#109.2 (#175.7) [#109.2]
NBL	-- (--) [--]	-- (--) [--]	-- (--) [--]	-- (--) [--]	15.2 (14.2) [18.5]	26.6 (25.5) [31.4]	-- (--) [--]	-- (--) [--]	15.2 (14.2) [18.5]	26.6 (25.5) [31.4]	0.0 (0.3) [0.0]	0.0 (2.3) [0.0]	15.2 (14.2) [18.5]	26.6 (25.5) [31.4]	2.0 (0.3) [0.9]	4.6 (2.6) [m2.3]	3.5 (2.4) [3.4]	8.6 (7.1) [8.4]
NBTR	0.1 (0.4) [0.8]	1.2 (2.0) [3.0]	2.0 (0.3) [1.2]	9.1 (2.4) [6.6]	5.6 (5.7) [7.5]	18.6 (18.9) [22.6]	1.9 (0.3) [1.2]	7.7 (2.0) [6.6]	5.6 (5.7) [7.5]	18.6 (18.9) [22.6]	2.3 (0.0) [1.4]	9.1 (0.0) [6.6]	5.7 (5.7) [7.5]	19.0 (18.9) [22.6]	0.3 (0.0) [0.5]	3.9 (0.0) [m3.1]	26.1 (24.0) [34.6]	46.8 (44.7) [#37.8]
SBL	-- (--) [--]	-- (--) [--]	26.2 (~38.1) [29.7]	45.4 (56.7) [50.5]	28.8 (36.8) [32.2]	44.7 (#56.6) [49.6]	26.2 (34.1) [29.7]	45.2 (56.3) [50.5]	28.8 (36.8) [32.2]	44.7 (#56.6) [49.6]	26.2 (~38.1) [29.7]	45.4 (57.6) [50.5]	28.8 (36.8) [32.2]	44.7 (#56.6) [49.6]	~69.9 (67.5) [~68.7]	81.6 (102.1) [83.7]	47.1 (67.5) [46.8]	72.5 (#130.7) [72.3]
SBT	15.3 (20.0) [17.6]	22.7 (23.6) [22.3]	0.1 (0.4) [0.7]	14.6 (21.2) [18.6]	4.0 (7.4) [7.5]	21.7 (36.1) [31.2]	0.2 (0.5) [0.7]	16.5 (24.5) [18.6]	4.0 (7.4) [7.5]	21.7 (36.1) [31.2]	0.1 (0.4) [0.5]	14.6 (3.1) [18.4]	3.8 (7.4) [7.5]	21.5 (36.1) [31.2]	0.2 (0.4) [0.8]	11.2 (16.8) [15.4]	11.4 (33.3) [31.3]	26.6 (69.0) [55.5]

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	795	0	110	520	0	175	565	0	60	525	0
Future Volume (vph)	110	795	0	110	520	0	175	565	0	60	525	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			0.99		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3471	0	1703	3438	0	1752	3539	0	1703	3505	0
Flt Permitted	0.338			0.153			0.272			0.354		
Satd. Flow (perm)	634	3471	0	274	3438	0	500	3539	0	627	3505	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		5	5		3	8		24	24		8
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
Heavy Vehicles (%)	1%	4%	5%	6%	5%	0%	3%	2%	4%	6%	3%	0%
Adj. Flow (vph)	124	893	0	124	584	0	197	635	0	67	590	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	893	0	124	584	0	197	635	0	67	590	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

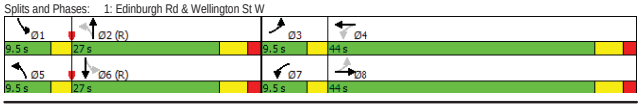
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	39.1	29.6		39.1	29.6		41.3	30.3		35.8	25.5	
Actuated g/C Ratio	0.43	0.33		0.43	0.33		0.46	0.34		0.40	0.28	
v/c Ratio	0.35	0.78		0.56	0.52		0.53	0.53		0.20	0.59	
Control Delay	15.4	32.2		22.7	25.5		22.5	28.4		12.2	27.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.4	32.2		22.7	25.5		22.5	28.4		12.2	27.4	
LOS	B	C		C	C		C	C		B	C	
Approach Delay		30.1			25.0			27.0			25.8	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 80 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 27.3		Intersection LOS: C	
Intersection Capacity Utilization 68.9%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	124	893	124	584	197	635	67	590
v/c Ratio	0.35	0.78	0.56	0.52	0.53	0.53	0.20	0.59
Control Delay	15.4	32.2	22.7	25.5	22.5	28.4	12.2	27.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.4	32.2	22.7	25.5	22.5	28.4	12.2	27.4
Queue Length 50th (m)	12.4	76.4	12.4	44.7	20.9	50.3	4.2	53.3
Queue Length 95th (m)	19.2	87.3	19.4	53.4	#40.6	75.9	8.5	67.0
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	358	1465	222	1451	373	1191	340	992
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	0.35	0.61	0.56	0.40	0.53	0.53	0.20	0.59

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

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	795	0	110	520	0	175	565	0	60	525	0
Future Volume (vph)	110	795	0	110	520	0	175	565	0	60	525	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1786	3471		1703	3438		1751	3539		1695	3505	
Flt Permitted	0.34	1.00		0.15	1.00		0.27	1.00		0.35	1.00	
Satd. Flow (perm)	635	3471		275	3438		501	3539		631	3505	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	124	893	0	124	584	0	197	635	0	67	590	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	124	893	0	124	584	0	197	635	0	67	590	0
Confl. Peds. (#/hr)	3		5	5		3	8		24	24		8
Heavy Vehicles (%)	1%	4%	5%	6%	5%	0%	3%	2%	4%	6%	3%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	36.1	29.6		36.1	29.6		38.9	29.7		31.7	25.5	
Effective Green, g (s)	36.1	29.6		36.1	29.6		38.9	29.7		31.7	25.5	
Actuated g/C Ratio	0.40	0.33		0.40	0.33		0.43	0.33		0.35	0.28	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	337	1141		213	1130		360	1167		295	993	
v/s Ratio Prot	0.03	c0.26		c0.04	0.17		c0.06	0.18		0.02	0.17	
v/s Ratio Perm	0.12			0.19			c0.17			0.06		
v/c Ratio	0.37	0.78		0.58	0.52		0.55	0.54		0.23	0.59	
Uniform Delay, d1	17.6	27.3		19.1	24.4		17.2	24.6		19.7	27.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.70	0.85	
Incremental Delay, d2	0.7	3.6		4.0	0.4		1.7	1.8		0.4	2.4	
Delay (s)	18.3	30.9		23.1	24.8		18.9	26.4		14.1	26.0	
Level of Service	B	C		C	C		B	C		B	C	
Approach Delay (s)		29.3			24.5			24.6			24.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	860	0	0	740	15	185	100	225	16	0	310
Future Volume (vph)	170	860	0	0	740	15	185	100	225	16	0	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.997				0.850			0.850
Flt Protected	0.950						0.950	0.985		0.950		
Satd. Flow (prot)	1736	4988	0	0	4974	0	1633	1739	1599	1805	0	1583
Flt Permitted	0.256						0.950	0.985		0.627		
Satd. Flow (perm)	467	4988	0	0	4974	0	1633	1739	1599	1191	0	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					3				247			341
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
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 (%)	4%	4%	0%	0%	4%	0%	5%	1%	1%	0%	0%	2%
Adj. Flow (vph)	187	945	0	0	813	16	203	110	247	18	0	341
Shared Lane Traffic (%)							24%					
Lane Group Flow (vph)	187	945	0	0	829	0	154	159	247	18	0	341
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	34.1	25.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	80.1	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	62.8%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	5.0	4.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	2.1	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	20.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

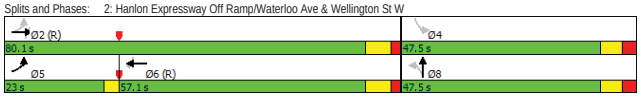
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.57	0.31		0.39
v/c Ratio	0.39	0.33			0.43		0.30	0.29	0.24	0.05		0.41
Control Delay	13.7	14.8			29.0		35.2	34.9	2.1	31.2		4.2
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	13.7	14.8			29.0		35.2	34.9	2.1	31.2		4.2
LOS	B	B			C		D	C	A	C		A
Approach Delay		14.6			29.0			20.5			5.5	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type: Other
Cycle Length: 127.6
Actuated Cycle Length: 127.6
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.43
Intersection Signal Delay: 18.8 — Intersection LOS: B
Intersection Capacity Utilization 67.5% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	187	945	829	154	159	247	18	341
v/c Ratio	0.39	0.33	0.43	0.30	0.29	0.24	0.05	0.41
Control Delay	13.7	14.8	29.0	35.2	34.9	2.1	31.2	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	14.8	29.0	35.2	34.9	2.1	31.2	4.2
Queue Length 50th (m)	20.7	46.1	57.7	32.5	33.3	0.0	3.3	0.0
Queue Length 95th (m)	32.4	55.3	70.3	52.6	53.6	11.4	9.5	19.0
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	481	2853	1950	511	545	1020	373	827
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	0.39	0.33	0.43	0.30	0.29	0.24	0.05	0.41

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	860	0	0	740	15	185	100	225	16	0	310
Future Volume (vph)	170	860	0	0	740	15	185	100	225	16	0	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			1.00		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00	0.95		1.00
Satd. Flow (prot)	1735	4988			4975		1633	1739	1599	1805		1583
Flt Permitted	0.26	1.00			1.00		0.95	0.98	1.00	0.63		1.00
Satd. Flow (perm)	467	4988			4975		1633	1739	1599	1192		1583
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)	187	945	0	0	813	16	203	110	247	18	0	341
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	106	0	0	207
Lane Group Flow (vph)	187	945	0	0	827	0	154	159	141	18	0	134
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	4%	4%	0%	0%	4%	0%	5%	1%	1%	0%	0%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.57	0.31		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Grp Cap (vph)	465	2853			1949		511	545	914	373		620
v/s Ratio Prot	c0.06	0.19			c0.17							
v/s Ratio Perm	0.17						c0.09	0.09	0.09	0.02		0.08
v/c Ratio	0.40	0.33			0.42		0.30	0.29	0.15	0.05		0.22
Uniform Delay, d1	13.9	14.4			28.3		33.2	33.1	12.8	30.5		25.8
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.6	0.3			0.7		1.5	1.4	0.4	0.2		0.8
Delay (s)	16.4	14.7			29.0		34.7	34.5	13.2	30.8		26.6
Level of Service	B	B			C		C	C	B	C		C
Approach Delay (s)		15.0			29.0			25.1			26.8	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	935	445	0	850	0	0	0	0	165	0	100
Future Volume (vph)	0	935	445	0	850	0	0	0	0	165	0	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.952										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4703	0	0	4988	0	0	0	0	3242	0	1455
Flt Permitted										0.950		
Satd. Flow (perm)	0	4703	0	0	4988	0	0	0	0	3242	0	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		177										105
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	1					1						
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%	5%	5%	0%	4%	0%	0%	0%	0%	8%	0%	11%
Adj. Flow (vph)	0	984	468	0	895	0	0	0	0	174	0	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1452	0	0	895	0	0	0	0	174	0	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			29.9					24.7		29.9
Total Split (s)		56.9			56.9					41.7		56.9
Total Split (%)		57.7%			57.7%					42.3%		57.7%
Maximum Green (s)		50.0			50.0					35.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		0.0			7.0					0.0		7.0
Flash Dont Walk (s)		0.0			16.0					0.0		16.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
v/c Ratio		0.59			0.35					0.15		0.13

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

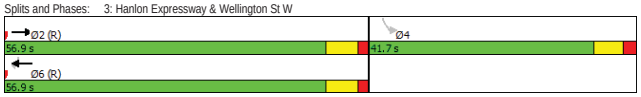
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		15.9			15.1					22.2		3.0
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		15.9			15.1					22.2		3.0
LOS		B			B					C		A
Approach Delay		15.9			15.1						15.0	
Approach LOS		B			B						B	

Intersection Summary

Area Type: Other
Cycle Length: 98.6
Actuated Cycle Length: 98.6
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 15.5 — Intersection LOS: B
Intersection Capacity Utilization 41.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1452	895	174	105
v/c Ratio	0.59	0.35	0.15	0.13
Control Delay	15.9	15.1	22.2	3.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.9	15.1	22.2	3.0
Queue Length 50th (m)	62.7	37.8	12.1	0.0
Queue Length 95th (m)	77.3	47.4	19.8	8.1
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	2472	2529	1150	789
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.35	0.15	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	935	445	0	850	0	0	0	0	165	0	100
Future Volume (vph)	0	935	445	0	850	0	0	0	0	165	0	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.95			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4701			4988					3242		1455
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4701			4988					3242		1455
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)	0	984	468	0	895	0	0	0	0	174	0	105
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	0	0	0	52
Lane Group Flow (vph)	0	1365	0	0	895	0	0	0	0	174	0	53
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	5%	5%	0%	4%	0%	0%	0%	0%	8%	0%	11%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					35.0		50.0
Effective Green, g (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2383			2529					1150		737
v/s Ratio Prot		c0.29			0.18							
v/s Ratio Perm										c0.05		0.04
v/c Ratio		0.57			0.35					0.15		0.07
Uniform Delay, d1		16.9			14.6					21.7		12.4
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		1.0			0.4					0.3		0.2
Delay (s)		17.9			15.0					22.0		12.6
Level of Service		B			B					C		B
Approach Delay (s)		17.9			15.0			0.0			18.4	
Approach LOS		B			B			A			B	

Intersection Summary

HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	945	695	165	420	70
Future Volume (vph)	60	945	695	165	420	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	1.00			
Frt			0.971			0.850
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3397	3319	0	1770	1599
Flt Permitted		0.829			0.950	
Satd. Flow (perm)	0	2825	3319	0	1770	1599
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			50			73
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	6%	5%	6%	2%	1%
Adj. Flow (vph)	63	984	724	172	438	73
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1047	896	0	438	73
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

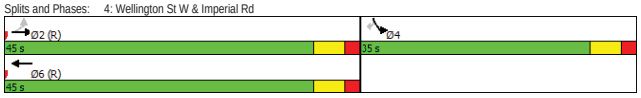
Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	-1.0
Total Lost Time (s)		6.0	6.0		6.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		43.8	43.8		24.2	25.2
Actuated g/C Ratio		0.55	0.55		0.30	0.32
v/c Ratio		0.68	0.49		0.82	0.13
Control Delay		16.8	12.4		38.7	5.1
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		16.8	12.4		38.7	5.1
LOS		B	B		D	A
Approach Delay		16.8	12.4		33.9	
Approach LOS		B	B		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 18.7		Intersection LOS: B	
Intersection Capacity Utilization 90.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1047	896	438	73
v/c Ratio	0.68	0.49	0.82	0.13
Control Delay	16.8	12.4	38.7	5.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.8	12.4	38.7	5.1
Queue Length 50th (m)	60.3	41.5	63.4	0.0
Queue Length 95th (m)	93.6	64.1	91.3	7.9
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1548	1841	641	645
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.68	0.49	0.68	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	945	695	165	420	70
Future Volume (vph)	60	945	695	165	420	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	5.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.97		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3397	3319		1770	1599
Flt Permitted		0.83	1.00		0.95	1.00
Satd. Flow (perm)		2826	3319		1770	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	984	724	172	438	73
RTOR Reduction (vph)	0	0	23	0	0	50
Lane Group Flow (vph)	0	1047	873	0	438	23
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	5%	6%	5%	6%	2%	1%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		43.8	43.8		24.2	24.2
Effective Green, g (s)		43.8	43.8		24.2	25.2
Actuated g/C Ratio		0.55	0.55		0.30	0.31
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1547	1817		535	503
v/s Ratio Prot			0.26		c0.25	
v/s Ratio Perm		c0.37				0.01
v/c Ratio		0.68	0.48		0.82	0.05
Uniform Delay, d1		13.0	11.1		25.9	19.0
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		2.4	0.9		9.5	0.0
Delay (s)		15.4	12.0		35.3	19.1
Level of Service		B	B		D	B
Approach Delay (s)		15.4	12.0		33.0	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	330	0	195	210	70	160	1245	0	40	935	45
Future Volume (vph)	95	330	0	195	210	70	160	1245	0	40	935	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Frt					0.963							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	3438	0	1787	3392	0	3303	3343	0	1597	3282	1482
Flt Permitted	0.577			0.303			0.950			0.950		
Satd. Flow (perm)	1025	3438	0	570	3392	0	3303	3343	0	1597	3282	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					23							102
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	7%	5%	2%	1%	2%	4%	6%	8%	3%	13%	10%	9%
Adj. Flow (vph)	97	337	0	199	214	71	163	1270	0	41	954	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	337	0	199	285	0	163	1270	0	41	954	46
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	

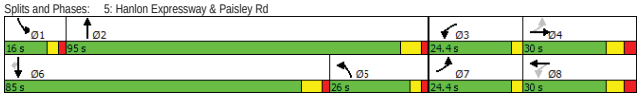
Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8								6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	1.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	30.0		9.5	30.0		10.0	59.4		10.0	59.4	59.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	36.7	19.4		45.6	25.3		17.4	89.0		8.9	78.0	78.0
Actuated g/C Ratio	0.23	0.12		0.29	0.16		0.11	0.57		0.06	0.50	0.50
v/c Ratio	0.33	0.79		0.65	0.50		0.44	0.67		0.45	0.58	0.06
Control Delay	45.5	81.5		54.9	58.9		69.5	27.5		89.7	30.9	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.5	81.5		54.9	58.9		69.5	27.5		89.7	30.9	0.1
LOS	D	F		D	E		E	C		F	C	A
Approach Delay		73.4			57.3			32.3			31.9	
Approach LOS		E			E			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 156.5			
Natural Cycle: 110			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 41.0		Intersection LOS: D	
Intersection Capacity Utilization 78.8%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	97	337	199	285	163	1270	41	954	46
v/c Ratio	0.33	0.79	0.65	0.50	0.44	0.67	0.45	0.58	0.06
Control Delay	45.5	81.5	54.9	58.9	69.5	27.5	89.7	30.9	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.5	81.5	54.9	58.9	69.5	27.5	89.7	30.9	0.1
Queue Length 50th (m)	24.4	58.5	53.0	42.2	26.6	161.5	13.6	121.7	0.0
Queue Length 95th (m)	41.3	79.0	78.4	61.2	40.1	199.7	28.2	152.2	0.0
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	380	485	333	581	445	1900	113	1635	789
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.69	0.60	0.49	0.37	0.67	0.36	0.58	0.06

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	330	0	195	210	70	160	1245	0	40	935	45
Future Volume (vph)	95	330	0	195	210	70	160	1245	0	40	935	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00		1.00	0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1687	3438		1787	3390		3303	3343		1597	3282	1482
Flt Permitted	0.58	1.00		0.30	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1025	3438		569	3390		3303	3343		1597	3282	1482
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)	97	337	0	199	214	71	163	1270	0	41	954	46
RTOR Reduction (vph)	0	0	0	0	19	0	0	0	0	0	0	23
Lane Group Flow (vph)	97	337	0	199	266	0	163	1270	0	41	954	23
Heavy Vehicles (%)	7%	5%	2%	1%	2%	4%	6%	8%	3%	13%	10%	9%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	31.8	19.5		40.6	25.3		18.6	89.0		7.6	78.0	78.0
Effective Green, g (s)	31.8	19.5		40.6	25.3		18.6	89.0		7.6	78.0	78.0
Actuated g/C Ratio	0.20	0.12		0.26	0.16		0.12	0.56		0.05	0.49	0.49
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	258	425		286	544		389	1887		77	1624	733
v/s Ratio Prot	0.03	c0.10		c0.08	0.08		0.05	c0.38		0.03	c0.29	
v/s Ratio Perm	0.05			0.10								0.02
v/c Ratio	0.38	0.79		0.70	0.49		0.42	0.67		0.53	0.59	0.03
Uniform Delay, d1	53.3	67.1		49.3	60.3		64.5	24.1		73.3	28.3	20.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.9	9.8		7.2	0.7		0.7	1.9		6.9	1.6	0.1
Delay (s)	54.2	76.9		56.4	60.9		65.2	26.0		80.2	29.9	20.5
Level of Service	D	E		E	E		E	C		F	C	C
Approach Delay (s)		71.8			59.1			30.5			31.5	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	40.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	157.6	Sum of lost time (s)	23.4
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	240	55	75	135	25	25	550	90	40	465	50
Future Volume (vph)	85	240	55	75	135	25	25	550	90	40	465	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.972			0.977			0.979			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1771	0	1752	1789	0	1805	1820	0	1770	1834	0
Flt Permitted	0.608			0.336			0.381			0.292		
Satd. Flow (perm)	1123	1771	0	614	1789	0	720	1820	0	542	1834	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			16			10			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	8		12	12		8	11		10	10		11
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
Heavy Vehicles (%)	2%	3%	7%	3%	4%	0%	0%	2%	0%	2%	2%	0%
Adj. Flow (vph)	92	261	60	82	147	27	27	598	98	43	505	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	321	0	82	174	0	27	696	0	43	559	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

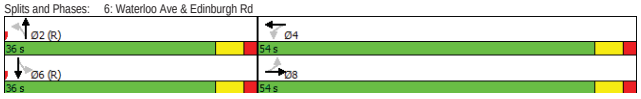
Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	21.7	21.7		21.7	21.7		56.3	56.3		56.3	56.3	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.63	0.63		0.63	0.63	
v/c Ratio	0.34	0.73		0.56	0.39		0.06	0.61		0.13	0.49	
Control Delay	29.8	38.5		42.9	27.1		20.1	30.1		10.1	12.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.8	38.5		42.9	27.1		20.1	30.1		10.1	12.0	
LOS	C	D		D	C		C	C		B	B	
Approach Delay		36.5			32.1			29.7			11.9	
Approach LOS		D			C			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 26.1		Intersection LOS: C	
Intersection Capacity Utilization 70.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	92	321	82	174	27	696	43	559
v/c Ratio	0.34	0.73	0.56	0.39	0.06	0.61	0.13	0.49
Control Delay	29.8	38.5	42.9	27.1	20.1	30.1	10.1	12.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.8	38.5	42.9	27.1	20.1	30.1	10.1	12.0
Queue Length 50th (m)	13.9	50.7	13.1	24.1	1.9	85.1	2.9	48.7
Queue Length 95th (m)	24.6	70.0	25.6	37.3	m8.6	152.2	9.8	95.1
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	598	953	327	961	450	1142	339	1149
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	0.15	0.34	0.25	0.18	0.06	0.61	0.13	0.49

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

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	240	55	75	135	25	25	550	90	40	465	50
Future Volume (vph)	85	240	55	75	135	25	25	550	90	40	465	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1756	1771		1739	1789		1793	1820		1762	1833	
Flt Permitted	0.61	1.00		0.34	1.00		0.38	1.00		0.29	1.00	
Satd. Flow (perm)	1124	1771		615	1789		718	1820		542	1833	
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)	92	261	60	82	147	27	27	598	98	43	505	54
RTOR Reduction (vph)	0	15	0	0	12	0	0	4	0	0	2	0
Lane Group Flow (vph)	92	306	0	82	162	0	27	692	0	43	557	0
Confl. Peds. (#/hr)	8		12	12		8	11		10	10		11
Heavy Vehicles (%)	2%	3%	7%	3%	4%	0%	0%	2%	0%	2%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	21.7	21.7		21.7	21.7		56.3	56.3		56.3	56.3	
Effective Green, g (s)	21.7	21.7		21.7	21.7		56.3	56.3		56.3	56.3	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.63	0.63		0.63	0.63	
Clearance Time (s)	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	
Lane Grp Cap (vph)	271	427		148	431		449	1138		339	1146	
v/s Ratio Prot		c0.17			0.09			c0.38			0.30	
v/s Ratio Perm	0.08			0.13			0.04			0.08		
v/c Ratio	0.34	0.72		0.55	0.38		0.06	0.61		0.13	0.49	
Uniform Delay, d1	28.2	31.3		29.9	28.5		6.6	10.2		6.9	9.1	
Progression Factor	1.00	1.00		1.00	1.00		2.24	2.34		1.00	1.00	
Incremental Delay, d2	0.7	5.6		4.4	0.6		0.2	2.1		0.8	1.5	
Delay (s)	29.0	37.0		34.3	29.0		14.9	26.0		7.6	10.5	
Level of Service	C	D		C	C		B	C		A	B	
Approach Delay (s)		35.2			30.7			25.5			10.3	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	65	79	245	40	45	245
Future Volume (vph)	65	79	245	40	45	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1568
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1568
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		7	7			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	3%
Adj. Flow (vph)	71	86	266	43	49	266
Shared Lane Traffic (%)						
Lane Group Flow (vph)	71	86	266	43	49	266
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	65	79	245	40	45	245
Future Volume (Veh/h)	65	79	245	40	45	245
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	86	266	43	49	266
Pedestrians				1	7	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	1	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			164		653	79
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			164		653	79
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			81		86	73
cM capacity (veh/h)			1406		351	972

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	71	86	266	43	315
Volume Left	0	0	266	0	49
Volume Right	0	86	0	0	266
cSH	1700	1700	1406	1700	1151
Volume to Capacity	0.04	0.05	0.19	0.03	0.27
Queue Length 95th (m)	0.0	0.0	5.6	0.0	8.9
Control Delay (s)	0.0	0.0	8.2	0.0	11.2
Lane LOS			A		B
Approach Delay (s)	0.0		7.0		11.2
Approach LOS					B

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	30.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	345	65	45	245	75	75	470	55	90	400	80
Future Volume (vph)	90	345	65	45	245	75	75	470	55	90	400	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99		0.99	0.99		0.99	1.00		1.00	0.99	
Frt		0.976			0.965			0.984			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1762	0	1805	1753	0	1770	1830	0	1656	1796	0
Flt Permitted	0.420			0.293			0.358			0.317		
Satd. Flow (perm)	735	1762	0	554	1753	0	660	1830	0	551	1796	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			22			11			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	29		9	9		29	20		7	7		20
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
Heavy Vehicles (%)	6%	5%	3%	0%	4%	0%	2%	1%	9%	9%	2%	4%
Adj. Flow (vph)	98	375	71	49	266	82	82	511	60	98	435	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	446	0	49	348	0	82	571	0	98	522	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.40	0.75		0.27	0.58		0.25	0.61		0.35	0.57	
Control Delay	22.9	29.2		23.1	24.0		12.9	16.5		15.7	15.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.9	29.2		23.1	24.0		12.9	16.5		15.7	15.3	
LOS	C	C		C	C		B	B		B	B	
Approach Delay		28.1			23.9			16.0			15.4	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 79.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd

Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	98	446	49	348	82	571	98	522
v/c Ratio	0.40	0.75	0.27	0.58	0.25	0.61	0.35	0.57
Control Delay	22.9	29.2	23.1	24.0	12.9	16.5	15.7	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.9	29.2	23.1	24.0	12.9	16.5	15.7	15.3
Queue Length 50th (m)	12.4	63.3	5.3	39.4	6.5	55.9	8.2	48.6
Queue Length 95th (m)	28.1	#105.1	14.4	66.0	15.4	87.9	20.0	77.4
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	245	596	184	599	334	932	279	919
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	0.40	0.75	0.27	0.58	0.25	0.61	0.35	0.57

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	345	65	45	245	75	75	470	55	90	400	80
Future Volume (vph)	90	345	65	45	245	75	75	470	55	90	400	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1663	1762		1795	1752		1750	1831		1650	1796	
Flt Permitted	0.42	1.00		0.29	1.00		0.36	1.00		0.32	1.00	
Satd. Flow (perm)	735	1762		554	1752		659	1831		551	1796	
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)	98	375	71	49	266	82	82	511	60	98	435	87
RTOR Reduction (vph)	0	9	0	0	15	0	0	5	0	0	9	0
Lane Group Flow (vph)	98	437	0	49	333	0	82	566	0	98	513	0
Confl. Peds. (#/hr)	29		9	9		29	20		7	7		20
Heavy Vehicles (%)	6%	5%	3%	0%	4%	0%	2%	1%	9%	9%	2%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	245	587		184	584		333	927		279	909	
v/s Ratio Prot		c0.25			0.19			c0.31			0.29	
v/s Ratio Perm	0.13			0.09			0.12			0.18		
v/c Ratio	0.40	0.74		0.27	0.57		0.25	0.61		0.35	0.56	
Uniform Delay, d1	19.2	22.2		18.3	20.6		10.4	13.2		11.1	12.8	
Progression Factor	0.91	0.96		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	7.4		3.5	4.0		1.8	3.0		3.5	2.5	
Delay (s)	21.7	28.6		21.8	24.6		12.2	16.2		14.6	15.3	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		27.4			24.3			15.7			15.2	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	340	56	35	295	145	95	29	50	170	21	130
Future Volume (vph)	200	340	56	35	295	145	95	29	50	170	21	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.98	1.00	0.98		0.99	0.95		0.94	0.98	
Frt			0.850		0.951			0.906			0.871	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1792	1615	1805	1714	0	1805	1634	0	1770	1567	0
Flt Permitted	0.370			0.541			0.611			0.564		
Satd. Flow (perm)	675	1792	1587	1025	1714	0	1150	1634	0	992	1567	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		35			54			141	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
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
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Adj. Flow (vph)	217	370	61	38	321	158	103	32	54	185	23	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	217	370	61	38	479	0	103	86	0	185	164	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	64.1	61.1	61.1	48.9	48.9		17.1	8.1		17.5	8.1	
Actuated g/C Ratio	0.71	0.68	0.68	0.54	0.54		0.19	0.09		0.19	0.09	
v/c Ratio	0.37	0.30	0.06	0.07	0.51		0.37	0.44		0.70	0.61	
Control Delay	7.1	7.8	1.6	13.3	16.2		30.8	24.2		44.4	19.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.1	7.8	1.6	13.3	16.2		30.8	24.2		44.4	19.5	
LOS	A	A	A	B	B		C	C		D	B	
Approach Delay		7.0			16.0			27.8			32.7	
Approach LOS		A			B			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 17.3		Intersection LOS: B	
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd

Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	217	370	61	38	479	103	86	185	164
v/c Ratio	0.37	0.30	0.06	0.07	0.51	0.37	0.44	0.70	0.61
Control Delay	7.1	7.8	1.6	13.3	16.2	30.8	24.2	44.4	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.1	7.8	1.6	13.3	16.2	30.8	24.2	44.4	19.5
Queue Length 50th (m)	11.7	25.1	0.0	3.2	49.3	15.2	5.6	28.8	4.0
Queue Length 95th (m)	24.7	47.9	3.8	10.0	93.8	26.6	18.6	44.7	21.7
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	618	1215	1100	556	946	281	282	263	346
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.30	0.06	0.07	0.51	0.37	0.30	0.70	0.47

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	340	56	35	295	145	95	29	50	170	21	130
Future Volume (vph)	200	340	56	35	295	145	95	29	50	170	21	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.98		1.00	0.95		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1745	1792	1587	1799	1713		1795	1633		1720	1567	
Flt Permitted	0.37	1.00	1.00	0.54	1.00		0.61	1.00		0.56	1.00	
Satd. Flow (perm)	680	1792	1587	1025	1713		1155	1633		1022	1567	
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)	217	370	61	38	321	158	103	32	54	185	23	141
RTOR Reduction (vph)	0	0	20	0	16	0	0	50	0	0	127	0
Lane Group Flow (vph)	217	370	41	38	463	0	103	36	0	185	37	0
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	59.9	59.9	59.9	47.7	47.7		13.4	7.0		16.8	8.7	
Effective Green, g (s)	59.9	59.9	59.9	47.7	47.7		13.4	7.0		16.8	8.7	
Actuated g/C Ratio	0.67	0.67	0.67	0.53	0.53		0.15	0.08		0.19	0.10	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	561	1192	1056	543	907		217	127		253	151	
v/s Ratio Prot	c0.04	0.21			c0.27		0.03	0.02		c0.07	0.02	
v/s Ratio Perm	0.22		0.03	0.04			0.04			c0.07		
v/c Ratio	0.39	0.31	0.04	0.07	0.51		0.47	0.29		0.73	0.24	
Uniform Delay, d1	6.9	6.3	5.2	10.3	13.6		34.6	39.1		33.5	37.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.7	0.1	0.2	2.0		1.6	1.2		10.4	0.8	
Delay (s)	7.3	7.0	5.2	10.6	15.7		36.2	40.4		43.9	38.4	
Level of Service	A	A	A	B	B		D	D		D	D	
Approach Delay (s)		6.9			15.3			38.1			41.3	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	4	40	25	4	30	25	80	10	10	55	45
Future Volume (vph)	45	4	40	25	4	30	25	80	10	10	55	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940			0.930			0.983			0.933	
Flt Protected		0.975			0.979		0.950			0.950		
Satd. Flow (prot)	0	1707	0	0	1696	0	1770	1831	0	1770	1738	0
Flt Permitted		0.975			0.979		0.950			0.950		
Satd. Flow (perm)	0	1707	0	0	1696	0	1770	1831	0	1770	1738	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	4	43	27	4	33	27	87	11	11	60	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	96	0	0	64	0	27	98	0	11	109	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.8%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	4	40	25	4	30	25	80	10	10	55	45
Future Volume (Veh/h)	45	4	40	25	4	30	25	80	10	10	55	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	49	4	43	27	4	33	27	87	11	11	60	49
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	282	258	84	274	278	92	109			98		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	282	258	84	274	278	92	109			98		
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 %	92	99	96	96	99	97	98			99		
cM capacity (veh/h)	631	629	975	633	614	965	1481			1495		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	96	64	27	98	11	109
Volume Left	49	27	27	0	11	0
Volume Right	43	33	0	11	0	49
cSH	749	768	1481	1700	1495	1700
Volume to Capacity	0.13	0.08	0.02	0.06	0.01	0.06
Queue Length 95th (m)	3.5	2.2	0.4	0.0	0.2	0.0
Control Delay (s)	10.5	10.1	7.5	0.0	7.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	10.5	10.1	1.6		0.7	
Approach LOS	B	B				

Intersection Summary

Average Delay	4.8		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	4	40	25	4	30	30	35	10	10	65	45
Future Volume (vph)	50	4	40	25	4	30	30	35	10	10	65	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.943			0.930			0.966			0.939	
Flt Protected		0.974			0.979		0.950			0.950		
Satd. Flow (prot)	0	1711	0	0	1696	0	1770	1799	0	1770	1749	0
Flt Permitted		0.974			0.979		0.950			0.950		
Satd. Flow (perm)	0	1711	0	0	1696	0	1770	1799	0	1770	1749	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	4	43	27	4	33	33	38	11	11	71	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	101	0	0	64	0	33	49	0	11	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	4	40	25	4	30	30	35	10	10	65	45
Future Volume (Veh/h)	50	4	40	25	4	30	30	35	10	10	65	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	54	4	43	27	4	33	33	38	11	11	71	49
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	256	232	96	248	252	44	120			49		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	256	232	96	248	252	44	120			49		
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 %	92	99	96	96	99	97	98			99		
cM capacity (veh/h)	656	648	961	656	632	1027	1468			1558		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	101	64	33	49	11	120
Volume Left	54	27	33	0	11	0
Volume Right	43	33	0	11	0	49
cSH	758	804	1468	1700	1558	1700
Volume to Capacity	0.13	0.08	0.02	0.03	0.01	0.07
Queue Length 95th (m)	3.7	2.1	0.6	0.0	0.2	0.0
Control Delay (s)	10.5	9.9	7.5	0.0	7.3	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.5	9.9	3.0		0.6	
Approach LOS	B	A				

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	635	0	230	745	0	190	665	0	55	650	0
Future Volume (vph)	110	635	0	230	745	0	190	665	0	55	650	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			1.00		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3539	0	1770	3539	0	1805	3610	0	1770	3610	0
Flt Permitted	0.213			0.251			0.247			0.361		
Satd. Flow (perm)	404	3539	0	467	3539	0	468	3610	0	670	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Adj. Flow (vph)	112	648	0	235	760	0	194	679	0	56	663	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	112	648	0	235	760	0	194	679	0	56	663	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

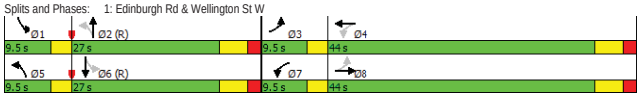
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	34.7	25.2		35.3	27.1		46.3	35.0		38.8	28.8	
Actuated g/C Ratio	0.39	0.28		0.39	0.30		0.51	0.39		0.43	0.32	
v/c Ratio	0.44	0.65		0.85	0.71		0.47	0.48		0.15	0.58	
Control Delay	20.3	31.3		46.9	32.0		17.3	24.4		12.8	24.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.3	31.3		46.9	32.0		17.3	24.4		12.8	24.8	
LOS	C	C		D	C		B	C		B	C	
Approach Delay		29.7			35.5			22.8			23.8	
Approach LOS		C			D			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 71 (79%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 28.4		Intersection LOS: C	
Intersection Capacity Utilization 75.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	112	648	235	760	194	679	56	663
v/c Ratio	0.44	0.65	0.85	0.71	0.47	0.48	0.15	0.58
Control Delay	20.3	31.3	46.9	32.0	17.3	24.4	12.8	24.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.3	31.3	46.9	32.0	17.3	24.4	12.8	24.8
Queue Length 50th (m)	12.1	53.9	27.5	65.8	18.6	50.1	3.9	50.8
Queue Length 95th (m)	19.7	65.0	#48.8	78.0	36.4	78.1	m8.6	72.0
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	256	1494	277	1494	412	1402	380	1153
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	0.44	0.43	0.85	0.51	0.47	0.48	0.15	0.58

Intersection Summary

\# 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.

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	110	635	0	230	745	0	190	665	0	55	650	0
Future Volume (vph)	110	635	0	230	745	0	190	665	0	55	650	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	3539		1769	3539		1804	3610		1766	3610	
Flt Permitted	0.21	1.00		0.25	1.00		0.25	1.00		0.36	1.00	
Satd. Flow (perm)	405	3539		468	3539		469	3610		670	3610	
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)	112	648	0	235	760	0	194	679	0	56	663	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	112	648	0	235	760	0	194	679	0	56	663	0
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	31.0	25.8		33.6	27.1		42.7	33.7		34.1	28.1	
Effective Green, g (s)	31.0	25.8		33.6	27.1		42.7	33.7		34.1	28.1	
Actuated g/C Ratio	0.34	0.29		0.37	0.30		0.47	0.37		0.38	0.31	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	220	1014		268	1065		394	1351		326	1127	
v/s Ratio Prot	0.03	0.18		c0.06	0.21		c0.06	0.19		0.01	c0.18	
v/s Ratio Perm	0.15			c0.26			0.17			0.05		
v/c Ratio	0.51	0.64		0.88	0.71		0.49	0.50		0.17	0.59	
Uniform Delay, d1	21.4	28.0		23.9	28.0		15.0	21.7		18.0	26.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.89	0.83	
Incremental Delay, d2	1.9	1.3		25.8	2.3		1.0	1.3		0.2	2.0	
Delay (s)	23.2	29.4		49.7	30.3		16.0	23.0		16.2	23.5	
Level of Service	C	C		D	C		B	C		B	C	
Approach Delay (s)		28.5			34.9			21.5			22.9	
Approach LOS		C			C			C			C	

Intersection Summary

HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	740	0	0	965	50	395	150	140	40	0	335
Future Volume (vph)	215	740	0	0	965	50	395	150	140	40	0	335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.993				0.850			0.850
Flt Protected	0.950						0.950	0.978		0.950		
Satd. Flow (prot)	1787	5136	0	0	5097	0	1698	1757	1599	1805	0	1599
Flt Permitted	0.178						0.950	0.978		0.436		
Satd. Flow (perm)	335	5136	0	0	5097	0	1698	1757	1599	828	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					7				144			345
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	222	763	0	0	995	52	407	155	144	41	0	345
Shared Lane Traffic (%)							32%					
Lane Group Flow (vph)	222	763	0	0	1047	0	277	285	144	41	0	345
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	34.1	24.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	80.1	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	62.8%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	5.0	3.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	2.1	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	20.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

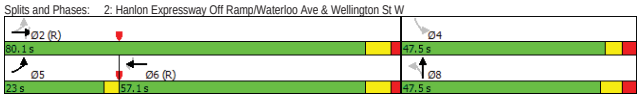
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.57	0.32		0.39
v/c Ratio	0.52	0.26			0.52		0.52	0.52	0.15	0.15		0.41
Control Delay	16.0	14.0			30.6		40.2	40.0	2.3	33.0		4.2
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	16.0	14.0			30.6		40.2	40.0	2.3	33.0		4.2
LOS	B	B			C		D	D	A	C		A
Approach Delay		14.4			30.6			32.4			7.2	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type: Other
Cycle Length: 127.6
Actuated Cycle Length: 127.6
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.52
Intersection Signal Delay: 23.0 — Intersection LOS: C
Intersection Capacity Utilization 76.2% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	222	763	1047	277	285	144	41	345
v/c Ratio	0.52	0.26	0.52	0.52	0.52	0.15	0.15	0.41
Control Delay	16.0	14.0	30.6	40.2	40.0	2.3	33.0	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.0	14.0	30.6	40.2	40.0	2.3	33.0	4.2
Queue Length 50th (m)	25.1	35.4	76.3	63.2	64.9	0.0	7.7	0.0
Queue Length 95th (m)	38.1	43.3	90.6	93.4	95.6	9.1	17.4	19.0
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	430	2938	2001	532	550	976	266	836
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	0.52	0.26	0.52	0.52	0.52	0.15	0.15	0.41

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	740	0	0	965	50	395	150	140	40	0	335
Future Volume (vph)	215	740	0	0	965	50	395	150	140	40	0	335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			0.99		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00	0.95		1.00
Satd. Flow (prot)	1787	5136			5094		1698	1757	1599	1805		1599
Flt Permitted	0.18	1.00			1.00		0.95	0.98	1.00	0.44		1.00
Satd. Flow (perm)	335	5136			5094		1698	1757	1599	828		1599
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)	222	763	0	0	995	52	407	155	144	41	0	345
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	62	0	0	210
Lane Group Flow (vph)	222	763	0	0	1043	0	277	285	82	41	0	135
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.57	0.32		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lane Grp Cap (vph)	419	2938			1996		532	550	914	266		626
v/s Ratio Prot	c0.08	0.15			0.20							
v/s Ratio Perm	c0.22						c0.16	0.16	0.05	0.05		0.08
v/c Ratio	0.53	0.26			0.52		0.52	0.52	0.09	0.15		0.22
Uniform Delay, d1	15.4	13.7			29.7		35.9	35.9	12.3	30.9		25.8
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	4.7	0.2			1.0		3.6	3.5	0.2	1.2		0.8
Delay (s)	20.1	13.9			30.7		39.5	39.4	12.5	32.1		26.6
Level of Service	C	B			C		D	D	B	C		C
Approach Delay (s)		15.3			30.7			34.0			27.2	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	860	490	0	1260	0	0	0	0	175	0	85
Future Volume (vph)	0	860	490	0	1260	0	0	0	0	175	0	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.946										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4828	0	0	5136	0	0	0	0	3467	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	4828	0	0	5136	0	0	0	0	3467	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		211										89
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	2					2						
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%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Adj. Flow (vph)	0	905	516	0	1326	0	0	0	0	184	0	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1421	0	0	1326	0	0	0	0	184	0	89
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			24.9					24.7		24.9
Total Split (s)		56.9			56.9					41.7		56.9
Total Split (%)		57.7%			57.7%					42.3%		57.7%
Maximum Green (s)		50.0			50.0					35.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		7.0			7.0					7.0		7.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
v/c Ratio		0.56			0.51					0.15		0.11

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

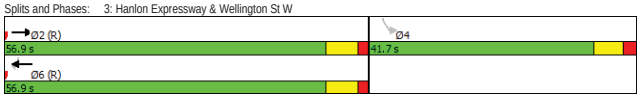
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		14.9			17.0					22.1		3.2
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		14.9			17.0					22.1		3.2
LOS		B			B					C		A
Approach Delay		14.9			17.0						15.9	
Approach LOS		B			B						B	

Intersection Summary

Area Type:	Other		
Cycle Length: 98.6			
Actuated Cycle Length: 98.6			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 50			
Control Type: Pretimed			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 15.9		Intersection LOS: B	
Intersection Capacity Utilization 41.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1421	1326	184	89
v/c Ratio	0.56	0.51	0.15	0.11
Control Delay	14.9	17.0	22.1	3.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.9	17.0	22.1	3.2
Queue Length 50th (m)	57.9	62.0	12.8	0.0
Queue Length 95th (m)	71.6	74.8	20.6	7.6
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	2552	2604	1230	816
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.56	0.51	0.15	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	860	490	0	1260	0	0	0	0	175	0	85
Future Volume (vph)	0	860	490	0	1260	0	0	0	0	175	0	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.95			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4825			5136					3467		1524
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4825			5136					3467		1524
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)	0	905	516	0	1326	0	0	0	0	184	0	89
RTOR Reduction (vph)	0	104	0	0	0	0	0	0	0	0	0	44
Lane Group Flow (vph)	0	1317	0	0	1326	0	0	0	0	184	0	45
Confl. Peds. (#/hr)	2					2						
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					35.0		50.0
Effective Green, g (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2446			2604					1230		772
v/s Ratio Prot		c0.27			0.26							
v/s Ratio Perm										c0.05		0.03
v/c Ratio		0.54			0.51					0.15		0.06
Uniform Delay, d1		16.5			16.1					21.7		12.3
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		0.9			0.7					0.3		0.1
Delay (s)		17.3			16.9					21.9		12.5
Level of Service		B			B					C		B
Approach Delay (s)		17.3			16.9			0.0			18.8	
Approach LOS		B			B			A			B	

Intersection Summary

HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	940	850	390	355	60
Future Volume (vph)	70	940	850	390	355	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99			
Frt			0.953			0.850
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3566	3348	0	1787	1615
Flt Permitted		0.707			0.950	
Satd. Flow (perm)	0	2529	3348	0	1787	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			130			62
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	3%	0%	1%	0%
Adj. Flow (vph)	72	969	876	402	366	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1041	1278	0	366	62
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

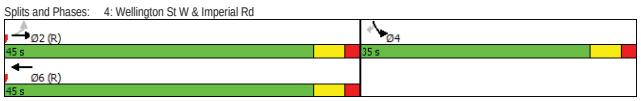
10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		46.4	46.4		21.6	21.6
Actuated g/C Ratio		0.58	0.58		0.27	0.27
v/c Ratio		0.71	0.64		0.76	0.13
Control Delay		17.0	12.7		36.8	6.0
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		17.0	12.7		36.8	6.0
LOS		B	B		D	A
Approach Delay		17.0	12.7		32.4	
Approach LOS		B	B		C	

Intersection Summary

Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 98.7%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1041	1278	366	62
v/c Ratio	0.71	0.64	0.76	0.13
Control Delay	17.0	12.7	36.8	6.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.0	12.7	36.8	6.0
Queue Length 50th (m)	57.6	58.8	53.4	0.0
Queue Length 95th (m)	#101.6	99.0	74.2	7.6
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1466	1996	647	624
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.71	0.64	0.57	0.10

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	940	850	390	355	60
Future Volume (vph)	70	940	850	390	355	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.95		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3564	3348		1787	1615
Flt Permitted		0.71	1.00		0.95	1.00
Satd. Flow (perm)		2529	3348		1787	1615
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	72	969	876	402	366	62
RTOR Reduction (vph)	0	0	55	0	0	45
Lane Group Flow (vph)	0	1041	1223	0	366	17
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	0%	1%	3%	0%	1%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		46.4	46.4		21.6	21.6
Effective Green, g (s)		46.4	46.4		21.6	21.6
Actuated g/C Ratio		0.58	0.58		0.27	0.27
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1466	1941		482	436
v/s Ratio Prot			0.37		c0.20	
v/s Ratio Perm		c0.41				0.01
v/c Ratio		0.71	0.63		0.76	0.04
Uniform Delay, d1		12.0	11.1		26.8	21.5
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		2.9	1.6		6.8	0.0
Delay (s)		14.9	12.7		33.6	21.6
Level of Service		B	B		C	C
Approach Delay (s)		14.9	12.7		31.8	
Approach LOS		B	B		C	

Intersection Summary

HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	380	0	265	445	70	400	1045	0	90	1400	130
Future Volume (vph)	115	380	0	265	445	70	400	1045	0	90	1400	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00	1.00							
Frt					0.980							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3574	0	1805	3531	0	3467	3374	0	1805	3471	1615
Flt Permitted	0.249			0.227			0.950			0.950		
Satd. Flow (perm)	468	3574	0	431	3531	0	3467	3374	0	1805	3471	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					9							134
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Adj. Flow (vph)	119	392	0	273	459	72	412	1077	0	93	1443	134
Shared Lane Traffic (%)												
Lane Group Flow (vph)	119	392	0	273	531	0	412	1077	0	93	1443	134
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

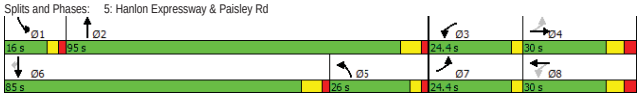
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	13.0	30.0		9.5	30.0		10.0	60.4		10.0	60.4	60.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	39.6	21.0		50.0	28.4		20.9	87.9		10.6	77.6	77.6
Actuated g/C Ratio	0.24	0.13		0.31	0.17		0.13	0.54		0.06	0.47	0.47
v/c Ratio	0.54	0.86		0.89	0.86		0.93	0.60		0.79	0.88	0.16
Control Delay	52.0	88.1		77.3	78.8		98.8	27.9		116.2	46.6	3.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	52.0	88.1		77.3	78.8		98.8	27.9		116.2	46.6	3.9
LOS	D	F		E	E		F	C		F	D	A
Approach Delay		79.7			78.3			47.5			47.0	
Approach LOS		E			E			D			D	

Intersection Summary

Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 163.9			
Natural Cycle: 115			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 56.5		Intersection LOS: E	
Intersection Capacity Utilization 95.8%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	119	392	273	531	412	1077	93	1443	134
v/c Ratio	0.54	0.86	0.89	0.86	0.93	0.60	0.79	0.88	0.16
Control Delay	52.0	88.1	77.3	78.8	98.8	27.9	116.2	46.6	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	88.1	77.3	78.8	98.8	27.9	116.2	46.6	3.9
Queue Length 50th (m)	30.6	70.7	77.2	93.0	74.1	132.8	32.3	236.3	0.0
Queue Length 95th (m)	49.0	#95.3	#118.0	#137.7	#107.6	155.6	#64.6	271.9	12.7
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	307	479	310	618	444	1808	121	1643	835
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.82	0.88	0.86	0.93	0.60	0.77	0.88	0.16

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	380	0	265	445	70	400	1045	0	90	1400	130
Future Volume (vph)	115	380	0	265	445	70	400	1045	0	90	1400	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.98		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3574		1805	3530		3467	3374		1805	3471	1615
Flt Permitted	0.25	1.00		0.23	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	467	3574		432	3530		3467	3374		1805	3471	1615
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)	119	392	0	273	459	72	412	1077	0	93	1443	134
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	0	0	0	71
Lane Group Flow (vph)	119	392	0	273	524	0	412	1077	0	93	1443	63
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	34.6	21.0		45.0	28.4		21.0	87.9		10.7	77.6	77.6
Effective Green, g (s)	34.6	21.0		45.0	28.4		21.0	87.9		10.7	77.6	77.6
Actuated g/C Ratio	0.21	0.13		0.27	0.17		0.13	0.54		0.07	0.47	0.47
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	207	457		294	611		443	1808		117	1642	764
v/s Ratio Prot	0.05	0.11		c0.12	0.15		c0.12	0.32		0.05	c0.42	
v/s Ratio Perm	0.07			c0.14								0.04
v/c Ratio	0.57	0.86		0.93	0.86		0.93	0.60		0.79	0.88	0.08
Uniform Delay, d1	55.0	70.0		51.8	65.8		70.8	25.9		75.6	39.0	23.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	3.8	14.7		33.8	11.4		26.2	1.5		30.0	7.0	0.2
Delay (s)	58.8	84.7		85.6	77.2		97.0	27.4		105.5	46.0	23.9
Level of Service	E	F		F	E		F	C		F	D	C
Approach Delay (s)		78.7			80.1			46.6			47.5	
Approach LOS		E			F			D			D	

Intersection Summary

HCM 2000 Control Delay	56.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	164.0	Sum of lost time (s)	23.4
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	165	50	90	255	45	50	615	80	50	605	70
Future Volume (vph)	70	165	50	90	255	45	50	615	80	50	605	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.965			0.978			0.983			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1802	0	1805	1836	0	1805	1858	0	1770	1865	0
Flt Permitted	0.341			0.507			0.298			0.286		
Satd. Flow (perm)	630	1802	0	957	1836	0	566	1858	0	531	1865	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			15			8			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Adj. Flow (vph)	72	170	52	93	263	46	52	634	82	52	624	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	222	0	93	309	0	52	716	0	52	696	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

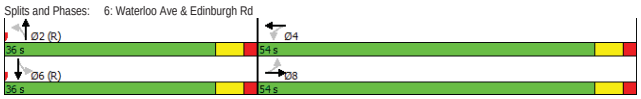
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	20.7	20.7		20.7	20.7		57.3	57.3		57.3	57.3	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.64	0.64		0.64	0.64	
v/c Ratio	0.50	0.51		0.42	0.71		0.14	0.60		0.15	0.58	
Control Delay	40.6	29.7		33.9	39.1		8.2	19.3		9.9	13.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.6	29.7		33.9	39.1		8.2	19.3		9.9	13.1	
LOS	D	C		C	D		A	B		A	B	
Approach Delay		32.3			37.9			18.5			12.9	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 22.0		Intersection LOS: C	
Intersection Capacity Utilization 77.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	222	93	309	52	716	52	696
v/c Ratio	0.50	0.51	0.42	0.71	0.14	0.60	0.15	0.58
Control Delay	40.6	29.7	33.9	39.1	8.2	19.3	9.9	13.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	29.7	33.9	39.1	8.2	19.3	9.9	13.1
Queue Length 50th (m)	11.5	31.2	14.5	49.6	1.9	50.3	3.4	65.0
Queue Length 95th (m)	23.0	47.1	26.2	69.3	m7.5	111.8	11.1	124.6
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	336	973	510	986	360	1186	338	1190
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	0.21	0.23	0.18	0.31	0.14	0.60	0.15	0.58

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	165	50	90	255	45	50	615	80	50	605	70
Future Volume (vph)	70	165	50	90	255	45	50	615	80	50	605	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1758	1802		1794	1835		1802	1858		1763	1866	
Flt Permitted	0.34	1.00		0.51	1.00		0.30	1.00		0.29	1.00	
Satd. Flow (perm)	631	1802		958	1835		566	1858		531	1866	
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)	72	170	52	93	263	46	52	634	82	52	624	72
RTOR Reduction (vph)	0	20	0	0	12	0	0	3	0	0	3	0
Lane Group Flow (vph)	72	202	0	93	297	0	52	713	0	52	693	0
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	20.7	20.7		20.7	20.7		57.3	57.3		57.3	57.3	
Effective Green, g (s)	20.7	20.7		20.7	20.7		57.3	57.3		57.3	57.3	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.64	0.64		0.64	0.64	
Clearance Time (s)	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	
Lane Grp Cap (vph)	145	414		220	422		360	1182		338	1188	
v/s Ratio Prot		0.11			c0.16			c0.38			0.37	
v/s Ratio Perm	0.11			0.10			0.09			0.10		
v/c Ratio	0.50	0.49		0.42	0.70		0.14	0.60		0.15	0.58	
Uniform Delay, d1	30.1	30.1		29.6	31.8		6.5	9.6		6.6	9.5	
Progression Factor	1.00	1.00		1.00	1.00		0.85	1.53		1.00	1.00	
Incremental Delay, d2	2.7	0.9		1.3	5.3		0.8	2.0		1.0	2.1	
Delay (s)	32.8	31.0		30.9	37.1		6.3	16.8		7.6	11.6	
Level of Service	C	C		C	D		A	B		A	B	
Approach Delay (s)		31.4			35.7			16.1			11.3	
Approach LOS		C			D			B			B	

Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	60	120	255	75	150	265
Future Volume (vph)	60	120	255	75	150	265
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1599
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	1%
Adj. Flow (vph)	65	130	277	82	163	288
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	130	277	82	163	288
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	60	120	255	75	150	265
Future Volume (Veh/h)	60	120	255	75	150	265
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	130	277	82	163	288
Pedestrians					1	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			196		702	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			196		702	66
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			80		50	71
cM capacity (veh/h)			1376		325	1000

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	65	130	277	82	451
Volume Left	0	0	277	0	163
Volume Right	0	130	0	0	288
cSH	1700	1700	1376	1700	900
Volume to Capacity	0.04	0.08	0.20	0.05	0.50
Queue Length 95th (m)	0.0	0.0	6.0	0.0	23.0
Control Delay (s)	0.0	0.0	8.3	0.0	16.1
Lane LOS			A		C
Approach Delay (s)	0.0		6.4		16.1
Approach LOS					C

Intersection Summary

Average Delay	9.5		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	320	120	55	390	45	110	525	50	95	545	110
Future Volume (vph)	90	320	120	55	390	45	110	525	50	95	545	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	1.00		1.00	1.00		1.00	0.99	
Frt		0.959			0.985			0.987			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1793	0	1805	1847	0	1805	1868	0	1736	1840	0
Flt Permitted	0.267			0.259			0.212			0.279		
Satd. Flow (perm)	503	1793	0	489	1847	0	402	1868	0	509	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			8			9			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Adj. Flow (vph)	97	344	129	59	419	48	118	565	54	102	586	118
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	473	0	59	467	0	118	619	0	102	704	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

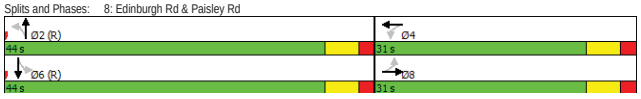
Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.58	0.77		0.36	0.75		0.58	0.65		0.40	0.75	
Control Delay	36.4	30.8		26.8	31.2		27.5	17.5		17.3	20.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	36.4	30.8		26.8	31.2		27.5	17.5		17.3	20.4	
LOS	D	C		C	C		C	B		B	C	
Approach Delay		31.7			30.7			19.1			20.0	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 24.4		Intersection LOS: C	
Intersection Capacity Utilization 90.2%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd



Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	473	59	467	118	619	102	704
v/c Ratio	0.58	0.77	0.36	0.75	0.58	0.65	0.40	0.75
Control Delay	36.4	30.8	26.8	31.2	27.5	17.5	17.3	20.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.4	30.8	26.8	31.2	27.5	17.5	17.3	20.4
Queue Length 50th (m)	13.3	66.2	6.6	60.0	11.5	62.8	8.8	75.9
Queue Length 95th (m)	#34.5	#110.8	17.7	#104.0	#36.7	98.0	21.8	119.5
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	167	615	163	621	203	950	257	942
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	0.58	0.77	0.36	0.75	0.58	0.65	0.40	0.75

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

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	320	120	55	390	45	110	525	50	95	545	110
Future Volume (vph)	90	320	120	55	390	45	110	525	50	95	545	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1791	1793		1795	1847		1800	1868		1732	1840	
Flt Permitted	0.27	1.00		0.26	1.00		0.21	1.00		0.28	1.00	
Satd. Flow (perm)	503	1793		490	1847		401	1868		508	1840	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	97	344	129	59	419	48	118	565	54	102	586	118
RTOR Reduction (vph)	0	18	0	0	5	0	0	4	0	0	10	0
Lane Group Flow (vph)	97	455	0	59	462	0	118	615	0	102	694	0
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	167	597		163	615		203	946		257	932	
v/s Ratio Prot		c0.25			0.25			0.33			c0.38	
v/s Ratio Perm	0.19			0.12			0.29			0.20		
v/c Ratio	0.58	0.76		0.36	0.75		0.58	0.65		0.40	0.74	
Uniform Delay, d1	20.7	22.3		19.0	22.2		12.9	13.6		11.4	14.7	
Progression Factor	0.99	1.01		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.8	8.2		6.1	8.2		11.6	3.5		4.5	5.4	
Delay (s)	33.3	30.8		25.1	30.4		24.5	17.1		16.0	20.0	
Level of Service	C	C		C	C		C	B		B	C	
Approach Delay (s)		31.2			29.8			18.3			19.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	385	115	65	400	190	90	30	50	215	40	295
Future Volume (vph)	280	385	115	65	400	190	90	30	50	215	40	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00	0.99		1.00	0.98		0.99	0.99	
Frt			0.850		0.952			0.907			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1783	0	1770	1695	0	1787	1629	0
Flt Permitted	0.231			0.518			0.500			0.578		
Satd. Flow (perm)	438	1881	1594	984	1783	0	931	1695	0	1081	1629	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125		34			54			321	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	304	418	125	71	435	207	98	33	54	234	43	321
Shared Lane Traffic (%)												
Lane Group Flow (vph)	304	418	125	71	642	0	98	87	0	234	364	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

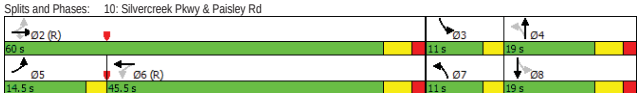
Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		2.5	5.0		4.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		7.5	19.0		9.0	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	63.1	60.1	60.1	46.5	46.5		18.0	9.1		18.5	9.1	
Actuated g/C Ratio	0.70	0.67	0.67	0.52	0.52		0.20	0.10		0.21	0.10	
v/c Ratio	0.65	0.33	0.11	0.14	0.69		0.38	0.40		0.82	0.81	
Control Delay	13.0	8.4	1.8	15.3	22.5		30.2	22.3		53.3	21.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.0	8.4	1.8	15.3	22.5		30.2	22.3		53.3	21.4	
LOS	B	A	A	B	C		C	C		D	C	
Approach Delay		9.1			21.7			26.5			33.9	
Approach LOS		A			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 20.6		Intersection LOS: C	
Intersection Capacity Utilization 90.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	304	418	125	71	642	98	87	234	364
v/c Ratio	0.65	0.33	0.11	0.14	0.69	0.38	0.40	0.82	0.81
Control Delay	13.0	8.4	1.8	15.3	22.5	30.2	22.3	53.3	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.0	8.4	1.8	15.3	22.5	30.2	22.3	53.3	21.4
Queue Length 50th (m)	18.3	30.5	0.0	6.9	84.7	14.2	5.7	36.8	7.4
Queue Length 95th (m)	34.6	54.4	6.5	16.5	#146.6	25.5	18.9	#56.6	36.1
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	484	1256	1106	508	937	264	291	285	509
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.33	0.11	0.14	0.69	0.37	0.30	0.82	0.72

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

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	385	115	65	400	190	90	30	50	215	40	295
Future Volume (vph)	280	385	115	65	400	190	90	30	50	215	40	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1881	1594	1804	1782		1769	1694		1781	1628	
Flt Permitted	0.23	1.00	1.00	0.52	1.00		0.50	1.00		0.58	1.00	
Satd. Flow (perm)	439	1881	1594	983	1782		931	1694		1083	1628	
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)	304	418	125	71	435	207	98	33	54	234	43	321
RTOR Reduction (vph)	0	0	43	0	17	0	0	49	0	0	286	0
Lane Group Flow (vph)	304	418	82	71	625	0	98	38	0	234	78	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	58.9	58.9	58.9	45.3	45.3		14.4	8.0		17.8	9.7	
Effective Green, g (s)	58.9	58.9	58.9	45.3	45.3		14.4	8.0		17.8	9.7	
Actuated g/C Ratio	0.65	0.65	0.65	0.50	0.50		0.16	0.09		0.20	0.11	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	448	1231	1043	494	896		208	150		277	175	
v/s Ratio Prot	c0.08	0.22			0.35		0.03	0.02		c0.08	0.05	
v/s Ratio Perm	c0.36		0.05	0.07			0.04			c0.09		
v/c Ratio	0.68	0.34	0.08	0.14	0.70		0.47	0.25		0.84	0.44	
Uniform Delay, d1	10.7	6.9	5.7	12.0	17.1		33.7	38.2		33.9	37.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.7	0.1	0.6	4.5		1.7	0.9		20.4	1.8	
Delay (s)	14.8	7.7	5.8	12.6	21.6		35.4	39.1		54.3	39.4	
Level of Service	B	A	A	B	C		D	D		D	D	
Approach Delay (s)		9.9			20.7			37.1			45.2	
Approach LOS		A			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	3	45	15	3	20	50	85	25	30	100	70
Future Volume (vph)	65	3	45	15	3	20	50	85	25	30	100	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.946			0.928			0.966			0.938	
Flt Protected		0.972			0.981		0.950			0.950		
Satd. Flow (prot)	0	1713	0	0	1696	0	1770	1799	0	1770	1747	0
Flt Permitted		0.972			0.981		0.950			0.950		
Satd. Flow (perm)	0	1713	0	0	1696	0	1770	1799	0	1770	1747	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	3	49	16	3	22	54	92	27	33	109	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	41	0	54	119	0	33	185	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.8%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	3	45	15	3	20	50	85	25	30	100	70
Future Volume (Veh/h)	65	3	45	15	3	20	50	85	25	30	100	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	71	3	49	16	3	22	54	92	27	33	109	76
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	436	440	147	439	464	106	185			119		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	436	440	147	439	464	106	185			119		
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 %	86	99	95	97	99	98	96			98		
cM capacity (veh/h)	492	480	900	474	465	949	1390			1469		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	123	41	54	119	33	185
Volume Left	71	16	54	0	33	0
Volume Right	49	22	0	27	0	76
cSH	600	647	1390	1700	1469	1700
Volume to Capacity	0.21	0.06	0.04	0.07	0.02	0.11
Queue Length 95th (m)	6.1	1.6	1.0	0.0	0.6	0.0
Control Delay (s)	12.5	10.9	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.5	10.9	2.4		1.1	
Approach LOS	B	B				

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	3	85	15	3	20	95	75	25	30	60	70
Future Volume (vph)	65	3	85	15	3	20	95	75	25	30	60	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.928			0.963			0.919	
Flt Protected		0.979			0.981		0.950			0.950		
Satd. Flow (prot)	0	1687	0	0	1696	0	1770	1794	0	1770	1712	0
Flt Permitted		0.979			0.981		0.950			0.950		
Satd. Flow (perm)	0	1687	0	0	1696	0	1770	1794	0	1770	1712	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	3	92	16	3	22	103	82	27	33	65	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	166	0	0	41	0	103	109	0	33	141	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	3	85	15	3	20	95	75	25	30	60	70
Future Volume (Veh/h)	65	3	85	15	3	20	95	75	25	30	60	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	71	3	92	16	3	22	103	82	27	33	65	76
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	480	484	103	526	508	96	141			109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480	484	103	526	508	96	141			109		
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 %	84	99	90	96	99	98	93			98		
cM capacity (veh/h)	448	438	952	386	424	961	1442			1481		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	166	41	103	109	33	141
Volume Left	71	16	103	0	33	0
Volume Right	92	22	0	27	0	76
cSH	634	574	1442	1700	1481	1700
Volume to Capacity	0.26	0.07	0.07	0.06	0.02	0.08
Queue Length 95th (m)	8.4	1.8	1.8	0.0	0.5	0.0
Control Delay (s)	12.7	11.7	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.7	11.7	3.7		1.4	
Approach LOS	B	B				

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	550	0	160	515	0	120	440	0	60	465	0
Future Volume (vph)	75	550	0	160	515	0	120	440	0	60	465	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			0.99		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3539	0	1770	3539	0	1805	3610	0	1770	3610	0
Flt Permitted	0.344			0.262			0.418			0.492		
Satd. Flow (perm)	651	3539	0	488	3539	0	791	3610	0	910	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Adj. Flow (vph)	77	561	0	163	526	0	122	449	0	61	474	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	561	0	163	526	0	122	449	0	61	474	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

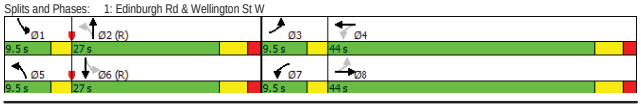
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	29.4	20.0		30.1	21.9		50.4	40.2		47.0	37.0	
Actuated g/C Ratio	0.33	0.22		0.33	0.24		0.56	0.45		0.52	0.41	
v/c Ratio	0.26	0.71		0.64	0.61		0.23	0.28		0.11	0.32	
Control Delay	20.2	37.3		32.0	33.6		11.0	18.0		8.1	18.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.2	37.3		32.0	33.6		11.0	18.0		8.1	18.3	
LOS	C	D		C	C		B	B		A	B	
Approach Delay		35.2			33.2			16.5			17.1	
Approach LOS		D			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 80.5 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 26.3		Intersection LOS: C	
Intersection Capacity Utilization 61.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	77	561	163	526	122	449	61	474
v/c Ratio	0.26	0.71	0.64	0.61	0.23	0.28	0.11	0.32
Control Delay	20.2	37.3	32.0	33.6	11.0	18.0	8.1	18.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.2	37.3	32.0	33.6	11.0	18.0	8.1	18.3
Queue Length 50th (m)	9.2	50.0	20.6	46.3	9.4	27.1	3.1	33.2
Queue Length 95th (m)	16.8	62.3	31.9	58.3	20.5	44.8	7.1	52.7
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	297	1494	256	1494	539	1612	546	1484
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	0.26	0.38	0.64	0.35	0.23	0.28	0.11	0.32

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	550	0	160	515	0	120	440	0	60	465	0
Future Volume (vph)	75	550	0	160	515	0	120	440	0	60	465	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1803	3539		1769	3539		1802	3610		1763	3610	
Flt Permitted	0.34	1.00		0.26	1.00		0.42	1.00		0.49	1.00	
Satd. Flow (perm)	654	3539		488	3539		792	3610		914	3610	
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)	77	561	0	163	526	0	122	449	0	61	474	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	77	561	0	163	526	0	122	449	0	61	474	0
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.8	20.6		28.4	21.9		47.4	39.0		42.4	36.5	
Effective Green, g (s)	25.8	20.6		28.4	21.9		47.4	39.0		42.4	36.5	
Actuated g/C Ratio	0.29	0.23		0.32	0.24		0.53	0.43		0.47	0.41	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	253	810		246	861		511	1564		486	1464	
v/s Ratio Prot	0.02	0.16		c0.05	0.15		c0.02	0.12		0.01	c0.13	
v/s Ratio Perm	0.07			c0.16			0.10			0.05		
v/c Ratio	0.30	0.69		0.66	0.61		0.24	0.29		0.13	0.32	
Uniform Delay, d1	24.1	31.8		23.8	30.3		11.0	16.5		13.0	18.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.76	0.91	
Incremental Delay, d2	0.7	2.6		6.6	1.3		0.2	0.5		0.1	0.6	
Delay (s)	24.8	34.4		30.3	31.6		11.2	17.0		10.0	17.3	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		33.2			31.3			15.7			16.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	525	0	0	680	50	275	80	155	45	0	245
Future Volume (vph)	145	525	0	0	680	50	275	80	155	45	0	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.990				0.850			0.850
Flt Protected	0.950						0.950	0.973		0.950		
Satd. Flow (prot)	1787	5136	0	0	5080	0	1698	1747	1599	1805	0	1599
Flt Permitted	0.288						0.950	0.973		0.587		
Satd. Flow (perm)	541	5136	0	0	5080	0	1698	1747	1599	1115	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					11				160			253
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	149	541	0	0	701	52	284	82	160	46	0	253
Shared Lane Traffic (%)							36%					
Lane Group Flow (vph)	149	541	0	0	753	0	182	184	160	46	0	253
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	Perm	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		8	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	47.5	25.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	47.5	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	37.2%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	4.5	4.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	3.0	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.5	7.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	33.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

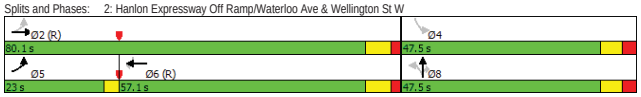
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.31	0.31		0.39
v/c Ratio	0.29	0.18			0.38		0.34	0.34	0.26	0.13		0.32
Control Delay	12.4	13.3			27.9		36.0	35.8	5.8	32.8		4.1
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	12.4	13.3			27.9		36.0	35.8	5.8	32.8		4.1
LOS	B	B			C		D	D	A	C		A
Approach Delay		13.1			27.9			26.7			8.5	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type:	Other		
Cycle Length: 127.6			
Actuated Cycle Length: 127.6			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 20.6		Intersection LOS: C	
Intersection Capacity Utilization 65.5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	149	541	753	182	184	160	46	253
v/c Ratio	0.29	0.18	0.38	0.34	0.34	0.26	0.13	0.32
Control Delay	12.4	13.3	27.9	36.0	35.8	5.8	32.8	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.4	13.3	27.9	36.0	35.8	5.8	32.8	4.1
Queue Length 50th (m)	16.1	23.9	50.7	38.9	39.2	0.0	8.7	0.0
Queue Length 95th (m)	26.1	30.4	62.3	61.2	61.7	16.1	18.8	17.0
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	522	2938	1997	532	547	611	349	780
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	0.29	0.18	0.38	0.34	0.34	0.26	0.13	0.32

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	525	0	0	680	50	275	80	155	45	0	245
Future Volume (vph)	145	525	0	0	680	50	275	80	155	45	0	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.5	7.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			0.99		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.97	1.00	0.95		1.00
Satd. Flow (prot)	1787	5136			5078		1698	1747	1599	1805		1599
Flt Permitted	0.29	1.00			1.00		0.95	0.97	1.00	0.59		1.00
Satd. Flow (perm)	541	5136			5078		1698	1747	1599	1116		1599
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)	149	541	0	0	701	52	284	82	160	46	0	253
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	110	0	0	154
Lane Group Flow (vph)	149	541	0	0	746	0	182	184	50	46	0	99
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		8	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.31	0.31		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.5	7.5		7.1
Lane Grp Cap (vph)	504	2938			1989		532	547	501	349		626
v/s Ratio Prot	c0.05	0.11			c0.15							
v/s Ratio Perm	0.12						c0.11	0.11	0.03	0.04		0.06
v/c Ratio	0.30	0.18			0.38		0.34	0.34	0.10	0.13		0.16
Uniform Delay, d1	13.2	13.1			27.7		33.7	33.6	31.0	31.4		25.2
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	1.5	0.1			0.5		1.7	1.7	0.4	0.8		0.5
Delay (s)	14.7	13.2			28.2		35.4	35.3	31.4	32.1		25.7
Level of Service	B	B			C		D	D	C	C		C
Approach Delay (s)		13.5			28.2			34.2			26.7	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	630	375	0	865	0	0	0	0	150	0	145
Future Volume (vph)	0	630	375	0	865	0	0	0	0	150	0	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.944										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4818	0	0	5136	0	0	0	0	3467	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	4818	0	0	5136	0	0	0	0	3467	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		341										153
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	2					2						
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%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Adj. Flow (vph)	0	663	395	0	911	0	0	0	0	158	0	153
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1058	0	0	911	0	0	0	0	158	0	153
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			24.9					24.7		24.9
Total Split (s)		56.9			56.9					24.7		56.9
Total Split (%)		69.7%			69.7%					30.3%		69.7%
Maximum Green (s)		50.0			50.0					18.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		7.0			7.0					7.0		7.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					18.0		50.0
Actuated g/C Ratio		0.61			0.61					0.22		0.61
v/c Ratio		0.34			0.29					0.21		0.15

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

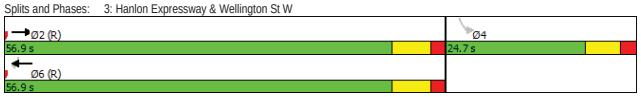
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		5.3			7.7					26.8		1.6
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		5.3			7.7					26.8		1.6
LOS		A			A					C		A
Approach Delay		5.3			7.7						14.4	
Approach LOS		A			A						B	

Intersection Summary

Area Type: Other
Cycle Length: 81.6
Actuated Cycle Length: 81.6
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 50
Control Type: Pretimed
Maximum v/c Ratio: 0.34
Intersection Signal Delay: 7.5 — Intersection LOS: A
Intersection Capacity Utilization 37.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1058	911	158	153
v/c Ratio	0.34	0.29	0.21	0.15
Control Delay	5.3	7.7	26.8	1.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.3	7.7	26.8	1.6
Queue Length 50th (m)	17.6	23.1	10.9	0.0
Queue Length 95th (m)	24.1	29.7	19.0	6.5
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	3084	3147	764	993
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.34	0.29	0.21	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	630	375	0	865	0	0	0	0	150	0	145
Future Volume (vph)	0	630	375	0	865	0	0	0	0	150	0	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.94			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4818			5136					3467		1524
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4818			5136					3467		1524
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)	0	663	395	0	911	0	0	0	0	158	0	153
RTOR Reduction (vph)	0	132	0	0	0	0	0	0	0	0	0	59
Lane Group Flow (vph)	0	926	0	0	911	0	0	0	0	158	0	94
Confl. Peds. (#/hr)	2					2						
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					18.0		50.0
Effective Green, g (s)		50.0			50.0					18.0		50.0
Actuated g/C Ratio		0.61			0.61					0.22		0.61
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2952			3147					764		933
v/s Ratio Prot		c0.19			0.18							
v/s Ratio Perm										c0.05		0.06
v/c Ratio		0.31			0.29					0.21		0.10
Uniform Delay, d1		7.6			7.4					26.0		6.5
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		0.3			0.2					0.6		0.2
Delay (s)		7.9			7.7					26.6		6.7
Level of Service		A			A					C		A
Approach Delay (s)		7.9			7.7			0.0			16.8	
Approach LOS		A			A			A			B	

Intersection Summary

HCM 2000 Control Delay 9.0 — HCM 2000 Level of Service A
HCM 2000 Volume to Capacity ratio 0.29
Actuated Cycle Length (s) 81.6 — Sum of lost time (s) 13.6
Intersection Capacity Utilization 37.2% — ICU Level of Service A
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	620	595	295	375	55
Future Volume (vph)	65	620	595	295	375	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99			
Frt			0.950			0.850
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	3528	3338	0	1787	1615
Flt Permitted		0.780			0.950	
Satd. Flow (perm)	0	2766	3338	0	1787	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			149			57
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	3%	0%	1%	0%
Adj. Flow (vph)	67	639	613	304	387	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	706	917	0	387	57
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

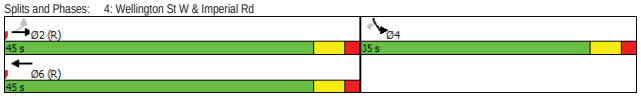
Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		45.6	45.6		22.4	22.4
Actuated g/C Ratio		0.57	0.57		0.28	0.28
v/c Ratio		0.45	0.47		0.77	0.12
Control Delay		12.1	10.0		36.9	6.0
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		12.1	10.0		36.9	6.0
LOS		B	A		D	A
Approach Delay		12.1	10.0		33.0	
Approach LOS		B	A		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 15.6		Intersection LOS: B	
Intersection Capacity Utilization 80.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	706	917	387	57
v/c Ratio	0.45	0.47	0.77	0.12
Control Delay	12.1	10.0	36.9	6.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.1	10.0	36.9	6.0
Queue Length 50th (m)	31.8	34.2	56.4	0.0
Queue Length 95th (m)	54.5	58.8	78.3	7.2
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1576	1966	647	621
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.45	0.47	0.60	0.09

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	620	595	295	375	55
Future Volume (vph)	65	620	595	295	375	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.95		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3529	3339		1787	1615
Flt Permitted		0.78	1.00		0.95	1.00
Satd. Flow (perm)		2764	3339		1787	1615
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	67	639	613	304	387	57
RTOR Reduction (vph)	0	0	64	0	0	41
Lane Group Flow (vph)	0	706	853	0	387	16
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	0%	2%	3%	0%	1%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		45.6	45.6		22.4	22.4
Effective Green, g (s)		45.6	45.6		22.4	22.4
Actuated g/C Ratio		0.57	0.57		0.28	0.28
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1575	1903		500	452
v/s Ratio Prot			c0.26		c0.22	
v/s Ratio Perm		0.26				0.01
v/c Ratio		0.45	0.45		0.77	0.04
Uniform Delay, d1		9.9	9.9		26.5	20.9
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		0.9	0.8		7.3	0.0
Delay (s)		10.9	10.7		33.8	21.0
Level of Service		B	B		C	C
Approach Delay (s)		10.9	10.7		32.2	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	15.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	320	0	225	330	70	350	1035	0	80	945	130
Future Volume (vph)	125	320	0	225	330	70	350	1035	0	80	945	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00	1.00							
Frt					0.974							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3574	0	1805	3507	0	3467	3374	0	1805	3471	1615
Flt Permitted	0.370			0.303			0.950			0.950		
Satd. Flow (perm)	695	3574	0	575	3507	0	3467	3374	0	1805	3471	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					12							134
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.97	0.97	0.40	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Adj. Flow (vph)	129	330	0	232	340	72	361	1067	0	82	974	134
Shared Lane Traffic (%)												
Lane Group Flow (vph)	129	330	0	232	412	0	361	1067	0	82	974	134
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

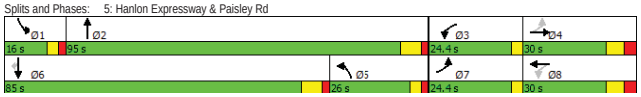
Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	1.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	30.0		9.5	30.0		10.0	59.4		10.0	60.4	60.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	38.6	19.3		46.7	24.6		20.4	87.8		10.4	77.7	77.7
Actuated g/C Ratio	0.24	0.12		0.29	0.15		0.13	0.55		0.06	0.48	0.48
v/c Ratio	0.49	0.77		0.73	0.75		0.82	0.58		0.70	0.58	0.16
Control Delay	49.9	81.3		60.5	72.9		84.2	26.3		104.2	32.0	3.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	49.9	81.3		60.5	72.9		84.2	26.3		104.2	32.0	3.9
LOS	D	F		E	E		F	C		F	C	A
Approach Delay		72.5			68.4			41.0			33.9	
Approach LOS		E			E			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 160.5			
Natural Cycle: 110			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 47.3		Intersection LOS: D	
Intersection Capacity Utilization 78.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	129	330	232	412	361	1067	82	974	134
v/c Ratio	0.49	0.77	0.73	0.75	0.82	0.58	0.70	0.58	0.16
Control Delay	49.9	81.3	60.5	72.9	84.2	26.3	104.2	32.0	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.9	81.3	60.5	72.9	84.2	26.3	104.2	32.0	3.9
Queue Length 50th (m)	33.4	58.4	63.9	69.0	63.0	128.0	28.0	126.8	0.0
Queue Length 95th (m)	52.2	76.8	91.3	92.5	#87.2	153.6	#54.5	152.6	12.7
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	340	490	331	556	454	1844	124	1681	851
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.67	0.70	0.74	0.80	0.58	0.66	0.58	0.16

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	320	0	225	330	70	350	1035	0	80	945	130
Future Volume (vph)	125	320	0	225	330	70	350	1035	0	80	945	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.97		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1786	3574		1804	3507		3467	3374		1805	3471	1615
Flt Permitted	0.37	1.00		0.30	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	696	3574		576	3507		3467	3374		1805	3471	1615
Peak-hour factor, PHF	0.97	0.97	0.40	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	129	330	0	232	340	72	361	1067	0	82	974	134
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	69
Lane Group Flow (vph)	129	330	0	232	402	0	361	1067	0	82	974	65
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	33.6	19.3		41.9	24.6		20.4	87.7		10.4	77.7	77.7
Effective Green, g (s)	33.6	19.3		41.9	24.6		20.4	87.7		10.4	77.7	77.7
Actuated g/C Ratio	0.21	0.12		0.26	0.15		0.13	0.55		0.06	0.48	0.48
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	242	430		300	537		440	1844		117	1681	782
v/s Ratio Prot	0.05	0.09		c0.09	0.11		c0.10	c0.32		0.05	c0.28	
v/s Ratio Perm	0.06			c0.11								0.04
v/c Ratio	0.53	0.77		0.77	0.75		0.82	0.58		0.70	0.58	0.08
Uniform Delay, d1	54.1	68.4		50.6	64.9		68.2	24.1		73.5	29.6	22.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.3	8.0		11.7	5.7		11.6	1.3		17.3	1.5	0.2
Delay (s)	56.4	76.4		62.4	70.6		79.8	25.4		90.7	31.1	22.4
Level of Service	E	E		E	E		E	C		F	C	C
Approach Delay (s)		70.8			67.6			39.2			34.2	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	160.4	Sum of lost time (s)	23.4
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	110	35	55	105	40	40	480	60	30	475	55
Future Volume (vph)	80	110	35	55	105	40	40	480	60	30	475	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		1.00	1.00		1.00	1.00	
Frt		0.964			0.959			0.983			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1800	0	1805	1797	0	1805	1859	0	1770	1865	0
Flt Permitted	0.602			0.602			0.430			0.424		
Satd. Flow (perm)	1110	1800	0	1135	1797	0	815	1859	0	787	1865	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			33			8			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Adj. Flow (vph)	82	113	36	57	108	41	41	495	62	31	490	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	149	0	57	149	0	41	557	0	31	547	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

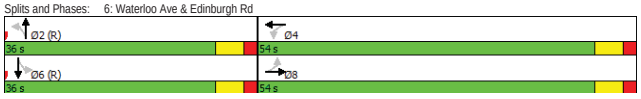
Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	11.7	11.7		11.7	11.7		66.3	66.3		66.3	66.3	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.74	0.74		0.74	0.74	
v/c Ratio	0.57	0.58		0.39	0.57		0.07	0.41		0.05	0.40	
Control Delay	50.9	38.2		41.9	36.1		3.7	9.7		4.5	5.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	50.9	38.2		41.9	36.1		3.7	9.7		4.5	5.9	
LOS	D	D		D	D		A	A		A	A	
Approach Delay		42.7			37.7			9.3			5.9	
Approach LOS		D			D			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 63.5%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	82	149	57	149	41	557	31	547
v/c Ratio	0.57	0.58	0.39	0.57	0.07	0.41	0.05	0.40
Control Delay	50.9	38.2	41.9	36.1	3.7	9.7	4.5	5.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	38.2	41.9	36.1	3.7	9.7	4.5	5.9
Queue Length 50th (m)	14.3	21.1	9.7	20.0	1.4	25.8	1.3	29.7
Queue Length 95th (m)	27.4	37.7	20.3	36.6	4.1	78.8	4.6	58.7
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	592	972	605	973	600	1370	579	1375
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	0.14	0.15	0.09	0.15	0.07	0.41	0.05	0.40

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	110	35	55	105	40	40	480	60	30	475	55
Future Volume (vph)	80	110	35	55	105	40	40	480	60	30	475	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1800		1792	1796		1800	1859		1759	1865	
Flt Permitted	0.60	1.00		0.60	1.00		0.43	1.00		0.42	1.00	
Satd. Flow (perm)	1110	1800		1135	1796		814	1859		785	1865	
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)	82	113	36	57	108	41	41	495	62	31	490	57
RTOR Reduction (vph)	0	23	0	0	29	0	0	2	0	0	2	0
Lane Group Flow (vph)	82	126	0	57	120	0	41	555	0	31	545	0
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	11.7	11.7		11.7	11.7		66.3	66.3		66.3	66.3	
Effective Green, g (s)	11.7	11.7		11.7	11.7		66.3	66.3		66.3	66.3	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.74	0.74		0.74	0.74	
Clearance Time (s)	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	
Lane Grp Cap (vph)	144	234		147	233		599	1369		578	1373	
v/s Ratio Prot		0.07			0.07			c0.30			0.29	
v/s Ratio Perm	c0.07			0.05			0.05			0.04		
v/c Ratio	0.57	0.54		0.39	0.52		0.07	0.41		0.05	0.40	
Uniform Delay, d1	36.8	36.6		35.9	36.5		3.3	4.4		3.2	4.4	
Progression Factor	1.00	1.00		1.00	1.00		0.81	1.72		1.00	1.00	
Incremental Delay, d2	5.1	2.4		1.7	1.9		0.2	0.9		0.2	0.9	
Delay (s)	41.9	39.0		37.6	38.4		2.9	8.5		3.4	5.3	
Level of Service	D	D		D	D		A	A		A	A	
Approach Delay (s)		40.0			38.2			8.1			5.2	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	70	140	165	70	135	155
Future Volume (vph)	70	140	165	70	135	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1599
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	1%
Adj. Flow (vph)	76	152	179	76	147	168
Shared Lane Traffic (%)						
Lane Group Flow (vph)	76	152	179	76	147	168
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.0%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	70	140	165	70	135	155
Future Volume (Veh/h)	70	140	165	70	135	155
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	152	179	76	147	168
Pedestrians					1	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			229		511	77
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			229		511	77
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		68	83
cM capacity (veh/h)			1338		455	986

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	76	152	179	76	315
Volume Left	0	0	179	0	147
Volume Right	0	152	0	0	168
cSH	1700	1700	1338	1700	976
Volume to Capacity	0.04	0.09	0.13	0.04	0.32
Queue Length 95th (m)	0.0	0.0	3.7	0.0	11.2
Control Delay (s)	0.0	0.0	8.1	0.0	12.8
Lane LOS			A		B
Approach Delay (s)	0.0		5.7		12.8
Approach LOS					B

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	290	95	35	270	60	110	450	25	55	425	85
Future Volume (vph)	100	290	95	35	270	60	110	450	25	55	425	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		1.00	1.00		1.00	0.99	
Frt		0.963			0.973			0.992			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1801	0	1805	1821	0	1805	1880	0	1736	1840	0
Flt Permitted	0.411			0.334			0.336			0.367		
Satd. Flow (perm)	773	1801	0	631	1821	0	636	1880	0	669	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			16			5			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Adj. Flow (vph)	108	312	102	38	290	65	118	484	27	59	457	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	414	0	38	355	0	118	511	0	59	548	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.42	0.67		0.18	0.58		0.37	0.54		0.17	0.58	
Control Delay	25.5	26.8		20.6	24.1		15.4	15.0		11.7	15.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.5	26.8		20.6	24.1		15.4	15.0		11.7	15.6	
LOS	C	C		C	C		B	B		B	B	
Approach Delay		26.6			23.8			15.1			15.2	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 19.5		Intersection LOS: B	
Intersection Capacity Utilization 80.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd

Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	108	414	38	355	118	511	59	548
v/c Ratio	0.42	0.67	0.18	0.58	0.37	0.54	0.17	0.58
Control Delay	25.5	26.8	20.6	24.1	15.4	15.0	11.7	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.5	26.8	20.6	24.1	15.4	15.0	11.7	15.6
Queue Length 50th (m)	13.8	55.2	4.0	41.0	10.0	47.8	4.5	51.6
Queue Length 95th (m)	30.1	89.1	11.2	67.4	22.8	74.9	11.3	81.7
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	257	616	210	617	322	955	338	941
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	0.42	0.67	0.18	0.58	0.37	0.54	0.17	0.58

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	290	95	35	270	60	110	450	25	55	425	85
Future Volume (vph)	100	290	95	35	270	60	110	450	25	55	425	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1786	1801		1794	1820		1798	1880		1731	1840	
Flt Permitted	0.41	1.00		0.33	1.00		0.34	1.00		0.37	1.00	
Satd. Flow (perm)	772	1801		631	1820		636	1880		668	1840	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	108	312	102	38	290	65	118	484	27	59	457	91
RTOR Reduction (vph)	0	16	0	0	11	0	0	2	0	0	9	0
Lane Group Flow (vph)	108	398	0	38	344	0	118	509	0	59	539	0
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	257	600		210	606		322	952		338	932	
v/s Ratio Prot		c0.22			0.19			0.27			c0.29	
v/s Ratio Perm	0.14			0.06			0.19			0.09		
v/c Ratio	0.42	0.66		0.18	0.57		0.37	0.53		0.17	0.58	
Uniform Delay, d1	19.4	21.4		17.7	20.6		11.2	12.5		10.0	12.9	
Progression Factor	1.01	1.03		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.7	5.3		1.9	3.8		3.2	2.1		1.1	2.6	
Delay (s)	24.3	27.4		19.6	24.4		14.4	14.7		11.1	15.5	
Level of Service	C	C		B	C		B	B		B	B	
Approach Delay (s)		26.7			23.9			14.6			15.1	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	315	120	70	310	145	115	40	65	190	40	205
Future Volume (vph)	205	315	120	70	310	145	115	40	65	190	40	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00	0.99		1.00	0.98		0.99	0.99	
Frt			0.850		0.952			0.907			0.874	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1783	0	1770	1695	0	1787	1641	0
Flt Permitted	0.339			0.555			0.519			0.526		
Satd. Flow (perm)	643	1881	1594	1054	1783	0	966	1695	0	984	1641	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			130		33			71			223	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	223	342	130	76	337	158	125	43	71	207	43	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	223	342	130	76	495	0	125	114	0	207	266	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	15.0	60.0	60.0	45.0	45.0		11.0	19.0		11.0	19.0	
Total Split (%)	16.7%	66.7%	66.7%	50.0%	50.0%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	12.0	54.0	54.0	39.0	39.0		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	61.4	58.4	58.4	45.9	45.9		17.9	8.8		20.2	8.8	
Actuated g/C Ratio	0.68	0.65	0.65	0.51	0.51		0.20	0.10		0.22	0.10	
v/c Ratio	0.40	0.28	0.12	0.14	0.54		0.48	0.50		0.67	0.74	
Control Delay	7.9	8.1	1.7	14.6	17.7		33.3	24.1		40.0	21.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.9	8.1	1.7	14.6	17.7		33.3	24.1		40.0	21.5	
LOS	A	A	A	B	B		C	C		D	C	
Approach Delay		6.8			17.3			28.9			29.6	
Approach LOS		A			B			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 18.0		Intersection LOS: B	
Intersection Capacity Utilization 74.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd

Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	223	342	130	76	495	125	114	207	266
v/c Ratio	0.40	0.28	0.12	0.14	0.54	0.48	0.50	0.67	0.74
Control Delay	7.9	8.1	1.7	14.6	17.7	33.3	24.1	40.0	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	8.1	1.7	14.6	17.7	33.3	24.1	40.0	21.5
Queue Length 50th (m)	12.5	23.4	0.0	6.8	52.8	18.5	7.5	32.2	7.5
Queue Length 95th (m)	25.1	43.1	6.7	17.5	97.2	31.4	22.6	49.6	31.2
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	593	1220	1080	537	925	265	305	311	427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.28	0.12	0.14	0.54	0.47	0.37	0.67	0.62

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	315	120	70	310	145	115	40	65	190	40	205
Future Volume (vph)	205	315	120	70	310	145	115	40	65	190	40	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	1881	1594	1804	1783		1769	1694		1782	1642	
Flt Permitted	0.34	1.00	1.00	0.56	1.00		0.52	1.00		0.53	1.00	
Satd. Flow (perm)	644	1881	1594	1054	1783		967	1694		988	1642	
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)	223	342	130	76	337	158	125	43	71	207	43	223
RTOR Reduction (vph)	0	0	47	0	17	0	0	65	0	0	198	0
Lane Group Flow (vph)	223	342	83	76	478	0	125	49	0	207	68	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	57.2	57.2	57.2	44.7	44.7		15.5	7.7		20.1	10.0	
Effective Green, g (s)	57.2	57.2	57.2	44.7	44.7		15.5	7.7		20.1	10.0	
Actuated g/C Ratio	0.64	0.64	0.64	0.50	0.50		0.17	0.09		0.22	0.11	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	531	1195	1013	523	885		236	144		309	182	
v/s Ratio Prot	c0.04	0.18			c0.27		0.05	0.03		c0.07	0.04	
v/s Ratio Perm	0.22		0.05	0.07			0.05			c0.07		
v/c Ratio	0.42	0.29	0.08	0.15	0.54		0.53	0.34		0.67	0.37	
Uniform Delay, d1	8.3	7.3	6.3	12.3	15.6		33.3	38.8		30.7	37.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.6	0.2	0.6	2.4		2.1	1.4		5.4	1.3	
Delay (s)	8.8	7.9	6.5	12.9	18.0		35.4	40.2		36.2	38.4	
Level of Service	A	A	A	B	B		D	D		D	D	
Approach Delay (s)		7.9			17.3			37.7			37.4	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	4	50	25	4	25	55	105	20	25	105	80
Future Volume (vph)	75	4	50	25	4	25	55	105	20	25	105	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948			0.937			0.976			0.935	
Flt Protected		0.972			0.977		0.950			0.950		
Satd. Flow (prot)	0	1716	0	0	1705	0	1770	1818	0	1770	1742	0
Flt Permitted		0.972			0.977		0.950			0.950		
Satd. Flow (perm)	0	1716	0	0	1705	0	1770	1818	0	1770	1742	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	4	54	27	4	27	60	114	22	27	114	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	140	0	0	58	0	60	136	0	27	201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.1%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	4	50	25	4	25	55	105	20	25	105	80
Future Volume (Veh/h)	75	4	50	25	4	25	55	105	20	25	105	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	82	4	54	27	4	27	60	114	22	27	114	87
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	474	468	158	469	500	125	201			136		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	474	468	158	469	500	125	201			136		
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 %	82	99	94	94	99	97	96			98		
cM capacity (veh/h)	460	463	888	449	444	926	1371			1448		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	140	58	60	136	27	201
Volume Left	82	27	60	0	27	0
Volume Right	54	27	0	22	0	87
cSH	565	590	1371	1700	1448	1700
Volume to Capacity	0.25	0.10	0.04	0.08	0.02	0.12
Queue Length 95th (m)	7.8	2.6	1.1	0.0	0.5	0.0
Control Delay (s)	13.5	11.8	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.5	11.8	2.4		0.9	
Approach LOS	B	B				

Intersection Summary

Average Delay	5.2		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	4	90	25	4	25	95	75	20	25	75	80
Future Volume (vph)	80	4	90	25	4	25	95	75	20	25	75	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.930			0.937			0.968			0.923	
Flt Protected		0.978			0.977		0.950			0.950		
Satd. Flow (prot)	0	1694	0	0	1705	0	1770	1803	0	1770	1719	0
Flt Permitted		0.978			0.977		0.950			0.950		
Satd. Flow (perm)	0	1694	0	0	1705	0	1770	1803	0	1770	1719	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	4	98	27	4	27	103	82	22	27	82	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	189	0	0	58	0	103	104	0	27	169	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.9%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	4	90	25	4	25	95	75	20	25	75	80
Future Volume (Veh/h)	80	4	90	25	4	25	95	75	20	25	75	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	87	4	98	27	4	27	103	82	22	27	82	87
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	496	490	126	535	522	93	169			104		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496	490	126	535	522	93	169			104		
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 %	80	99	89	93	99	97	93			98		
cM capacity (veh/h)	435	436	925	377	418	964	1409			1488		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	189	58	103	104	27	169
Volume Left	87	27	103	0	27	0
Volume Right	98	27	0	22	0	87
cSH	600	531	1409	1700	1488	1700
Volume to Capacity	0.32	0.11	0.07	0.06	0.02	0.10
Queue Length 95th (m)	10.8	2.9	1.9	0.0	0.4	0.0
Control Delay (s)	13.7	12.6	7.8	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.7	12.6	3.9		1.0	
Approach LOS	B	B				

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	245	40	45	245	65	79
Future Volume (vph)	245	40	45	245	65	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.873			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3074	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3074	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	7			1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	3%	0%	0%
Adj. Flow (vph)	266	43	49	266	71	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	266	43	315	0	71	86
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	245	40	45	245	65	79
Future Volume (Veh/h)	245	40	45	245	65	79
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	266	43	49	266	71	86
Pedestrians	1		7			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	0		1			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	375	158			316	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	375	158			316	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	53	95			94	
cM capacity (veh/h)	561	864			1255	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	266	43	33	282	71	43	43
Volume Left	266	0	0	0	71	0	0
Volume Right	0	43	0	266	0	0	0
cSH	561	864	1700	1700	1255	1700	1700
Volume to Capacity	0.47	0.05	0.02	0.17	0.06	0.03	0.03
Queue Length 95th (m)	20.2	1.3	0.0	0.0	1.4	0.0	0.0
Control Delay (s)	17.1	9.4	0.0	0.0	8.0	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	16.0		0.0		3.6		
Approach LOS	C						

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	255	75	150	265	60	120
Future Volume (vph)	255	75	150	265	60	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.904			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3243	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3243	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	277	82	163	288	65	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	277	82	451	0	65	130
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.1%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	255	75	150	265	60	120
Future Volume (Veh/h)	255	75	150	265	60	120
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	277	82	163	288	65	130
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	503	226			451	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	503	226			451	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	41	90			94	
cM capacity (veh/h)	469	784			1120	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	277	82	109	342	65	65	65
Volume Left	277	0	0	0	65	0	0
Volume Right	0	82	0	288	0	0	0
cSH	469	784	1700	1700	1120	1700	1700
Volume to Capacity	0.59	0.10	0.06	0.20	0.06	0.04	0.04
Queue Length 95th (m)	30.0	2.8	0.0	0.0	1.5	0.0	0.0
Control Delay (s)	23.2	10.1	0.0	0.0	8.4	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	20.2		0.0		2.8		
Approach LOS	C						

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	165	70	135	155	70	140
Future Volume (vph)	165	70	135	155	70	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.920			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3304	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3304	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	179	76	147	168	76	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	179	76	315	0	76	152
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.7%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	165	70	135	155	70	140
Future Volume (Veh/h)	165	70	135	155	70	140
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	179	76	147	168	76	152
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	460	158			315	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	460	158			315	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	64	91			94	
cM capacity (veh/h)	497	866			1257	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	179	76	98	217	76	76	76
Volume Left	179	0	0	0	76	0	0
Volume Right	0	76	0	168	0	0	0
cSH	497	866	1700	1700	1257	1700	1700
Volume to Capacity	0.36	0.09	0.06	0.13	0.06	0.04	0.04
Queue Length 95th (m)	13.0	2.3	0.0	0.0	1.5	0.0	0.0
Control Delay (s)	16.2	9.6	0.0	0.0	8.0	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	14.3		0.0		2.7		
Approach LOS	B						

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	815	0	110	530	0	180	580	0	60	540	0
Future Volume (vph)	115	815	0	110	530	0	180	580	0	60	540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			0.99		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3471	0	1703	3438	0	1752	3539	0	1703	3505	0
Flt Permitted	0.334			0.149			0.253			0.342		
Satd. Flow (perm)	626	3471	0	267	3438	0	465	3539	0	606	3505	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		5	5		3	8		24	24		8
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
Heavy Vehicles (%)	1%	4%	5%	6%	5%	0%	3%	2%	4%	6%	3%	0%
Adj. Flow (vph)	129	916	0	124	596	0	202	652	0	67	607	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	129	916	0	124	596	0	202	652	0	67	607	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

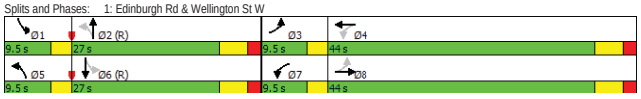
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	39.8	30.3		39.8	30.3		40.6	29.8		34.8	24.7	
Actuated g/C Ratio	0.44	0.34		0.44	0.34		0.45	0.33		0.39	0.27	
v/c Ratio	0.36	0.78		0.56	0.52		0.56	0.56		0.21	0.63	
Control Delay	15.2	31.8		22.4	25.0		25.2	29.2		12.5	28.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.2	31.8		22.4	25.0		25.2	29.2		12.5	28.2	
LOS	B	C		C	C		C	C		B	C	
Approach Delay		29.7			24.6			28.3			26.7	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 80 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 27.6		Intersection LOS: C	
Intersection Capacity Utilization 70.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	129	916	124	596	202	652	67	607
v/c Ratio	0.36	0.78	0.56	0.52	0.56	0.56	0.21	0.63
Control Delay	15.2	31.8	22.4	25.0	25.2	29.2	12.5	28.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.2	31.8	22.4	25.0	25.2	29.2	12.5	28.2
Queue Length 50th (m)	12.7	78.2	12.3	45.3	21.7	52.5	4.2	55.9
Queue Length 95th (m)	19.3	88.3	18.9	53.4	#42.8	78.3	m8.4	67.3
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	360	1465	221	1451	359	1171	325	962
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	0.36	0.63	0.56	0.41	0.56	0.56	0.21	0.63

Intersection Summary
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.

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	815	0	110	530	0	180	580	0	60	540	0
Future Volume (vph)	115	815	0	110	530	0	180	580	0	60	540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1786	3471		1703	3438		1751	3539		1696	3505	
Flt Permitted	0.33	1.00		0.15	1.00		0.25	1.00		0.34	1.00	
Satd. Flow (perm)	627	3471		266	3438		467	3539		610	3505	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	129	916	0	124	596	0	202	652	0	67	607	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	129	916	0	124	596	0	202	652	0	67	607	0
Confl. Peds. (#/hr)	3		5	5		3	8		24	24		8
Heavy Vehicles (%)	1%	4%	5%	6%	5%	0%	3%	2%	4%	6%	3%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	36.8	30.3		36.8	30.3		38.2	29.2		30.7	24.7	
Effective Green, g (s)	36.8	30.3		36.8	30.3		38.2	29.2		30.7	24.7	
Actuated g/C Ratio	0.41	0.34		0.41	0.34		0.42	0.32		0.34	0.27	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	340	1168		212	1157		348	1148		280	961	
v/s Ratio Prot	0.03	c0.26		c0.04	0.17		c0.07	0.18		0.02	0.17	
v/s Ratio Perm	0.13			0.20			c0.18			0.07		
v/c Ratio	0.38	0.78		0.58	0.52		0.58	0.57		0.24	0.63	
Uniform Delay, d1	17.2	26.9		18.8	24.0		17.8	25.2		20.4	28.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.69	0.84	
Incremental Delay, d2	0.7	3.5		4.1	0.4		2.5	2.0		0.4	2.9	
Delay (s)	17.9	30.4		22.8	24.3		20.2	27.2		14.5	27.0	
Level of Service	B	C		C	C		C	C		B	C	
Approach Delay (s)		28.9			24.1			25.6			25.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	880	0	0	755	15	190	100	230	16	0	315
Future Volume (vph)	175	880	0	0	755	15	190	100	230	16	0	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.997				0.850			0.850
Flt Protected	0.950						0.950	0.984		0.950		
Satd. Flow (prot)	1736	4988	0	0	4974	0	1633	1736	1599	1805	0	1583
Flt Permitted	0.249						0.950	0.984		0.622		
Satd. Flow (perm)	455	4988	0	0	4974	0	1633	1736	1599	1182	0	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					3				253			346
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
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 (%)	4%	4%	0%	0%	4%	0%	5%	1%	1%	0%	0%	2%
Adj. Flow (vph)	192	967	0	0	830	16	209	110	253	18	0	346
Shared Lane Traffic (%)							25%					
Lane Group Flow (vph)	192	967	0	0	846	0	157	162	253	18	0	346
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	34.1	25.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	80.1	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	62.8%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	5.0	4.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	2.1	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	20.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

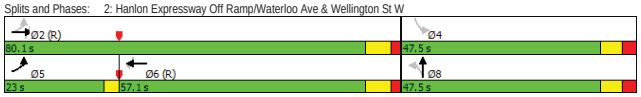
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.57	0.31		0.39
v/c Ratio	0.40	0.34			0.43		0.31	0.30	0.25	0.05		0.42
Control Delay	13.9	14.9			29.2		35.3	35.1	2.1	31.2		4.2
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	13.9	14.9			29.2		35.3	35.1	2.1	31.2		4.2
LOS	B	B			C		D	D	A	C		A
Approach Delay		14.7			29.2			20.5			5.5	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type:	Other
Cycle Length: 127.6	
Actuated Cycle Length: 127.6	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green	
Natural Cycle: 95	
Control Type: Pretimed	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 18.9	Intersection LOS: B
Intersection Capacity Utilization 68.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	192	967	846	157	162	253	18	346
v/c Ratio	0.40	0.34	0.43	0.31	0.30	0.25	0.05	0.42
Control Delay	13.9	14.9	29.2	35.3	35.1	2.1	31.2	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	14.9	29.2	35.3	35.1	2.1	31.2	4.2
Queue Length 50th (m)	21.4	47.5	59.1	33.1	34.1	0.0	3.3	0.0
Queue Length 95th (m)	33.3	56.8	71.8	53.4	54.7	11.5	9.5	19.2
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	475	2853	1950	511	544	1023	370	830
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	0.40	0.34	0.43	0.31	0.30	0.25	0.05	0.42

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	880	0	0	755	15	190	100	230	16	0	315
Future Volume (vph)	175	880	0	0	755	15	190	100	230	16	0	315
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			1.00		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00	0.95		1.00
Satd. Flow (prot)	1735	4988			4975		1633	1737	1599	1805		1583
Flt Permitted	0.25	1.00			1.00		0.95	0.98	1.00	0.62		1.00
Satd. Flow (perm)	454	4988			4975		1633	1737	1599	1182		1583
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)	192	967	0	0	830	16	209	110	253	18	0	346
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	108	0	0	210
Lane Group Flow (vph)	192	967	0	0	844	0	157	162	145	18	0	136
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	4%	4%	0%	0%	4%	0%	5%	1%	1%	0%	0%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.57	0.31		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Grp Cap (vph)	460	2853			1949		511	544	914	370		620
v/s Ratio Prot	c0.07	0.19			0.17							
v/s Ratio Perm	c0.17						c0.10	0.09	0.09	0.02		0.09
v/c Ratio	0.42	0.34			0.43		0.31	0.30	0.16	0.05		0.22
Uniform Delay, d1	14.0	14.5			28.4		33.3	33.2	12.8	30.5		25.8
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	2.8	0.3			0.7		1.6	1.4	0.4	0.2		0.8
Delay (s)	16.8	14.8			29.1		34.8	34.6	13.2	30.8		26.6
Level of Service	B	B			C		C	C	B	C		C
Approach Delay (s)		15.1			29.1			25.2			26.8	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	960	455	0	875	0	0	0	0	180	0	105
Future Volume (vph)	0	960	455	0	875	0	0	0	0	180	0	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.952										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4703	0	0	4988	0	0	0	0	3242	0	1455
Flt Permitted										0.950		
Satd. Flow (perm)	0	4703	0	0	4988	0	0	0	0	3242	0	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		176										111
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	1					1						
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%	5%	5%	0%	4%	0%	0%	0%	0%	8%	0%	11%
Adj. Flow (vph)	0	1011	479	0	921	0	0	0	0	189	0	111
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1490	0	0	921	0	0	0	0	189	0	111
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			29.9					24.7		29.9
Total Split (s)		56.9			56.9					41.7		56.9
Total Split (%)		57.7%			57.7%					42.3%		57.7%
Maximum Green (s)		50.0			50.0					35.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		0.0			7.0					0.0		7.0
Flash Dont Walk (s)		0.0			16.0					0.0		16.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
v/c Ratio		0.60			0.36					0.16		0.14

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

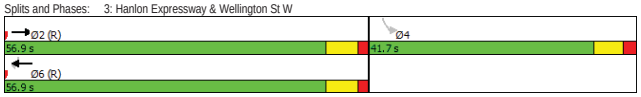
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		16.2			15.2					22.3		3.0
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		16.2			15.2					22.3		3.0
LOS		B			B					C		A
Approach Delay		16.2			15.2						15.1	
Approach LOS		B			B						B	

Intersection Summary

Area Type:	Other		
Cycle Length: 98.6			
Actuated Cycle Length: 98.6			
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 55			
Control Type: Pretimed			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 15.7		Intersection LOS: B	
Intersection Capacity Utilization 42.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1490	921	189	111
v/c Ratio	0.60	0.36	0.16	0.14
Control Delay	16.2	15.2	22.3	3.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.2	15.2	22.3	3.0
Queue Length 50th (m)	65.3	39.2	13.2	0.0
Queue Length 95th (m)	80.4	48.9	21.2	8.3
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	2471	2529	1150	792
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.60	0.36	0.16	0.14

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	960	455	0	875	0	0	0	0	180	0	105
Future Volume (vph)	0	960	455	0	875	0	0	0	0	180	0	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.95			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4702			4988					3242		1455
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4702			4988					3242		1455
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)	0	1011	479	0	921	0	0	0	0	189	0	111
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	0	0	0	55
Lane Group Flow (vph)	0	1403	0	0	921	0	0	0	0	189	0	56
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	5%	5%	0%	4%	0%	0%	0%	0%	8%	0%	11%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					35.0		50.0
Effective Green, g (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2384			2529					1150		737
v/s Ratio Prot		c0.30			0.18							
v/s Ratio Perm										c0.06		0.04
v/c Ratio		0.59			0.36					0.16		0.08
Uniform Delay, d1		17.1			14.7					21.8		12.5
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		1.1			0.4					0.3		0.2
Delay (s)		18.1			15.1					22.1		12.7
Level of Service		B			B					C		B
Approach Delay (s)		18.1			15.1			0.0			18.6	
Approach LOS		B			B			A			B	

Intersection Summary

HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	965	710	170	430	70
Future Volume (vph)	60	965	710	170	430	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	1.00			
Frt			0.971			0.850
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3397	3318	0	1770	1599
Flt Permitted		0.828			0.950	
Satd. Flow (perm)	0	2821	3318	0	1770	1599
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			51			73
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	6%	5%	6%	2%	1%
Adj. Flow (vph)	63	1005	740	177	448	73
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1068	917	0	448	73
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

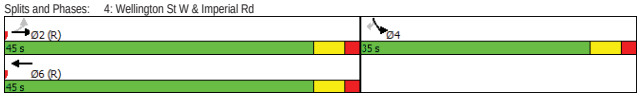
Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	-1.0
Total Lost Time (s)		6.0	6.0		6.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		43.5	43.5		24.5	25.5
Actuated g/C Ratio		0.54	0.54		0.31	0.32
v/c Ratio		0.70	0.50		0.83	0.13
Control Delay		17.5	12.7		39.1	5.1
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		17.5	12.7		39.1	5.1
LOS		B	B		D	A
Approach Delay		17.5	12.7		34.4	
Approach LOS		B	B		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 19.2		Intersection LOS: B	
Intersection Capacity Utilization 92.3%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1068	917	448	73
v/c Ratio	0.70	0.50	0.83	0.13
Control Delay	17.5	12.7	39.1	5.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.5	12.7	39.1	5.1
Queue Length 50th (m)	63.1	43.5	64.9	0.0
Queue Length 95th (m)	96.7	66.2	94.0	7.9
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1535	1829	641	645
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.70	0.50	0.70	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	965	710	170	430	70
Future Volume (vph)	60	965	710	170	430	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	5.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.97		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3397	3319		1770	1599
Flt Permitted		0.83	1.00		0.95	1.00
Satd. Flow (perm)		2821	3319		1770	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	62	1005	740	177	448	73
RTOR Reduction (vph)	0	0	23	0	0	50
Lane Group Flow (vph)	0	1068	894	0	448	23
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	5%	6%	5%	6%	2%	1%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		43.5	43.5		24.5	24.5
Effective Green, g (s)		43.5	43.5		24.5	25.5
Actuated g/C Ratio		0.54	0.54		0.31	0.32
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1533	1804		542	509
v/s Ratio Prot			0.27		c0.25	
v/s Ratio Perm		c0.38				0.01
v/c Ratio		0.70	0.50		0.83	0.05
Uniform Delay, d1		13.4	11.4		25.8	18.8
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		2.6	1.0		10.0	0.0
Delay (s)		16.0	12.4		35.8	18.9
Level of Service		B	B		D	B
Approach Delay (s)		16.0	12.4		33.4	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	340	0	195	215	70	165	1340	0	40	1005	45
Future Volume (vph)	95	340	0	195	215	70	165	1340	0	40	1005	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Frt					0.963							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	3438	0	1787	3392	0	3303	3343	0	1597	3282	1482
Flt Permitted	0.574			0.290			0.950			0.950		
Satd. Flow (perm)	1019	3438	0	546	3392	0	3303	3343	0	1597	3282	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					22							102
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	7%	5%	2%	1%	2%	4%	6%	8%	3%	13%	10%	9%
Adj. Flow (vph)	97	347	0	199	219	71	168	1367	0	41	1026	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	347	0	199	290	0	168	1367	0	41	1026	46
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	

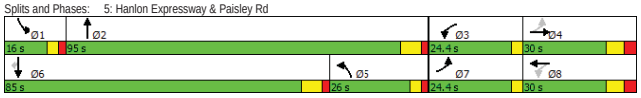
Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8								6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	1.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	30.0		9.5	30.0		10.0	59.4		10.0	59.4	59.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	37.0	19.7		45.9	25.6		17.5	89.0		8.9	78.0	78.0
Actuated g/C Ratio	0.24	0.13		0.29	0.16		0.11	0.57		0.06	0.50	0.50
v/c Ratio	0.33	0.81		0.66	0.51		0.46	0.72		0.46	0.63	0.06
Control Delay	45.5	82.4		55.3	59.3		69.9	29.4		90.0	32.3	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.5	82.4		55.3	59.3		69.9	29.4		90.0	32.3	0.1
LOS	D	F		E	E		E	C		F	C	A
Approach Delay		74.3			57.7			33.8			33.1	
Approach LOS		E			E			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 156.8			
Natural Cycle: 110			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 41.9		Intersection LOS: D	
Intersection Capacity Utilization 81.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	97	347	199	290	168	1367	41	1026	46
v/c Ratio	0.33	0.81	0.66	0.51	0.46	0.72	0.46	0.63	0.06
Control Delay	45.5	82.4	55.3	59.3	69.9	29.4	90.0	32.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.5	82.4	55.3	59.3	69.9	29.4	90.0	32.3	0.1
Queue Length 50th (m)	24.4	60.4	53.0	43.2	27.5	183.7	13.7	136.0	0.0
Queue Length 95th (m)	41.3	81.3	78.4	62.4	41.0	224.8	28.2	168.2	0.0
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	380	484	330	583	444	1897	112	1632	788
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.72	0.60	0.50	0.38	0.72	0.37	0.63	0.06

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	340	0	195	215	70	165	1340	0	40	1005	45
Future Volume (vph)	95	340	0	195	215	70	165	1340	0	40	1005	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00		1.00	0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1687	3438		1787	3393		3303	3343		1597	3282	1482
Flt Permitted	0.57	1.00		0.29	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1020	3438		545	3393		3303	3343		1597	3282	1482
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)	97	347	0	199	219	71	168	1367	0	41	1026	46
RTOR Reduction (vph)	0	0	0	0	18	0	0	0	0	0	0	23
Lane Group Flow (vph)	97	347	0	199	272	0	168	1367	0	41	1026	23
Heavy Vehicles (%)	7%	5%	2%	1%	2%	4%	6%	8%	3%	13%	10%	9%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	32.0	19.7		40.8	25.5		18.6	89.0		7.6	78.0	78.0
Effective Green, g (s)	32.0	19.7		40.8	25.5		18.6	89.0		7.6	78.0	78.0
Actuated g/C Ratio	0.20	0.12		0.26	0.16		0.12	0.56		0.05	0.49	0.49
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	258	429		283	548		389	1885		76	1622	732
v/s Ratio Prot	0.03	c0.10		c0.08	0.08		0.05	c0.41		0.03	c0.31	
v/s Ratio Perm	0.05			0.10								0.02
v/c Ratio	0.38	0.81		0.70	0.50		0.43	0.73		0.54	0.63	0.03
Uniform Delay, d1	53.2	67.2		49.3	60.3		64.7	25.4		73.4	29.4	20.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.9	10.7		7.7	0.7		0.8	2.5		7.2	1.9	0.1
Delay (s)	54.1	78.0		56.9	61.0		65.5	27.8		80.6	31.2	20.6
Level of Service	D	E		E	E		E	C		F	C	C
Approach Delay (s)		72.7			59.3			32.0			32.6	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	41.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	157.8	Sum of lost time (s)	23.4
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	245	55	75	140	25	25	565	95	45	475	50
Future Volume (vph)	85	245	55	75	140	25	25	565	95	45	475	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.972			0.977			0.978			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1771	0	1752	1789	0	1805	1818	0	1770	1834	0
Flt Permitted	0.600			0.332			0.372			0.277		
Satd. Flow (perm)	1109	1771	0	607	1789	0	703	1818	0	515	1834	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			15			10			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	8		12	12		8	11		10	10		11
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
Heavy Vehicles (%)	2%	3%	7%	3%	4%	0%	0%	2%	0%	2%	2%	0%
Adj. Flow (vph)	92	266	60	82	152	27	27	614	103	49	516	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	326	0	82	179	0	27	717	0	49	570	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

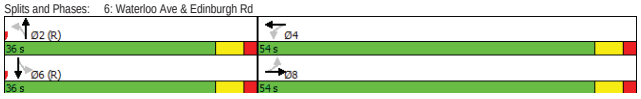
Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	22.0	22.0		22.0	22.0		56.0	56.0		56.0	56.0	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.62	0.62		0.62	0.62	
v/c Ratio	0.34	0.73		0.55	0.40		0.06	0.63		0.15	0.50	
Control Delay	29.6	38.4		42.5	27.2		21.0	31.5		10.8	12.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.6	38.4		42.5	27.2		21.0	31.5		10.8	12.4	
LOS	C	D		D	C		C	C		B	B	
Approach Delay		36.5			32.0			31.1			12.3	
Approach LOS		D			C			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 26.6		Intersection LOS: C	
Intersection Capacity Utilization 73.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	92	326	82	179	27	717	49	570
v/c Ratio	0.34	0.73	0.55	0.40	0.06	0.63	0.15	0.50
Control Delay	29.6	38.4	42.5	27.2	21.0	31.5	10.8	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	38.4	42.5	27.2	21.0	31.5	10.8	12.4
Queue Length 50th (m)	13.9	51.6	13.1	24.9	2.2	92.2	3.4	50.7
Queue Length 95th (m)	24.5	71.3	25.4	38.2	m8.5	156.6	11.3	98.7
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	591	953	323	961	437	1134	320	1143
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	0.16	0.34	0.25	0.19	0.06	0.63	0.15	0.50

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

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	245	55	75	140	25	25	565	95	45	475	50
Future Volume (vph)	85	245	55	75	140	25	25	565	95	45	475	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1756	1772		1739	1790		1794	1819		1763	1833	
Flt Permitted	0.60	1.00		0.33	1.00		0.37	1.00		0.28	1.00	
Satd. Flow (perm)	1109	1772		608	1790		702	1819		514	1833	
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)	92	266	60	82	152	27	27	614	103	49	516	54
RTOR Reduction (vph)	0	14	0	0	11	0	0	4	0	0	2	0
Lane Group Flow (vph)	92	312	0	82	168	0	27	713	0	49	568	0
Confl. Peds. (#/hr)	8		12	12		8	11		10	10		11
Heavy Vehicles (%)	2%	3%	7%	3%	4%	0%	0%	2%	0%	2%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	22.0	22.0		22.0	22.0		56.0	56.0		56.0	56.0	
Effective Green, g (s)	22.0	22.0		22.0	22.0		56.0	56.0		56.0	56.0	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.62	0.62		0.62	0.62	
Clearance Time (s)	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	
Lane Grp Cap (vph)	271	433		148	437		436	1131		319	1140	
v/s Ratio Prot		c0.18			0.09			c0.39			0.31	
v/s Ratio Perm	0.08			0.13			0.04			0.10		
v/c Ratio	0.34	0.72		0.55	0.38		0.06	0.63		0.15	0.50	
Uniform Delay, d1	28.0	31.2		29.7	28.3		6.7	10.6		7.1	9.3	
Progression Factor	1.00	1.00		1.00	1.00		2.29	2.34		1.00	1.00	
Incremental Delay, d2	0.7	5.7		4.4	0.6		0.2	2.3		1.0	1.6	
Delay (s)	28.8	36.8		34.1	28.9		15.5	27.1		8.1	10.9	
Level of Service	C	D		C	C		B	C		A	B	
Approach Delay (s)		35.1			30.6			26.6			10.6	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	65	79	250	40	45	250
Future Volume (vph)	65	79	250	40	45	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1568
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1568
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		7	7			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	3%
Adj. Flow (vph)	71	86	272	43	49	272
Shared Lane Traffic (%)						
Lane Group Flow (vph)	71	86	272	43	49	272
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.8%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	65	79	250	40	45	250
Future Volume (Veh/h)	65	79	250	40	45	250
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	86	272	43	49	272
Pedestrians				1	7	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	1	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			164		665	79
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			164		665	79
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			81		86	72
cM capacity (veh/h)			1406		343	972

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	71	86	272	43	321
Volume Left	0	0	272	0	49
Volume Right	0	86	0	0	272
cSH	1700	1700	1406	1700	1147
Volume to Capacity	0.04	0.05	0.19	0.03	0.28
Queue Length 95th (m)	0.0	0.0	5.7	0.0	9.2
Control Delay (s)	0.0	0.0	8.2	0.0	11.2
Lane LOS			A		B
Approach Delay (s)	0.0		7.1		11.2
Approach LOS					B

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	30.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	355	70	50	250	75	80	480	60	95	410	80
Future Volume (vph)	90	355	70	50	250	75	80	480	60	95	410	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99		0.99	0.99		0.99	1.00		1.00	0.99	
Frt		0.975			0.965			0.983			0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1760	0	1805	1753	0	1770	1827	0	1656	1799	0
Flt Permitted	0.412			0.273			0.349			0.304		
Satd. Flow (perm)	721	1760	0	516	1753	0	643	1827	0	528	1799	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			22			12			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	29		9	9		29	20		7	7		20
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
Heavy Vehicles (%)	6%	5%	3%	0%	4%	0%	2%	1%	9%	9%	2%	4%
Adj. Flow (vph)	98	386	76	54	272	82	87	522	65	103	446	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	462	0	54	354	0	87	587	0	103	533	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.41	0.78		0.31	0.59		0.27	0.63		0.39	0.58	
Control Delay	23.1	30.6		24.8	24.2		13.4	16.9		16.8	15.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.1	30.6		24.8	24.2		13.4	16.9		16.8	15.6	
LOS	C	C		C	C		B	B		B	B	
Approach Delay		29.3			24.3			16.4			15.8	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 20.8		Intersection LOS: C	
Intersection Capacity Utilization 81.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd

Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	98	462	54	354	87	587	103	533
v/c Ratio	0.41	0.78	0.31	0.59	0.27	0.63	0.39	0.58
Control Delay	23.1	30.6	24.8	24.2	13.4	16.9	16.8	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.1	30.6	24.8	24.2	13.4	16.9	16.8	15.6
Queue Length 50th (m)	12.5	66.5	5.9	40.3	6.9	58.2	8.8	50.0
Queue Length 95th (m)	m28.1	#111.1	16.0	67.1	16.5	91.5	21.7	79.5
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	240	596	172	599	325	931	267	920
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	0.41	0.78	0.31	0.59	0.27	0.63	0.39	0.58

Intersection Summary

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.

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	355	70	50	250	75	80	480	60	95	410	80
Future Volume (vph)	90	355	70	50	250	75	80	480	60	95	410	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1663	1761		1795	1753		1751	1828		1651	1798	
Flt Permitted	0.41	1.00		0.27	1.00		0.35	1.00		0.30	1.00	
Satd. Flow (perm)	721	1761		516	1753		642	1828		529	1798	
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)	98	386	76	54	272	82	87	522	65	103	446	87
RTOR Reduction (vph)	0	9	0	0	15	0	0	6	0	0	9	0
Lane Group Flow (vph)	98	453	0	54	339	0	87	581	0	103	524	0
Confl. Peds. (#/hr)	29		9	9		29	20		7	7		20
Heavy Vehicles (%)	6%	5%	3%	0%	4%	0%	2%	1%	9%	9%	2%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	240	587		172	584		325	926		268	910	
v/s Ratio Prot		c0.26			0.19			c0.32			0.29	
v/s Ratio Perm	0.14			0.10			0.14			0.19		
v/c Ratio	0.41	0.77		0.31	0.58		0.27	0.63		0.38	0.58	
Uniform Delay, d1	19.3	22.4		18.6	20.7		10.6	13.4		11.3	12.9	
Progression Factor	0.91	0.96		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	8.4		4.7	4.2		2.0	3.2		4.1	2.6	
Delay (s)	21.9	29.9		23.3	24.9		12.6	16.6		15.5	15.5	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		28.5			24.7			16.1			15.5	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	350	56	35	305	150	95	29	50	170	21	130
Future Volume (vph)	205	350	56	35	305	150	95	29	50	170	21	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.98	1.00	0.98		0.99	0.95		0.94	0.98	
Frt			0.850		0.951			0.906			0.871	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1792	1615	1805	1714	0	1805	1634	0	1770	1567	0
Flt Permitted	0.358			0.536			0.611			0.564		
Satd. Flow (perm)	653	1792	1587	1015	1714	0	1150	1634	0	992	1567	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		35			54			141	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
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
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Adj. Flow (vph)	223	380	61	38	332	163	103	32	54	185	23	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	223	380	61	38	495	0	103	86	0	185	164	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	64.1	61.1	61.1	48.8	48.8		17.1	8.1		17.5	8.1	
Actuated g/C Ratio	0.71	0.68	0.68	0.54	0.54		0.19	0.09		0.19	0.09	
v/c Ratio	0.39	0.31	0.06	0.07	0.52		0.37	0.44		0.70	0.61	
Control Delay	7.3	7.8	1.6	13.4	16.7		30.8	24.2		44.4	19.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.3	7.8	1.6	13.4	16.7		30.8	24.2		44.4	19.5	
LOS	A	A	A	B	B		C	C		D	B	
Approach Delay		7.1			16.4			27.8			32.7	
Approach LOS		A			B			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 71.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd

Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	223	380	61	38	495	103	86	185	164
v/c Ratio	0.39	0.31	0.06	0.07	0.52	0.37	0.44	0.70	0.61
Control Delay	7.3	7.8	1.6	13.4	16.7	30.8	24.2	44.4	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.3	7.8	1.6	13.4	16.7	30.8	24.2	44.4	19.5
Queue Length 50th (m)	12.1	26.0	0.0	3.2	52.0	15.2	5.6	28.8	4.0
Queue Length 95th (m)	25.4	49.5	3.8	10.0	98.2	26.6	18.6	44.7	21.7
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	605	1215	1100	550	945	281	282	263	346
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.31	0.06	0.07	0.52	0.37	0.30	0.70	0.47

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	350	56	35	305	150	95	29	50	170	21	130
Future Volume (vph)	205	350	56	35	305	150	95	29	50	170	21	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.98		1.00	0.95		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1746	1792	1587	1799	1713		1795	1633		1720	1567	
Flt Permitted	0.36	1.00	1.00	0.54	1.00		0.61	1.00		0.56	1.00	
Satd. Flow (perm)	657	1792	1587	1016	1713		1155	1633		1022	1567	
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)	223	380	61	38	332	163	103	32	54	185	23	141
RTOR Reduction (vph)	0	0	20	0	16	0	0	50	0	0	127	0
Lane Group Flow (vph)	223	380	41	38	479	0	103	36	0	185	37	0
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	59.9	59.9	59.9	47.6	47.6		13.4	7.0		16.8	8.7	
Effective Green, g (s)	59.9	59.9	59.9	47.6	47.6		13.4	7.0		16.8	8.7	
Actuated g/C Ratio	0.67	0.67	0.67	0.53	0.53		0.15	0.08		0.19	0.10	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	549	1192	1056	537	905		217	127		253	151	
v/s Ratio Prot	c0.04	0.21			c0.28		0.03	0.02		c0.07	0.02	
v/s Ratio Perm	0.23		0.03	0.04			0.04			c0.07		
v/c Ratio	0.41	0.32	0.04	0.07	0.53		0.47	0.29		0.73	0.24	
Uniform Delay, d1	7.0	6.4	5.2	10.4	13.9		34.6	39.1		33.5	37.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.7	0.1	0.3	2.2		1.6	1.2		10.4	0.8	
Delay (s)	7.5	7.1	5.2	10.6	16.1		36.2	40.4		43.9	38.4	
Level of Service	A	A	A	B	B		D	D		D	D	
Approach Delay (s)		7.1			15.7			38.1			41.3	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	4	40	25	4	30	25	80	10	10	55	45
Future Volume (vph)	45	4	40	25	4	30	25	80	10	10	55	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940			0.930			0.983			0.933	
Flt Protected		0.975			0.979		0.950			0.950		
Satd. Flow (prot)	0	1707	0	0	1696	0	1770	1831	0	1770	1738	0
Flt Permitted		0.975			0.979		0.950			0.950		
Satd. Flow (perm)	0	1707	0	0	1696	0	1770	1831	0	1770	1738	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	4	43	27	4	33	27	87	11	11	60	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	96	0	0	64	0	27	98	0	11	109	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.8%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	4	40	25	4	30	25	80	10	10	55	45
Future Volume (Veh/h)	45	4	40	25	4	30	25	80	10	10	55	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	49	4	43	27	4	33	27	87	11	11	60	49
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	282	258	84	274	278	92	109			98		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	282	258	84	274	278	92	109			98		
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 %	92	99	96	96	99	97	98			99		
cM capacity (veh/h)	631	629	975	633	614	965	1481			1495		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	96	64	27	98	11	109
Volume Left	49	27	27	0	11	0
Volume Right	43	33	0	11	0	49
cSH	749	768	1481	1700	1495	1700
Volume to Capacity	0.13	0.08	0.02	0.06	0.01	0.06
Queue Length 95th (m)	3.5	2.2	0.4	0.0	0.2	0.0
Control Delay (s)	10.5	10.1	7.5	0.0	7.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	10.5	10.1	1.6		0.7	
Approach LOS	B	B				

Intersection Summary

Average Delay	4.8		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	4	40	25	4	30	30	35	10	10	65	45
Future Volume (vph)	50	4	40	25	4	30	30	35	10	10	65	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.943			0.930			0.966			0.939	
Flt Protected		0.974			0.979		0.950			0.950		
Satd. Flow (prot)	0	1711	0	0	1696	0	1770	1799	0	1770	1749	0
Flt Permitted		0.974			0.979		0.950			0.950		
Satd. Flow (perm)	0	1711	0	0	1696	0	1770	1799	0	1770	1749	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	4	43	27	4	33	33	38	11	11	71	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	101	0	0	64	0	33	49	0	11	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	4	40	25	4	30	30	35	10	10	65	45
Future Volume (Veh/h)	50	4	40	25	4	30	30	35	10	10	65	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	54	4	43	27	4	33	33	38	11	11	71	49
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	256	232	96	248	252	44	120			49		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	256	232	96	248	252	44	120			49		
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 %	92	99	96	96	99	97	98			99		
cM capacity (veh/h)	656	648	961	656	632	1027	1468			1558		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	101	64	33	49	11	120
Volume Left	54	27	33	0	11	0
Volume Right	43	33	0	11	0	49
cSH	758	804	1468	1700	1558	1700
Volume to Capacity	0.13	0.08	0.02	0.03	0.01	0.07
Queue Length 95th (m)	3.7	2.1	0.6	0.0	0.2	0.0
Control Delay (s)	10.5	9.9	7.5	0.0	7.3	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.5	9.9	3.0		0.6	
Approach LOS	B	A				

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	655	0	235	760	0	195	680	0	60	665	0
Future Volume (vph)	115	655	0	235	760	0	195	680	0	60	665	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			1.00		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3539	0	1770	3539	0	1805	3610	0	1770	3610	0
Flt Permitted	0.208			0.243			0.230			0.351		
Satd. Flow (perm)	394	3539	0	452	3539	0	436	3610	0	651	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Adj. Flow (vph)	117	668	0	240	776	0	199	694	0	61	679	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	668	0	240	776	0	199	694	0	61	679	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

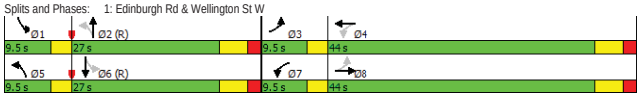
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	35.2	25.7		35.8	27.6		45.7	34.3		38.0	27.8	
Actuated g/C Ratio	0.39	0.29		0.40	0.31		0.51	0.38		0.42	0.31	
v/c Ratio	0.46	0.66		0.88	0.72		0.49	0.50		0.17	0.61	
Control Delay	20.6	31.1		50.7	31.7		18.1	25.2		13.4	26.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.6	31.1		50.7	31.7		18.1	25.2		13.4	26.0	
LOS	C	C		D	C		B	C		B	C	
Approach Delay		29.5			36.2			23.6			25.0	
Approach LOS		C			D			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 71 (79%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay: 29.0		Intersection LOS: C	
Intersection Capacity Utilization 77.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	117	668	240	776	199	694	61	679
v/c Ratio	0.46	0.66	0.88	0.72	0.49	0.50	0.17	0.61
Control Delay	20.6	31.1	50.7	31.7	18.1	25.2	13.4	26.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.6	31.1	50.7	31.7	18.1	25.2	13.4	26.0
Queue Length 50th (m)	12.6	55.5	27.9	67.0	19.3	52.0	4.2	54.4
Queue Length 95th (m)	20.3	66.6	#51.3	79.2	37.6	80.9	m9.3	#77.2
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	255	1494	274	1494	403	1375	369	1115
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	0.46	0.45	0.88	0.52	0.49	0.50	0.17	0.61

Intersection Summary

\# 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.

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	655	0	235	760	0	195	680	0	60	665	0
Future Volume (vph)	115	655	0	235	760	0	195	680	0	60	665	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	3539		1769	3539		1804	3610		1766	3610	
Flt Permitted	0.21	1.00		0.24	1.00		0.23	1.00		0.35	1.00	
Satd. Flow (perm)	395	3539		452	3539		437	3610		652	3610	
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)	117	668	0	240	776	0	199	694	0	61	679	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	117	668	0	240	776	0	199	694	0	61	679	0
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	31.5	26.3		34.1	27.6		42.2	33.1		33.3	27.2	
Effective Green, g (s)	31.5	26.3		34.1	27.6		42.2	33.1		33.3	27.2	
Actuated g/C Ratio	0.35	0.29		0.38	0.31		0.47	0.37		0.37	0.30	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	219	1034		266	1085		387	1327		316	1091	
v/s Ratio Prot	0.03	0.19		c0.07	0.22		c0.07	0.19		0.01	c0.19	
v/s Ratio Perm	0.16			c0.28			0.17			0.06		
v/c Ratio	0.53	0.65		0.90	0.72		0.51	0.52		0.19	0.62	
Uniform Delay, d1	21.1	27.8		24.0	27.7		15.5	22.3		18.5	27.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.91	0.83	
Incremental Delay, d2	2.5	1.4		30.8	2.3		1.2	1.5		0.3	2.3	
Delay (s)	23.6	29.2		54.8	30.0		16.6	23.7		17.1	24.7	
Level of Service	C	C		D	C		B	C		B	C	
Approach Delay (s)		28.4			35.8			22.2			24.1	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	760	0	0	990	50	405	150	145	40	0	340
Future Volume (vph)	220	760	0	0	990	50	405	150	145	40	0	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.993				0.850			0.850
Flt Protected	0.950						0.950	0.977		0.950		
Satd. Flow (prot)	1787	5136	0	0	5097	0	1698	1755	1599	1805	0	1599
Flt Permitted	0.170						0.950	0.977		0.430		
Satd. Flow (perm)	320	5136	0	0	5097	0	1698	1755	1599	817	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					7				149			351
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	227	784	0	0	1021	52	418	155	149	41	0	351
Shared Lane Traffic (%)							32%					
Lane Group Flow (vph)	227	784	0	0	1073	0	284	289	149	41	0	351
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	34.1	24.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	80.1	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	62.8%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	5.0	3.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	2.1	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	20.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

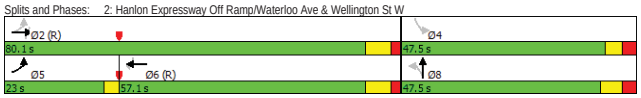
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.57	0.32		0.39
v/c Ratio	0.54	0.27			0.54		0.53	0.53	0.15	0.16		0.42
Control Delay	16.8	14.1			30.9		40.6	40.2	2.3	33.1		4.2
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	16.8	14.1			30.9		40.6	40.2	2.3	33.1		4.2
LOS	B	B			C		D	D	A	C		A
Approach Delay		14.7			30.9			32.5			7.2	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type: Other
Cycle Length: 127.6
Actuated Cycle Length: 127.6
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 23.2 — Intersection LOS: C
Intersection Capacity Utilization 76.8% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	227	784	1073	284	289	149	41	351
v/c Ratio	0.54	0.27	0.54	0.53	0.53	0.15	0.16	0.42
Control Delay	16.8	14.1	30.9	40.6	40.2	2.3	33.1	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.8	14.1	30.9	40.6	40.2	2.3	33.1	4.2
Queue Length 50th (m)	25.7	36.5	78.6	65.0	66.0	0.0	7.7	0.0
Queue Length 95th (m)	39.5	44.7	93.1	96.0	97.0	9.2	17.5	19.4
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	423	2938	2001	532	550	978	262	840
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	0.54	0.27	0.54	0.53	0.53	0.15	0.16	0.42

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	760	0	0	990	50	405	150	145	40	0	340
Future Volume (vph)	220	760	0	0	990	50	405	150	145	40	0	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			0.99		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00	0.95		1.00
Satd. Flow (prot)	1787	5136			5095		1698	1756	1599	1805		1599
Flt Permitted	0.17	1.00			1.00		0.95	0.98	1.00	0.43		1.00
Satd. Flow (perm)	320	5136			5095		1698	1756	1599	817		1599
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)	227	784	0	0	1021	52	418	155	149	41	0	351
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	64	0	0	213
Lane Group Flow (vph)	227	784	0	0	1069	0	284	289	85	41	0	138
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.57	0.32		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lane Grp Cap (vph)	413	2938			1996		532	550	914	262		626
v/s Ratio Prot	c0.09	0.15			0.21							
v/s Ratio Perm	c0.23						c0.17	0.16	0.05	0.05		0.09
v/c Ratio	0.55	0.27			0.54		0.53	0.53	0.09	0.16		0.22
Uniform Delay, d1	15.7	13.8			29.9		36.1	36.0	12.3	30.9		25.8
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	5.2	0.2			1.0		3.8	3.6	0.2	1.3		0.8
Delay (s)	20.9	14.0			30.9		39.9	39.6	12.5	32.2		26.6
Level of Service	C	B			C		D	D	B	C		C
Approach Delay (s)		15.6			30.9			34.1			27.2	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	880	505	0	1295	0	0	0	0	190	0	95
Future Volume (vph)	0	880	505	0	1295	0	0	0	0	190	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.945										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4823	0	0	5136	0	0	0	0	3467	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	4823	0	0	5136	0	0	0	0	3467	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		213										100
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	2					2						
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%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Adj. Flow (vph)	0	926	532	0	1363	0	0	0	0	200	0	100
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1458	0	0	1363	0	0	0	0	200	0	100
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			24.9					24.7		24.9
Total Split (s)		56.9			56.9					41.7		56.9
Total Split (%)		57.7%			57.7%					42.3%		57.7%
Maximum Green (s)		50.0			50.0					35.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		7.0			7.0					7.0		7.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
v/c Ratio		0.57			0.52					0.16		0.12

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

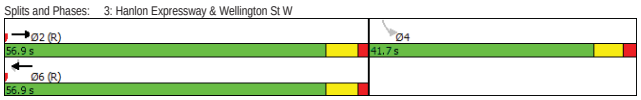
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		15.1			17.2					22.2		3.0
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		15.1			17.2					22.2		3.0
LOS		B			B					C		A
Approach Delay		15.1			17.2						15.8	
Approach LOS		B			B						B	

Intersection Summary

Area Type:	Other
Cycle Length: 98.6	
Actuated Cycle Length: 98.6	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 50	
Control Type: Pretimed	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 16.1	Intersection LOS: B
Intersection Capacity Utilization 42.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1458	1363	200	100
v/c Ratio	0.57	0.52	0.16	0.12
Control Delay	15.1	17.2	22.2	3.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.1	17.2	22.2	3.0
Queue Length 50th (m)	60.3	64.3	13.9	0.0
Queue Length 95th (m)	74.4	77.5	22.2	7.9
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	2550	2604	1230	822
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.52	0.16	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	880	505	0	1295	0	0	0	0	190	0	95
Future Volume (vph)	0	880	505	0	1295	0	0	0	0	190	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.95			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4824			5136					3467		1524
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4824			5136					3467		1524
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)	0	926	532	0	1363	0	0	0	0	200	0	100
RTOR Reduction (vph)	0	105	0	0	0	0	0	0	0	0	0	49
Lane Group Flow (vph)	0	1353	0	0	1363	0	0	0	0	200	0	51
Confl. Peds. (#/hr)	2					2						
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					35.0		50.0
Effective Green, g (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2446			2604					1230		772
v/s Ratio Prot		c0.28			0.27							
v/s Ratio Perm										c0.06		0.03
v/c Ratio		0.55			0.52					0.16		0.07
Uniform Delay, d1		16.6			16.3					21.8		12.4
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		0.9			0.8					0.3		0.2
Delay (s)		17.6			17.1					22.1		12.6
Level of Service		B			B					C		B
Approach Delay (s)		17.6			17.1			0.0			18.9	
Approach LOS		B			B			A			B	

Intersection Summary

HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	960	870	400	360	60
Future Volume (vph)	70	960	870	400	360	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99			
Frt			0.953			0.850
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3566	3348	0	1787	1615
Flt Permitted		0.699			0.950	
Satd. Flow (perm)	0	2500	3348	0	1787	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			131			62
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	3%	0%	1%	0%
Adj. Flow (vph)	72	990	897	412	371	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1062	1309	0	371	62
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

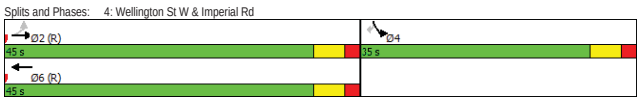
10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		46.2	46.2		21.8	21.8
Actuated g/C Ratio		0.58	0.58		0.27	0.27
v/c Ratio		0.74	0.66		0.76	0.13
Control Delay		18.1	13.2		36.8	6.0
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		18.1	13.2		36.8	6.0
LOS		B	B		D	A
Approach Delay		18.1	13.2		32.4	
Approach LOS		B	B		C	

Intersection Summary

Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 18.0		Intersection LOS: B	
Intersection Capacity Utilization 100.4%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1062	1309	371	62
v/c Ratio	0.74	0.66	0.76	0.13
Control Delay	18.1	13.2	36.8	6.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	18.1	13.2	36.8	6.0
Queue Length 50th (m)	60.5	61.9	54.0	0.0
Queue Length 95th (m)	#118.4	103.8	75.0	7.6
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1443	1988	647	624
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.74	0.66	0.57	0.10

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	960	870	400	360	60
Future Volume (vph)	70	960	870	400	360	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.95		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3565	3348		1787	1615
Flt Permitted		0.70	1.00		0.95	1.00
Satd. Flow (perm)		2499	3348		1787	1615
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	72	990	897	412	371	62
RTOR Reduction (vph)	0	0	55	0	0	45
Lane Group Flow (vph)	0	1062	1254	0	371	17
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	0%	1%	3%	0%	1%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		46.2	46.2		21.8	21.8
Effective Green, g (s)		46.2	46.2		21.8	21.8
Actuated g/C Ratio		0.58	0.58		0.27	0.27
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1443	1933		486	440
v/s Ratio Prot			0.37		c0.21	
v/s Ratio Perm		c0.42				0.01
v/c Ratio		0.74	0.65		0.76	0.04
Uniform Delay, d1		12.4	11.4		26.7	21.4
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		3.4	1.7		7.0	0.0
Delay (s)		15.8	13.1		33.7	21.4
Level of Service		B	B		C	C
Approach Delay (s)		15.8	13.1		32.0	
Approach LOS		B	B		C	

Intersection Summary

HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	390	0	270	460	70	410	1130	0	95	1510	135
Future Volume (vph)	120	390	0	270	460	70	410	1130	0	95	1510	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00	1.00							
Frt					0.980							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3574	0	1805	3531	0	3467	3374	0	1805	3471	1615
Flt Permitted	0.224			0.217			0.950			0.950		
Satd. Flow (perm)	421	3574	0	412	3531	0	3467	3374	0	1805	3471	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					8							139
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Adj. Flow (vph)	124	402	0	278	474	72	423	1165	0	98	1557	139
Shared Lane Traffic (%)												
Lane Group Flow (vph)	124	402	0	278	546	0	423	1165	0	98	1557	139
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

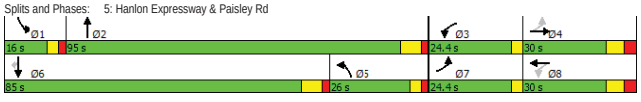
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	13.0	30.0		9.5	30.0		10.0	60.4		10.0	60.4	60.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	40.3	21.3		50.3	28.5		21.0	87.8		10.8	77.6	77.6
Actuated g/C Ratio	0.24	0.13		0.31	0.17		0.13	0.53		0.07	0.47	0.47
v/c Ratio	0.57	0.87		0.91	0.88		0.96	0.65		0.82	0.95	0.17
Control Delay	53.3	89.6		80.6	81.7		103.3	29.6		120.5	55.0	3.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	53.3	89.6		80.6	81.7		103.3	29.6		120.5	55.0	3.9
LOS	D	F		F	F		F	C		F	E	A
Approach Delay		81.0			81.3			49.3			54.6	
Approach LOS		F			F			D			D	

Intersection Summary

Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 164.5			
Natural Cycle: 135			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 60.4		Intersection LOS: E	
Intersection Capacity Utilization 99.7%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	124	402	278	546	423	1165	98	1557	139
v/c Ratio	0.57	0.87	0.91	0.88	0.96	0.65	0.82	0.95	0.17
Control Delay	53.3	89.6	80.6	81.7	103.3	29.6	120.5	55.0	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.3	89.6	80.6	81.7	103.3	29.6	120.5	55.0	3.9
Queue Length 50th (m)	32.0	72.7	78.9	96.7	76.3	149.5	34.2	270.3	0.0
Queue Length 95th (m)	50.4	#99.0	#125.1	#146.6	#112.0	174.1	#69.6	#324.6	12.7
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	299	478	307	617	442	1800	121	1637	835
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.84	0.91	0.88	0.96	0.65	0.81	0.95	0.17

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	390	0	270	460	70	410	1130	0	95	1510	135
Future Volume (vph)	120	390	0	270	460	70	410	1130	0	95	1510	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.98		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3574		1805	3532		3467	3374		1805	3471	1615
Flt Permitted	0.22	1.00		0.22	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	422	3574		412	3532		3467	3374		1805	3471	1615
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)	124	402	0	278	474	72	423	1165	0	98	1557	139
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	0	0	0	73
Lane Group Flow (vph)	124	402	0	278	539	0	423	1165	0	98	1557	66
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	35.3	21.3		45.5	28.5		21.0	87.8		10.8	77.6	77.6
Effective Green, g (s)	35.3	21.3		45.5	28.5		21.0	87.8		10.8	77.6	77.6
Actuated g/C Ratio	0.21	0.13		0.28	0.17		0.13	0.53		0.07	0.47	0.47
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	206	462		293	611		442	1800		118	1637	761
v/s Ratio Prot	0.05	0.11		c0.12	0.15		c0.12	0.35		0.05	c0.45	
v/s Ratio Perm	0.08			c0.14								0.04
v/c Ratio	0.60	0.87		0.95	0.88		0.96	0.65		0.83	0.95	0.09
Uniform Delay, d1	54.9	70.2		52.0	66.4		71.3	27.3		75.9	41.6	23.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.9	16.2		38.5	14.1		31.6	1.8		36.7	13.3	0.2
Delay (s)	59.8	86.4		90.6	80.5		102.9	29.1		112.7	55.0	24.1
Level of Service	E	F		F	F		F	C		F	D	C
Approach Delay (s)		80.2			83.9			48.8			55.7	
Approach LOS		F			F			D			E	

Intersection Summary

HCM 2000 Control Delay	61.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	164.5	Sum of lost time (s)	23.4
Intersection Capacity Utilization	99.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	170	50	90	260	45	50	630	85	50	620	70
Future Volume (vph)	70	170	50	90	260	45	50	630	85	50	620	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.966			0.978			0.982			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1804	0	1805	1836	0	1805	1856	0	1770	1867	0
Flt Permitted	0.335			0.500			0.288			0.272		
Satd. Flow (perm)	619	1804	0	944	1836	0	547	1856	0	505	1867	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			15			8			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Adj. Flow (vph)	72	175	52	93	268	46	52	649	88	52	639	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	227	0	93	314	0	52	737	0	52	711	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

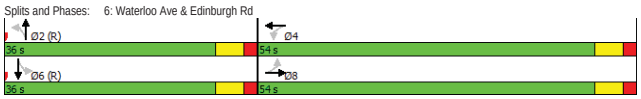
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	20.9	20.9		20.9	20.9		57.1	57.1		57.1	57.1	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.63	0.63		0.63	0.63	
v/c Ratio	0.50	0.52		0.42	0.72		0.15	0.62		0.16	0.60	
Control Delay	40.7	29.9		33.8	39.0		9.1	20.6		10.2	13.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.7	29.9		33.8	39.0		9.1	20.6		10.2	13.6	
LOS	D	C		C	D		A	C		B	B	
Approach Delay		32.5			37.8			19.8			13.4	
Approach LOS		C			D			B			B	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 22.6		Intersection LOS: C	
Intersection Capacity Utilization 77.6%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	227	93	314	52	737	52	711
v/c Ratio	0.50	0.52	0.42	0.72	0.15	0.62	0.16	0.60
Control Delay	40.7	29.9	33.8	39.0	9.1	20.6	10.2	13.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.7	29.9	33.8	39.0	9.1	20.6	10.2	13.6
Queue Length 50th (m)	11.5	32.1	14.5	50.4	1.9	53.4	3.5	67.7
Queue Length 95th (m)	23.0	48.3	26.2	70.0	m8.1	119.4	11.4	130.0
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	330	973	503	986	347	1180	320	1187
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	0.22	0.23	0.18	0.32	0.15	0.62	0.16	0.60

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	170	50	90	260	45	50	630	85	50	620	70
Future Volume (vph)	70	170	50	90	260	45	50	630	85	50	620	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1758	1804		1794	1836		1802	1856		1763	1866	
Flt Permitted	0.34	1.00		0.50	1.00		0.29	1.00		0.27	1.00	
Satd. Flow (perm)	620	1804		944	1836		546	1856		505	1866	
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)	72	175	52	93	268	46	52	649	88	52	639	72
RTOR Reduction (vph)	0	19	0	0	12	0	0	3	0	0	3	0
Lane Group Flow (vph)	72	208	0	93	302	0	52	734	0	52	708	0
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	20.9	20.9		20.9	20.9		57.1	57.1		57.1	57.1	
Effective Green, g (s)	20.9	20.9		20.9	20.9		57.1	57.1		57.1	57.1	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.63	0.63		0.63	0.63	
Clearance Time (s)	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	
Lane Grp Cap (vph)	143	418		219	426		346	1177		320	1183	
v/s Ratio Prot		0.12			c0.16			c0.40			0.38	
v/s Ratio Perm	0.12			0.10			0.10			0.10		
v/c Ratio	0.50	0.50		0.42	0.71		0.15	0.62		0.16	0.60	
Uniform Delay, d1	30.0	30.0		29.4	31.8		6.6	10.0		6.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00		0.92	1.57		1.00	1.00	
Incremental Delay, d2	2.8	0.9		1.3	5.5		0.8	2.2		1.1	2.2	
Delay (s)	32.8	30.9		30.8	37.3		6.9	17.8		7.8	11.9	
Level of Service	C	C		C	D		A	B		A	B	
Approach Delay (s)		31.4			35.8			17.1			11.7	
Approach LOS		C			D			B			B	

Intersection Summary

HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	60	120	260	75	150	270
Future Volume (vph)	60	120	260	75	150	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1599
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	1%
Adj. Flow (vph)	65	130	283	82	163	293
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	130	283	82	163	293
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.0%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	60	120	260	75	150	270
Future Volume (Veh/h)	60	120	260	75	150	270
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	130	283	82	163	293
Pedestrians					1	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			196		714	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			196		714	66
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			79		49	71
cM capacity (veh/h)			1376		318	1000

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	65	130	283	82	456
Volume Left	0	0	283	0	163
Volume Right	0	130	0	0	293
cSH	1700	1700	1376	1700	890
Volume to Capacity	0.04	0.08	0.21	0.05	0.51
Queue Length 95th (m)	0.0	0.0	6.2	0.0	23.9
Control Delay (s)	0.0	0.0	8.3	0.0	16.4
Lane LOS			A		C
Approach Delay (s)	0.0		6.4		16.4
Approach LOS					C

Intersection Summary

Average Delay	9.7		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	330	120	55	395	45	110	540	55	100	560	110
Future Volume (vph)	90	330	120	55	395	45	110	540	55	100	560	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.960			0.985			0.986			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1795	0	1805	1847	0	1805	1865	0	1736	1840	0
Flt Permitted	0.259			0.246			0.199			0.262		
Satd. Flow (perm)	488	1795	0	465	1847	0	377	1865	0	478	1840	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			8			10			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Adj. Flow (vph)	97	355	129	59	425	48	118	581	59	108	602	118
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	484	0	59	473	0	118	640	0	108	720	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

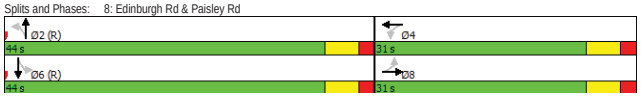
Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.60	0.79		0.38	0.76		0.62	0.67		0.45	0.77	
Control Delay	37.9	31.7		27.9	31.7		31.1	18.1		19.2	21.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	37.9	31.7		27.9	31.7		31.1	18.1		19.2	21.3	
LOS	D	C		C	C		C	B		B	C	
Approach Delay		32.7			31.3			20.1			21.0	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 25.3		Intersection LOS: C	
Intersection Capacity Utilization 91.5%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd



Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	484	59	473	118	640	108	720
v/c Ratio	0.60	0.79	0.38	0.76	0.62	0.67	0.45	0.77
Control Delay	37.9	31.7	27.9	31.7	31.1	18.1	19.2	21.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.9	31.7	27.9	31.7	31.1	18.1	19.2	21.3
Queue Length 50th (m)	13.4	68.6	6.6	61.0	11.8	66.0	9.6	79.0
Queue Length 95th (m)	#35.6	#115.1	18.0	#106.3	#38.7	102.8	24.3	124.5
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	162	615	155	621	191	949	242	941
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	0.60	0.79	0.38	0.76	0.62	0.67	0.45	0.77

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

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	330	120	55	395	45	110	540	55	100	560	110
Future Volume (vph)	90	330	120	55	395	45	110	540	55	100	560	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1791	1795		1796	1847		1800	1866		1732	1841	
Flt Permitted	0.26	1.00		0.25	1.00		0.20	1.00		0.26	1.00	
Satd. Flow (perm)	489	1795		465	1847		378	1866		477	1841	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	97	355	129	59	425	48	118	581	59	108	602	118
RTOR Reduction (vph)	0	17	0	0	5	0	0	5	0	0	9	0
Lane Group Flow (vph)	97	467	0	59	468	0	118	635	0	108	711	0
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	163	598		155	615		191	945		241	932	
v/s Ratio Prot		c0.26			0.25			0.34			c0.39	
v/s Ratio Perm	0.20			0.13			0.31			0.23		
v/c Ratio	0.60	0.78		0.38	0.76		0.62	0.67		0.45	0.76	
Uniform Delay, d1	20.8	22.5		19.1	22.3		13.3	13.8		11.8	14.9	
Progression Factor	0.98	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.7	8.9		7.0	8.6		14.1	3.8		5.9	5.9	
Delay (s)	34.1	31.5		26.1	30.9		27.4	17.6		17.7	20.7	
Level of Service	C	C		C	C		C	B		B	C	
Approach Delay (s)		32.0			30.4			19.2			20.4	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	395	115	65	410	195	90	30	50	215	40	295
Future Volume (vph)	285	395	115	65	410	195	90	30	50	215	40	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.99	1.00	0.99		1.00	0.98		0.99	0.99	
Frt			0.850		0.952			0.907			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1783	0	1770	1695	0	1787	1629	0
Flt Permitted	0.217			0.513			0.500			0.578		
Satd. Flow (perm)	412	1881	1594	974	1783	0	931	1695	0	1081	1629	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125		34			54			321	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	310	429	125	71	446	212	98	33	54	234	43	321
Shared Lane Traffic (%)												
Lane Group Flow (vph)	310	429	125	71	658	0	98	87	0	234	364	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

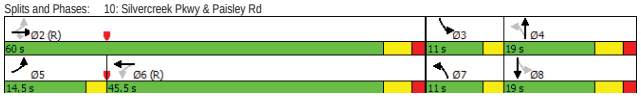
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		2.5	5.0		4.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		7.5	19.0		9.0	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	63.1	60.1	60.1	46.2	46.2		18.0	9.1		18.5	9.1	
Actuated g/C Ratio	0.70	0.67	0.67	0.51	0.51		0.20	0.10		0.21	0.10	
v/c Ratio	0.68	0.34	0.11	0.14	0.71		0.38	0.40		0.82	0.81	
Control Delay	15.0	8.5	1.8	15.4	23.4		30.2	22.3		53.3	21.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.0	8.5	1.8	15.4	23.4		30.2	22.3		53.3	21.4	
LOS	B	A	A	B	C		C	C		D	C	
Approach Delay		9.9			22.6			26.5			33.9	
Approach LOS		A			C			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 21.1 — Intersection LOS: C
Intersection Capacity Utilization 91.4% — ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	310	429	125	71	658	98	87	234	364
v/c Ratio	0.68	0.34	0.11	0.14	0.71	0.38	0.40	0.82	0.81
Control Delay	15.0	8.5	1.8	15.4	23.4	30.2	22.3	53.3	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.0	8.5	1.8	15.4	23.4	30.2	22.3	53.3	21.4
Queue Length 50th (m)	18.8	31.5	0.0	7.0	89.7	14.2	5.7	36.8	7.4
Queue Length 95th (m)	#41.0	55.9	6.5	16.6	#161.7	25.5	18.9	#56.6	36.1
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	471	1256	1106	500	932	264	291	285	509
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.34	0.11	0.14	0.71	0.37	0.30	0.82	0.72

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	285	395	115	65	410	195	90	30	50	215	40	295
Future Volume (vph)	285	395	115	65	410	195	90	30	50	215	40	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1881	1594	1804	1782		1769	1694		1781	1628	
Flt Permitted	0.22	1.00	1.00	0.51	1.00		0.50	1.00		0.58	1.00	
Satd. Flow (perm)	412	1881	1594	973	1782		931	1694		1083	1628	
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)	310	429	125	71	446	212	98	33	54	234	43	321
RTOR Reduction (vph)	0	0	43	0	17	0	0	49	0	0	286	0
Lane Group Flow (vph)	310	429	82	71	641	0	98	38	0	234	78	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	58.9	58.9	58.9	45.0	45.0		14.4	8.0		17.8	9.7	
Effective Green, g (s)	58.9	58.9	58.9	45.0	45.0		14.4	8.0		17.8	9.7	
Actuated g/C Ratio	0.65	0.65	0.65	0.50	0.50		0.16	0.09		0.20	0.11	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	438	1231	1043	486	891		208	150		277	175	
v/s Ratio Prot	c0.09	0.23			0.36		0.03	0.02		c0.08	0.05	
v/s Ratio Perm	c0.38		0.05	0.07			0.04			c0.09		
v/c Ratio	0.71	0.35	0.08	0.15	0.72		0.47	0.25		0.84	0.44	
Uniform Delay, d1	11.3	7.0	5.7	12.1	17.6		33.7	38.2		33.9	37.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	0.8	0.1	0.6	5.0		1.7	0.9		20.4	1.8	
Delay (s)	16.5	7.7	5.8	12.8	22.6		35.4	39.1		54.3	39.4	
Level of Service	B	A	A	B	C		D	D		D	D	
Approach Delay (s)		10.6			21.6			37.1			45.2	
Approach LOS		B			C			D			D	

Intersection Summary

HCM 2000 Control Delay 24.8 — HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio 0.78
Actuated Cycle Length (s) 90.0 — Sum of lost time (s) 18.0
Intersection Capacity Utilization 91.4% — ICU Level of Service F
Analysis Period (min) 15
c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	3	45	15	3	20	50	85	25	30	100	70
Future Volume (vph)	65	3	45	15	3	20	50	85	25	30	100	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.946			0.928			0.966			0.938	
Flt Protected		0.972			0.981		0.950			0.950		
Satd. Flow (prot)	0	1713	0	0	1696	0	1770	1799	0	1770	1747	0
Flt Permitted		0.972			0.981		0.950			0.950		
Satd. Flow (perm)	0	1713	0	0	1696	0	1770	1799	0	1770	1747	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	3	49	16	3	22	54	92	27	33	109	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	41	0	54	119	0	33	185	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.8%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	3	45	15	3	20	50	85	25	30	100	70
Future Volume (Veh/h)	65	3	45	15	3	20	50	85	25	30	100	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	71	3	49	16	3	22	54	92	27	33	109	76
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	436	440	147	439	464	106	185			119		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	436	440	147	439	464	106	185			119		
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 %	86	99	95	97	99	98	96			98		
cM capacity (veh/h)	492	480	900	474	465	949	1390			1469		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	123	41	54	119	33	185
Volume Left	71	16	54	0	33	0
Volume Right	49	22	0	27	0	76
cSH	600	647	1390	1700	1469	1700
Volume to Capacity	0.21	0.06	0.04	0.07	0.02	0.11
Queue Length 95th (m)	6.1	1.6	1.0	0.0	0.6	0.0
Control Delay (s)	12.5	10.9	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.5	10.9	2.4		1.1	
Approach LOS	B	B				

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	3	85	15	3	20	95	75	25	30	60	70
Future Volume (vph)	65	3	85	15	3	20	95	75	25	30	60	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.928			0.963			0.919	
Flt Protected		0.979			0.981		0.950			0.950		
Satd. Flow (prot)	0	1687	0	0	1696	0	1770	1794	0	1770	1712	0
Flt Permitted		0.979			0.981		0.950			0.950		
Satd. Flow (perm)	0	1687	0	0	1696	0	1770	1794	0	1770	1712	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	3	92	16	3	22	103	82	27	33	65	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	166	0	0	41	0	103	109	0	33	141	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	3	85	15	3	20	95	75	25	30	60	70
Future Volume (Veh/h)	65	3	85	15	3	20	95	75	25	30	60	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	71	3	92	16	3	22	103	82	27	33	65	76
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	480	484	103	526	508	96	141			109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480	484	103	526	508	96	141			109		
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 %	84	99	90	96	99	98	93			98		
cM capacity (veh/h)	448	438	952	386	424	961	1442			1481		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	166	41	103	109	33	141
Volume Left	71	16	103	0	33	0
Volume Right	92	22	0	27	0	76
cSH	634	574	1442	1700	1481	1700
Volume to Capacity	0.26	0.07	0.07	0.06	0.02	0.08
Queue Length 95th (m)	8.4	1.8	1.8	0.0	0.5	0.0
Control Delay (s)	12.7	11.7	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.7	11.7	3.7		1.4	
Approach LOS	B	B				

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	565	0	165	530	0	120	455	0	60	475	0
Future Volume (vph)	75	565	0	165	530	0	120	455	0	60	475	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			0.99		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3539	0	1770	3539	0	1805	3610	0	1770	3610	0
Flt Permitted	0.335			0.255			0.407			0.485		
Satd. Flow (perm)	634	3539	0	475	3539	0	770	3610	0	897	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Adj. Flow (vph)	77	577	0	168	541	0	122	464	0	61	485	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	77	577	0	168	541	0	122	464	0	61	485	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

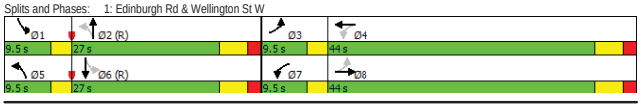
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	29.8	20.5		30.6	22.4		50.0	39.7		46.5	36.5	
Actuated g/C Ratio	0.33	0.23		0.34	0.25		0.56	0.44		0.52	0.41	
v/c Ratio	0.26	0.72		0.66	0.61		0.23	0.29		0.11	0.33	
Control Delay	19.9	37.0		33.1	33.3		11.3	18.4		8.3	18.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.9	37.0		33.1	33.3		11.3	18.4		8.3	18.6	
LOS	B	D		C	C		B	B		A	B	
Approach Delay		35.0			33.3			17.0			17.5	
Approach LOS		D			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 80.5 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 26.4		Intersection LOS: C	
Intersection Capacity Utilization 62.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	77	577	168	541	122	464	61	485
v/c Ratio	0.26	0.72	0.66	0.61	0.23	0.29	0.11	0.33
Control Delay	19.9	37.0	33.1	33.3	11.3	18.4	8.3	18.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.9	37.0	33.1	33.3	11.3	18.4	8.3	18.6
Queue Length 50th (m)	9.1	51.3	21.1	47.5	9.6	28.4	3.1	34.1
Queue Length 95th (m)	16.6	63.6	32.5	59.4	20.8	46.7	7.2	54.2
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	295	1494	254	1494	526	1593	536	1464
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	0.26	0.39	0.66	0.36	0.23	0.29	0.11	0.33

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	565	0	165	530	0	120	455	0	60	475	0
Future Volume (vph)	75	565	0	165	530	0	120	455	0	60	475	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1803	3539		1769	3539		1802	3610		1763	3610	
Flt Permitted	0.34	1.00		0.25	1.00		0.41	1.00		0.49	1.00	
Satd. Flow (perm)	636	3539		474	3539		772	3610		901	3610	
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)	77	577	0	168	541	0	122	464	0	61	485	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	77	577	0	168	541	0	122	464	0	61	485	0
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	26.3	21.1		28.9	22.4		47.0	38.5		41.8	35.9	
Effective Green, g (s)	26.3	21.1		28.9	22.4		47.0	38.5		41.8	35.9	
Actuated g/C Ratio	0.29	0.23		0.32	0.25		0.52	0.43		0.46	0.40	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	253	829		245	880		500	1544		474	1439	
v/s Ratio Prot	0.02	0.16		c0.05	0.15		c0.02	0.13		0.01	c0.13	
v/s Ratio Perm	0.07			c0.17			0.10			0.05		
v/c Ratio	0.30	0.70		0.69	0.61		0.24	0.30		0.13	0.34	
Uniform Delay, d1	23.7	31.5		23.5	30.0		11.2	16.9		13.4	18.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.76	0.91	
Incremental Delay, d2	0.7	2.6		7.7	1.3		0.3	0.5		0.1	0.6	
Delay (s)	24.4	34.1		31.2	31.3		11.5	17.4		10.3	17.7	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		32.9			31.3			16.2			16.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	540	0	0	695	50	285	80	160	45	0	250
Future Volume (vph)	145	540	0	0	695	50	285	80	160	45	0	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.990				0.850			0.850
Flt Protected	0.950						0.950	0.972		0.950		
Satd. Flow (prot)	1787	5136	0	0	5080	0	1698	1745	1599	1805	0	1599
Flt Permitted	0.281						0.950	0.972		0.576		
Satd. Flow (perm)	528	5136	0	0	5080	0	1698	1745	1599	1094	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					11				165			258
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	149	557	0	0	716	52	294	82	165	46	0	258
Shared Lane Traffic (%)							37%					
Lane Group Flow (vph)	149	557	0	0	768	0	185	191	165	46	0	258
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	Perm	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		8	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	47.5	25.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	47.5	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	37.2%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	4.5	4.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	3.0	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.5	7.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	33.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

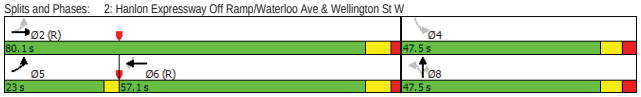
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.31	0.31		0.39
v/c Ratio	0.29	0.19			0.38		0.35	0.35	0.27	0.13		0.33
Control Delay	12.5	13.3			28.1		36.1	36.0	5.8	32.9		4.1
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	12.5	13.3			28.1		36.1	36.0	5.8	32.9		4.1
LOS	B	B			C		D	D	A	C		A
Approach Delay		13.1			28.1			26.8			8.5	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type:	Other		
Cycle Length: 127.6			
Actuated Cycle Length: 127.6			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 20.7		Intersection LOS: C	
Intersection Capacity Utilization 66.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	149	557	768	185	191	165	46	258
v/c Ratio	0.29	0.19	0.38	0.35	0.35	0.27	0.13	0.33
Control Delay	12.5	13.3	28.1	36.1	36.0	5.8	32.9	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	13.3	28.1	36.1	36.0	5.8	32.9	4.1
Queue Length 50th (m)	16.1	24.7	51.9	39.6	40.9	0.0	8.7	0.0
Queue Length 95th (m)	26.1	31.3	63.6	62.4	64.0	16.1	18.9	17.0
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	516	2938	1997	532	547	614	342	783
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	0.29	0.19	0.38	0.35	0.35	0.27	0.13	0.33

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	540	0	0	695	50	285	80	160	45	0	250
Future Volume (vph)	145	540	0	0	695	50	285	80	160	45	0	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.5	7.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			0.99		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.97	1.00	0.95		1.00
Satd. Flow (prot)	1787	5136			5079		1698	1745	1599	1805		1599
Flt Permitted	0.28	1.00			1.00		0.95	0.97	1.00	0.58		1.00
Satd. Flow (perm)	529	5136			5079		1698	1745	1599	1095		1599
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)	149	557	0	0	716	52	294	82	165	46	0	258
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	113	0	0	157
Lane Group Flow (vph)	149	557	0	0	761	0	185	191	52	46	0	101
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		8	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	40.0	40.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.31	0.31		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.5	7.5		7.1
Lane Grp Cap (vph)	499	2938			1990		532	547	501	343		626
v/s Ratio Prot	c0.05	0.11			c0.15							
v/s Ratio Perm	0.12						0.11	0.11	0.03	0.04		0.06
v/c Ratio	0.30	0.19			0.38		0.35	0.35	0.10	0.13		0.16
Uniform Delay, d1	13.3	13.1			27.8		33.7	33.8	31.1	31.4		25.2
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	1.5	0.1			0.6		1.8	1.8	0.4	0.8		0.6
Delay (s)	14.8	13.2			28.3		35.5	35.5	31.5	32.2		25.7
Level of Service	B	B			C		D	D	C	C		C
Approach Delay (s)		13.6			28.3			34.3			26.7	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	645	385	0	885	0	0	0	0	165	0	155
Future Volume (vph)	0	645	385	0	885	0	0	0	0	165	0	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.944										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4818	0	0	5136	0	0	0	0	3467	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	4818	0	0	5136	0	0	0	0	3467	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		342										163
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	2					2						
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%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Adj. Flow (vph)	0	679	405	0	932	0	0	0	0	174	0	163
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1084	0	0	932	0	0	0	0	174	0	163
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			24.9					24.7		24.9
Total Split (s)		56.9			56.9					24.7		56.9
Total Split (%)		69.7%			69.7%					30.3%		69.7%
Maximum Green (s)		50.0			50.0					18.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		7.0			7.0					7.0		7.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					18.0		50.0
Actuated g/C Ratio		0.61			0.61					0.22		0.61
v/c Ratio		0.35			0.30					0.23		0.16

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

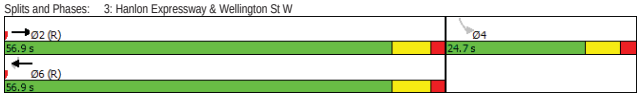
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		5.4			7.8					27.1		1.6
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		5.4			7.8					27.1		1.6
LOS		A			A					C		A
Approach Delay		5.4			7.8						14.7	
Approach LOS		A			A						B	

Intersection Summary

Area Type: Other
Cycle Length: 81.6
Actuated Cycle Length: 81.6
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 50
Control Type: Pretimed
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 7.7 — Intersection LOS: A
Intersection Capacity Utilization 38.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1084	932	174	163
v/c Ratio	0.35	0.30	0.23	0.16
Control Delay	5.4	7.8	27.1	1.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.4	7.8	27.1	1.6
Queue Length 50th (m)	18.2	23.7	12.1	0.0
Queue Length 95th (m)	25.1	30.5	20.6	6.7
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	3084	3147	764	996
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.35	0.30	0.23	0.16

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	645	385	0	885	0	0	0	0	165	0	155
Future Volume (vph)	0	645	385	0	885	0	0	0	0	165	0	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.94			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4818			5136					3467		1524
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4818			5136					3467		1524
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)	0	679	405	0	932	0	0	0	0	174	0	163
RTOR Reduction (vph)	0	132	0	0	0	0	0	0	0	0	0	63
Lane Group Flow (vph)	0	952	0	0	932	0	0	0	0	174	0	100
Confl. Peds. (#/hr)	2					2						
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					18.0		50.0
Effective Green, g (s)		50.0			50.0					18.0		50.0
Actuated g/C Ratio		0.61			0.61					0.22		0.61
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2952			3147					764		933
v/s Ratio Prot		c0.20			0.18							
v/s Ratio Perm										c0.05		0.07
v/c Ratio		0.32			0.30					0.23		0.11
Uniform Delay, d1		7.6			7.5					26.1		6.5
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		0.3			0.2					0.7		0.2
Delay (s)		7.9			7.7					26.8		6.8
Level of Service		A			A					C		A
Approach Delay (s)		7.9			7.7			0.0			17.1	
Approach LOS		A			A			A			B	

Intersection Summary

HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	635	610	300	385	55
Future Volume (vph)	65	635	610	300	385	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99			
Frt			0.951			0.850
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	3528	3342	0	1787	1615
Flt Permitted		0.778			0.950	
Satd. Flow (perm)	0	2758	3342	0	1787	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			147			57
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	3%	0%	1%	0%
Adj. Flow (vph)	67	655	629	309	397	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	722	938	0	397	57
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

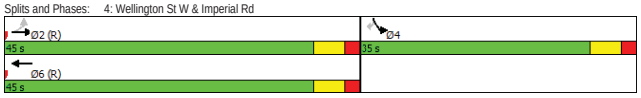
Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		45.3	45.3		22.7	22.7
Actuated g/C Ratio		0.57	0.57		0.28	0.28
v/c Ratio		0.46	0.48		0.78	0.11
Control Delay		12.4	10.3		37.2	5.9
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		12.4	10.3		37.2	5.9
LOS		B	B		D	A
Approach Delay		12.4	10.3		33.3	
Approach LOS		B	B		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 16.0		Intersection LOS: B	
Intersection Capacity Utilization 82.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	722	938	397	57
v/c Ratio	0.46	0.48	0.78	0.11
Control Delay	12.4	10.3	37.2	5.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.4	10.3	37.2	5.9
Queue Length 50th (m)	33.3	36.0	57.8	0.0
Queue Length 95th (m)	56.2	60.9	80.5	7.2
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1560	1955	647	621
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.46	0.48	0.61	0.09

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	635	610	300	385	55
Future Volume (vph)	65	635	610	300	385	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.95		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3529	3340		1787	1615
Flt Permitted		0.78	1.00		0.95	1.00
Satd. Flow (perm)		2759	3340		1787	1615
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	67	655	629	309	397	57
RTOR Reduction (vph)	0	0	64	0	0	41
Lane Group Flow (vph)	0	722	874	0	397	16
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	0%	2%	3%	0%	1%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		45.3	45.3		22.7	22.7
Effective Green, g (s)		45.3	45.3		22.7	22.7
Actuated g/C Ratio		0.57	0.57		0.28	0.28
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1562	1891		507	458
v/s Ratio Prot			c0.26		c0.22	
v/s Ratio Perm		0.26				0.01
v/c Ratio		0.46	0.46		0.78	0.04
Uniform Delay, d1		10.2	10.2		26.4	20.7
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.0	0.8		7.7	0.0
Delay (s)		11.2	11.0		34.1	20.8
Level of Service		B	B		C	C
Approach Delay (s)		11.2	11.0		32.4	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	325	0	230	340	70	360	1115	0	85	1020	130
Future Volume (vph)	130	325	0	230	340	70	360	1115	0	85	1020	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00	1.00							
Frt					0.974							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3574	0	1805	3508	0	3467	3374	0	1805	3471	1615
Flt Permitted	0.343			0.297			0.950			0.950		
Satd. Flow (perm)	645	3574	0	564	3508	0	3467	3374	0	1805	3471	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					12							134
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.97	0.97	0.40	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Adj. Flow (vph)	134	335	0	237	351	72	371	1149	0	88	1052	134
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	335	0	237	423	0	371	1149	0	88	1052	134
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

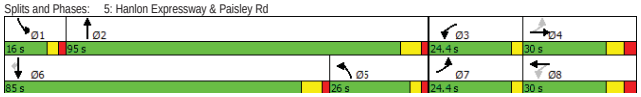
Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	1.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	30.0		9.5	30.0		10.0	59.4		10.0	60.4	60.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	39.1	19.4		46.8	24.5		20.5	87.7		10.5	77.7	77.7
Actuated g/C Ratio	0.24	0.12		0.29	0.15		0.13	0.55		0.07	0.48	0.48
v/c Ratio	0.52	0.78		0.75	0.78		0.84	0.62		0.75	0.63	0.16
Control Delay	50.8	81.9		61.9	74.5		86.0	27.7		109.0	33.5	3.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	50.8	81.9		61.9	74.5		86.0	27.7		109.0	33.5	3.9
LOS	D	F		E	E		F	C		F	C	A
Approach Delay		73.0			70.0			41.9			35.6	
Approach LOS		E			E			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 160.8			
Natural Cycle: 110			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 48.3		Intersection LOS: D	
Intersection Capacity Utilization 80.8%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	134	335	237	423	371	1149	88	1052	134
v/c Ratio	0.52	0.78	0.75	0.78	0.84	0.62	0.75	0.63	0.16
Control Delay	50.8	81.9	61.9	74.5	86.0	27.7	109.0	33.5	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	81.9	61.9	74.5	86.0	27.7	109.0	33.5	3.9
Queue Length 50th (m)	34.8	59.4	65.5	71.3	65.1	143.3	30.2	141.7	0.0
Queue Length 95th (m)	54.4	78.1	93.4	#100.3	#91.3	170.6	#60.3	169.2	12.7
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	333	489	329	552	453	1840	123	1677	849
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.69	0.72	0.77	0.82	0.62	0.72	0.63	0.16

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

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	325	0	230	340	70	360	1115	0	85	1020	130
Future Volume (vph)	130	325	0	230	340	70	360	1115	0	85	1020	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.97		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3574		1804	3509		3467	3374		1805	3471	1615
Flt Permitted	0.34	1.00		0.30	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	646	3574		564	3509		3467	3374		1805	3471	1615
Peak-hour factor, PHF	0.97	0.97	0.40	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	134	335	0	237	351	72	371	1149	0	88	1052	134
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	69
Lane Group Flow (vph)	134	335	0	237	413	0	371	1149	0	88	1052	65
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	34.2	19.5		42.2	24.5		20.5	87.7		10.5	77.7	77.7
Effective Green, g (s)	34.2	19.5		42.2	24.5		20.5	87.7		10.5	77.7	77.7
Actuated g/C Ratio	0.21	0.12		0.26	0.15		0.13	0.55		0.07	0.48	0.48
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	241	433		299	534		441	1840		117	1677	780
v/s Ratio Prot	0.05	0.09		c0.10	0.12		c0.11	c0.34		0.05	c0.30	
v/s Ratio Perm	0.07			c0.11								0.04
v/c Ratio	0.56	0.77		0.79	0.77		0.84	0.62		0.75	0.63	0.08
Uniform Delay, d1	54.0	68.5		50.8	65.5		68.6	25.2		73.9	30.8	22.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.8	8.4		13.4	6.9		13.5	1.6		23.5	1.8	0.2
Delay (s)	56.8	76.9		64.2	72.3		82.1	26.8		97.4	32.6	22.6
Level of Service	E	E		E	E		F	C		F	C	C
Approach Delay (s)		71.1			69.4			40.3			36.0	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	160.8	Sum of lost time (s)	23.4
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	110	35	55	105	40	45	495	65	30	490	55
Future Volume (vph)	80	110	35	55	105	40	45	495	65	30	490	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		1.00	1.00		1.00	1.00	
Frt		0.964			0.959			0.983			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1800	0	1805	1797	0	1805	1858	0	1770	1867	0
Flt Permitted	0.602			0.602			0.421			0.412		
Satd. Flow (perm)	1110	1800	0	1135	1797	0	798	1858	0	765	1867	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			33			8			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Adj. Flow (vph)	82	113	36	57	108	41	46	510	67	31	505	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	149	0	57	149	0	46	577	0	31	562	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

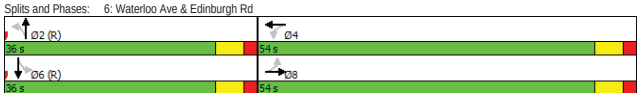
Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	11.7	11.7		11.7	11.7		66.3	66.3		66.3	66.3	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.74	0.74		0.74	0.74	
v/c Ratio	0.57	0.58		0.39	0.57		0.08	0.42		0.06	0.41	
Control Delay	50.9	38.2		41.9	36.1		3.8	10.4		4.5	6.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	50.9	38.2		41.9	36.1		3.8	10.4		4.5	6.0	
LOS	D	D		D	D		A	B		A	A	
Approach Delay		42.7			37.7			9.9			5.9	
Approach LOS		D			D			A			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 67.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	82	149	57	149	46	577	31	562
v/c Ratio	0.57	0.58	0.39	0.57	0.08	0.42	0.06	0.41
Control Delay	50.9	38.2	41.9	36.1	3.8	10.4	4.5	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.9	38.2	41.9	36.1	3.8	10.4	4.5	6.0
Queue Length 50th (m)	14.3	21.1	9.7	20.0	1.6	27.2	1.3	30.9
Queue Length 95th (m)	27.4	37.7	20.3	36.6	4.7	84.9	4.6	60.8
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	592	972	605	973	587	1369	563	1376
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	0.14	0.15	0.09	0.15	0.08	0.42	0.06	0.41

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	110	35	55	105	40	45	495	65	30	490	55
Future Volume (vph)	80	110	35	55	105	40	45	495	65	30	490	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1800		1792	1796		1800	1858		1760	1866	
Flt Permitted	0.60	1.00		0.60	1.00		0.42	1.00		0.41	1.00	
Satd. Flow (perm)	1110	1800		1135	1796		798	1858		764	1866	
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)	82	113	36	57	108	41	46	510	67	31	505	57
RTOR Reduction (vph)	0	23	0	0	29	0	0	2	0	0	2	0
Lane Group Flow (vph)	82	126	0	57	120	0	46	575	0	31	560	0
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	11.7	11.7		11.7	11.7		66.3	66.3		66.3	66.3	
Effective Green, g (s)	11.7	11.7		11.7	11.7		66.3	66.3		66.3	66.3	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.74	0.74		0.74	0.74	
Clearance Time (s)	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	
Lane Grp Cap (vph)	144	234		147	233		587	1368		562	1374	
v/s Ratio Prot		0.07			0.07			c0.31			0.30	
v/s Ratio Perm	c0.07			0.05			0.06			0.04		
v/c Ratio	0.57	0.54		0.39	0.52		0.08	0.42		0.06	0.41	
Uniform Delay, d1	36.8	36.6		35.9	36.5		3.3	4.5		3.3	4.5	
Progression Factor	1.00	1.00		1.00	1.00		0.81	1.82		1.00	1.00	
Incremental Delay, d2	5.1	2.4		1.7	1.9		0.3	0.9		0.2	0.9	
Delay (s)	41.9	39.0		37.6	38.4		2.9	9.2		3.4	5.4	
Level of Service	D	D		D	D		A	A		A	A	
Approach Delay (s)		40.0			38.2			8.7			5.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	70	140	170	70	135	160
Future Volume (vph)	70	140	170	70	135	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1599
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	1%
Adj. Flow (vph)	76	152	185	76	147	174
Shared Lane Traffic (%)						
Lane Group Flow (vph)	76	152	185	76	147	174
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.2%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	70	140	170	70	135	160
Future Volume (Veh/h)	70	140	170	70	135	160
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	152	185	76	147	174
Pedestrians					1	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			229		523	77
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			229		523	77
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			86		67	82
cM capacity (veh/h)			1338		446	986

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	76	152	185	76	321
Volume Left	0	0	185	0	147
Volume Right	0	152	0	0	174
cSH	1700	1700	1338	1700	974
Volume to Capacity	0.04	0.09	0.14	0.04	0.33
Queue Length 95th (m)	0.0	0.0	3.8	0.0	11.6
Control Delay (s)	0.0	0.0	8.1	0.0	12.9
Lane LOS			A		B
Approach Delay (s)	0.0		5.8		12.9
Approach LOS					B

Intersection Summary			
Average Delay	7.0		
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	300	95	35	275	60	110	460	30	55	435	85
Future Volume (vph)	100	300	95	35	275	60	110	460	30	55	435	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		1.00	1.00		1.00	1.00	
Frt		0.964			0.973			0.991			0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1803	0	1805	1821	0	1805	1878	0	1736	1842	0
Flt Permitted	0.403			0.320			0.327			0.354		
Satd. Flow (perm)	758	1803	0	604	1821	0	619	1878	0	645	1842	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			16			6			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Adj. Flow (vph)	108	323	102	38	296	65	118	495	32	59	468	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	425	0	38	361	0	118	527	0	59	559	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.43	0.69		0.19	0.59		0.38	0.55		0.18	0.59	
Control Delay	25.7	27.4		20.9	24.4		15.8	15.3		11.9	15.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.7	27.4		20.9	24.4		15.8	15.3		11.9	15.8	
LOS	C	C		C	C		B	B		B	B	
Approach Delay		27.0			24.0			15.4			15.4	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 19.8		Intersection LOS: B	
Intersection Capacity Utilization 80.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd

Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	108	425	38	361	118	527	59	559
v/c Ratio	0.43	0.69	0.19	0.59	0.38	0.55	0.18	0.59
Control Delay	25.7	27.4	20.9	24.4	15.8	15.3	11.9	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.7	27.4	20.9	24.4	15.8	15.3	11.9	15.8
Queue Length 50th (m)	13.9	57.4	4.0	41.8	10.1	49.8	4.5	53.1
Queue Length 95th (m)	30.3	92.3	11.3	68.7	23.2	78.0	11.5	83.6
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	252	616	201	617	313	954	326	942
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	0.43	0.69	0.19	0.59	0.38	0.55	0.18	0.59

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	300	95	35	275	60	110	460	30	55	435	85
Future Volume (vph)	100	300	95	35	275	60	110	460	30	55	435	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1786	1803		1794	1821		1798	1877		1731	1841	
Flt Permitted	0.40	1.00		0.32	1.00		0.33	1.00		0.35	1.00	
Satd. Flow (perm)	758	1803		604	1821		619	1877		644	1841	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	108	323	102	38	296	65	118	495	32	59	468	91
RTOR Reduction (vph)	0	15	0	0	11	0	0	3	0	0	9	0
Lane Group Flow (vph)	108	410	0	38	350	0	118	524	0	59	550	0
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	252	601		201	607		313	951		326	932	
v/s Ratio Prot		c0.23			0.19			0.28			c0.30	
v/s Ratio Perm	0.14			0.06			0.19			0.09		
v/c Ratio	0.43	0.68		0.19	0.58		0.38	0.55		0.18	0.59	
Uniform Delay, d1	19.4	21.6		17.8	20.6		11.3	12.7		10.0	13.0	
Progression Factor	1.00	1.02		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	5.7		2.1	4.0		3.4	2.3		1.2	2.7	
Delay (s)	24.4	27.8		19.9	24.6		14.7	15.0		11.3	15.8	
Level of Service	C	C		B	C		B	B		B	B	
Approach Delay (s)		27.1			24.2			14.9			15.3	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	325	120	70	315	145	115	40	65	190	40	205
Future Volume (vph)	210	325	120	70	315	145	115	40	65	190	40	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00	0.99		1.00	0.98		0.99	0.99	
Frt			0.850		0.953			0.907			0.874	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1785	0	1770	1695	0	1787	1641	0
Flt Permitted	0.335			0.550			0.519			0.526		
Satd. Flow (perm)	635	1881	1594	1044	1785	0	966	1695	0	984	1641	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			130		33			71			223	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	228	353	130	76	342	158	125	43	71	207	43	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	353	130	76	500	0	125	114	0	207	266	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	61.4	58.4	58.4	45.9	45.9		17.9	8.8		20.2	8.8	
Actuated g/C Ratio	0.68	0.65	0.65	0.51	0.51		0.20	0.10		0.22	0.10	
v/c Ratio	0.41	0.29	0.12	0.14	0.54		0.48	0.50		0.67	0.74	
Control Delay	8.1	8.2	1.7	14.5	17.8		33.3	24.1		40.0	21.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	8.1	8.2	1.7	14.5	17.8		33.3	24.1		40.0	21.5	
LOS	A	A	A	B	B		C	C		D	C	
Approach Delay		7.0			17.3			28.9			29.6	
Approach LOS		A			B			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 17.9		Intersection LOS: B	
Intersection Capacity Utilization 75.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd

Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	228	353	130	76	500	125	114	207	266
v/c Ratio	0.41	0.29	0.12	0.14	0.54	0.48	0.50	0.67	0.74
Control Delay	8.1	8.2	1.7	14.5	17.8	33.3	24.1	40.0	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.1	8.2	1.7	14.5	17.8	33.3	24.1	40.0	21.5
Queue Length 50th (m)	12.9	24.3	0.0	6.8	53.6	18.5	7.5	32.2	7.5
Queue Length 95th (m)	25.8	44.6	6.7	17.3	97.7	31.4	22.6	49.6	31.2
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	582	1220	1080	532	926	265	305	311	427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.29	0.12	0.14	0.54	0.47	0.37	0.67	0.62

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	325	120	70	315	145	115	40	65	190	40	205
Future Volume (vph)	210	325	120	70	315	145	115	40	65	190	40	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	1881	1594	1804	1784		1769	1694		1782	1642	
Flt Permitted	0.33	1.00	1.00	0.55	1.00		0.52	1.00		0.53	1.00	
Satd. Flow (perm)	636	1881	1594	1044	1784		967	1694		988	1642	
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)	228	353	130	76	342	158	125	43	71	207	43	223
RTOR Reduction (vph)	0	0	47	0	17	0	0	65	0	0	198	0
Lane Group Flow (vph)	228	353	83	76	483	0	125	49	0	207	68	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	57.2	57.2	57.2	44.7	44.7		15.5	7.7		20.1	10.0	
Effective Green, g (s)	57.2	57.2	57.2	44.7	44.7		15.5	7.7		20.1	10.0	
Actuated g/C Ratio	0.64	0.64	0.64	0.50	0.50		0.17	0.09		0.22	0.11	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	527	1195	1013	518	886		236	144		309	182	
v/s Ratio Prot	c0.05	0.19			c0.27		0.05	0.03		c0.07	0.04	
v/s Ratio Perm	0.23		0.05	0.07			0.05			c0.07		
v/c Ratio	0.43	0.30	0.08	0.15	0.55		0.53	0.34		0.67	0.37	
Uniform Delay, d1	8.4	7.4	6.3	12.3	15.6		33.3	38.8		30.7	37.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.6	0.2	0.6	2.4		2.1	1.4		5.4	1.3	
Delay (s)	9.0	8.0	6.5	12.9	18.0		35.4	40.2		36.2	38.4	
Level of Service	A	A	A	B	B		D	D		D	D	
Approach Delay (s)		8.0			17.4			37.7			37.4	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	4	50	25	4	25	55	105	20	25	105	80
Future Volume (vph)	75	4	50	25	4	25	55	105	20	25	105	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948			0.937			0.976			0.935	
Flt Protected		0.972			0.977		0.950			0.950		
Satd. Flow (prot)	0	1716	0	0	1705	0	1770	1818	0	1770	1742	0
Flt Permitted		0.972			0.977		0.950			0.950		
Satd. Flow (perm)	0	1716	0	0	1705	0	1770	1818	0	1770	1742	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	4	54	27	4	27	60	114	22	27	114	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	140	0	0	58	0	60	136	0	27	201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.1%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	4	50	25	4	25	55	105	20	25	105	80
Future Volume (Veh/h)	75	4	50	25	4	25	55	105	20	25	105	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	82	4	54	27	4	27	60	114	22	27	114	87
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	474	468	158	469	500	125	201			136		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	474	468	158	469	500	125	201			136		
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 %	82	99	94	94	99	97	96			98		
cM capacity (veh/h)	460	463	888	449	444	926	1371			1448		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	140	58	60	136	27	201
Volume Left	82	27	60	0	27	0
Volume Right	54	27	0	22	0	87
cSH	565	590	1371	1700	1448	1700
Volume to Capacity	0.25	0.10	0.04	0.08	0.02	0.12
Queue Length 95th (m)	7.8	2.6	1.1	0.0	0.5	0.0
Control Delay (s)	13.5	11.8	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.5	11.8	2.4		0.9	
Approach LOS	B	B				

Intersection Summary

Average Delay	5.2		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	4	90	25	4	25	95	75	20	25	75	80
Future Volume (vph)	80	4	90	25	4	25	95	75	20	25	75	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.930			0.937			0.968			0.923	
Flt Protected		0.978			0.977		0.950			0.950		
Satd. Flow (prot)	0	1694	0	0	1705	0	1770	1803	0	1770	1719	0
Flt Permitted		0.978			0.977		0.950			0.950		
Satd. Flow (perm)	0	1694	0	0	1705	0	1770	1803	0	1770	1719	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	4	98	27	4	27	103	82	22	27	82	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	189	0	0	58	0	103	104	0	27	169	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.9%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	4	90	25	4	25	95	75	20	25	75	80
Future Volume (Veh/h)	80	4	90	25	4	25	95	75	20	25	75	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	87	4	98	27	4	27	103	82	22	27	82	87
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	496	490	126	535	522	93	169			104		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496	490	126	535	522	93	169			104		
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 %	80	99	89	93	99	97	93			98		
cM capacity (veh/h)	435	436	925	377	418	964	1409			1488		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	189	58	103	104	27	169
Volume Left	87	27	103	0	27	0
Volume Right	98	27	0	22	0	87
cSH	600	531	1409	1700	1488	1700
Volume to Capacity	0.32	0.11	0.07	0.06	0.02	0.10
Queue Length 95th (m)	10.8	2.9	1.9	0.0	0.4	0.0
Control Delay (s)	13.7	12.6	7.8	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.7	12.6	3.9		1.0	
Approach LOS	B	B				

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	250	40	45	250	65	79
Future Volume (vph)	250	40	45	250	65	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.873			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3073	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3073	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	7			1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	3%	0%	0%
Adj. Flow (vph)	272	43	49	272	71	86
Shared Lane Traffic (%)						
Lane Group Flow (vph)	272	43	321	0	71	86
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.0%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	250	40	45	250	65	79
Future Volume (Veh/h)	250	40	45	250	65	79
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	272	43	49	272	71	86
Pedestrians	1		7			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	0		1			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	378	162			322	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	378	162			322	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	51	95			94	
cM capacity (veh/h)	559	860			1248	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	272	43	33	288	71	43	43
Volume Left	272	0	0	0	71	0	0
Volume Right	0	43	0	272	0	0	0
cSH	559	860	1700	1700	1248	1700	1700
Volume to Capacity	0.49	0.05	0.02	0.17	0.06	0.03	0.03
Queue Length 95th (m)	21.2	1.3	0.0	0.0	1.4	0.0	0.0
Control Delay (s)	17.4	9.4	0.0	0.0	8.1	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	16.3		0.0		3.6		
Approach LOS	C						

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	260	75	150	270	60	120
Future Volume (vph)	260	75	150	270	60	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.904			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3243	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3243	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	283	82	163	293	65	130
Shared Lane Traffic (%)						
Lane Group Flow (vph)	283	82	456	0	65	130
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	260	75	150	270	60	120
Future Volume (Veh/h)	260	75	150	270	60	120
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	283	82	163	293	65	130
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	506	228			456	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	506	228			456	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	39	89			94	
cM capacity (veh/h)	467	781			1115	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	283	82	109	347	65	65	65
Volume Left	283	0	0	0	65	0	0
Volume Right	0	82	0	293	0	0	0
cSH	467	781	1700	1700	1115	1700	1700
Volume to Capacity	0.61	0.11	0.06	0.20	0.06	0.04	0.04
Queue Length 95th (m)	31.5	2.8	0.0	0.0	1.5	0.0	0.0
Control Delay (s)	23.9	10.2	0.0	0.0	8.4	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	20.8		0.0		2.8		
Approach LOS	C						

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	40.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	170	70	135	160	70	140
Future Volume (vph)	170	70	135	160	70	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.919			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3300	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3300	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	185	76	147	174	76	152
Shared Lane Traffic (%)						
Lane Group Flow (vph)	185	76	321	0	76	152
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.2%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	170	70	135	160	70	140
Future Volume (Veh/h)	170	70	135	160	70	140
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	185	76	147	174	76	152
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	463	160			321	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	463	160			321	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	63	91			94	
cM capacity (veh/h)	495	862			1250	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	185	76	98	223	76	76	76
Volume Left	185	0	0	0	76	0	0
Volume Right	0	76	0	174	0	0	0
cSH	495	862	1700	1700	1250	1700	1700
Volume to Capacity	0.37	0.09	0.06	0.13	0.06	0.04	0.04
Queue Length 95th (m)	13.7	2.3	0.0	0.0	1.6	0.0	0.0
Control Delay (s)	16.5	9.6	0.0	0.0	8.1	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	14.5		0.0		2.7		
Approach LOS	B						

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	835	0	115	545	0	185	595	0	60	550	0
Future Volume (vph)	115	835	0	115	545	0	185	595	0	60	550	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			0.99		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3471	0	1703	3438	0	1752	3539	0	1703	3505	0
Flt Permitted	0.328			0.145			0.238			0.325		
Satd. Flow (perm)	615	3471	0	260	3438	0	437	3539	0	577	3505	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		5	5		3	8		24	24		8
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
Heavy Vehicles (%)	1%	4%	5%	6%	5%	0%	3%	2%	4%	6%	3%	0%
Adj. Flow (vph)	129	938	0	129	612	0	208	669	0	67	618	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	129	938	0	129	612	0	208	669	0	67	618	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

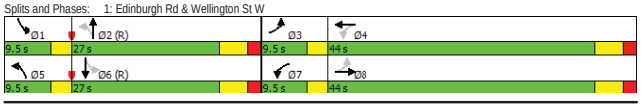
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	40.6	31.1		40.6	31.1		39.7	29.1		34.0	23.9	
Actuated g/C Ratio	0.45	0.35		0.45	0.35		0.44	0.32		0.38	0.27	
v/c Ratio	0.36	0.78		0.58	0.52		0.60	0.59		0.22	0.66	
Control Delay	14.8	31.2		23.0	24.5		27.8	30.2		12.7	28.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.8	31.2		23.0	24.5		27.8	30.2		12.7	28.9	
LOS	B	C		C	C		C	C		B	C	
Approach Delay		29.2			24.3			29.7			27.3	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 80 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 27.8		Intersection LOS: C	
Intersection Capacity Utilization 71.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	129	938	129	612	208	669	67	618
v/c Ratio	0.36	0.78	0.58	0.52	0.60	0.59	0.22	0.66
Control Delay	14.8	31.2	23.0	24.5	27.8	30.2	12.7	28.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.8	31.2	23.0	24.5	27.8	30.2	12.7	28.9
Queue Length 50th (m)	12.4	78.9	12.4	45.7	23.1	55.5	4.3	57.7
Queue Length 95th (m)	19.1	90.1	19.2	54.3	#50.0	#81.7	m8.1	66.1
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	361	1465	221	1451	345	1143	309	932
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	0.36	0.64	0.58	0.42	0.60	0.59	0.22	0.66

Intersection Summary
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.

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	835	0	115	545	0	185	595	0	60	550	0
Future Volume (vph)	115	835	0	115	545	0	185	595	0	60	550	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1786	3471		1703	3438		1751	3539		1696	3505	
Flt Permitted	0.33	1.00		0.15	1.00		0.24	1.00		0.32	1.00	
Satd. Flow (perm)	616	3471		261	3438		439	3539		580	3505	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	129	938	0	129	612	0	208	669	0	67	618	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	129	938	0	129	612	0	208	669	0	67	618	0
Confl. Peds. (#/hr)	3		5	5		3	8		24	24		8
Heavy Vehicles (%)	1%	4%	5%	6%	5%	0%	3%	2%	4%	6%	3%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	37.6	31.1		37.6	31.1		37.4	28.5		29.8	23.9	
Effective Green, g (s)	37.6	31.1		37.6	31.1		37.4	28.5		29.8	23.9	
Actuated g/C Ratio	0.42	0.35		0.42	0.35		0.42	0.32		0.33	0.27	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	341	1199		213	1188		335	1120		265	930	
v/s Ratio Prot	0.03	c0.27		c0.04	0.18		c0.07	0.19		0.02	0.18	
v/s Ratio Perm	0.13			0.21			c0.19			0.07		
v/c Ratio	0.38	0.78		0.61	0.52		0.62	0.60		0.25	0.66	
Uniform Delay, d1	16.8	26.4		18.4	23.4		18.5	25.9		21.1	29.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.67	0.83	
Incremental Delay, d2	0.7	3.4		4.8	0.4		3.6	2.4		0.5	3.4	
Delay (s)	17.5	29.8		23.2	23.8		22.0	28.3		14.6	27.9	
Level of Service	B	C		C	C		C	C		B	C	
Approach Delay (s)		28.3			23.7			26.8			26.6	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	71.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	905	0	0	775	15	195	100	235	15	0	320
Future Volume (vph)	180	905	0	0	775	15	195	100	235	15	0	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.997				0.850			0.850
Flt Protected	0.950						0.950	0.983		0.950		
Satd. Flow (prot)	1736	4988	0	0	4974	0	1633	1734	1599	1805	0	1583
Flt Permitted	0.240						0.950	0.983		0.616		
Satd. Flow (perm)	438	4988	0	0	4974	0	1633	1734	1599	1170	0	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					2				258			352
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
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 (%)	4%	4%	0%	0%	4%	0%	5%	1%	1%	0%	0%	2%
Adj. Flow (vph)	198	995	0	0	852	16	214	110	258	16	0	352
Shared Lane Traffic (%)							26%					
Lane Group Flow (vph)	198	995	0	0	868	0	158	166	258	16	0	352
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	34.1	25.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	80.1	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	62.8%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	5.0	4.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	2.1	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	20.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

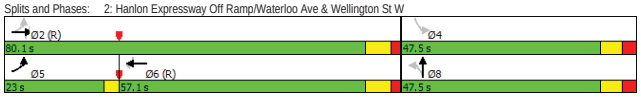
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.57	0.31		0.39
v/c Ratio	0.42	0.35			0.45		0.31	0.31	0.25	0.04		0.42
Control Delay	14.2	15.0			29.4		35.4	35.2	2.1	31.1		4.2
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	14.2	15.0			29.4		35.4	35.2	2.1	31.1		4.2
LOS	B	B			C		D	D	A	C		A
Approach Delay		14.9			29.4			20.6			5.4	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type: Other
Cycle Length: 127.6
Actuated Cycle Length: 127.6
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.45
Intersection Signal Delay: 19.0 — Intersection LOS: B
Intersection Capacity Utilization 68.4% — ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	198	995	868	158	166	258	16	352
v/c Ratio	0.42	0.35	0.45	0.31	0.31	0.25	0.04	0.42
Control Delay	14.2	15.0	29.4	35.4	35.2	2.1	31.1	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.2	15.0	29.4	35.4	35.2	2.1	31.1	4.2
Queue Length 50th (m)	22.1	49.1	61.0	33.3	35.0	0.0	3.0	0.0
Queue Length 95th (m)	34.3	58.7	74.0	54.0	56.0	11.5	8.7	19.2
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	468	2853	1950	511	543	1025	366	834
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	0.42	0.35	0.45	0.31	0.31	0.25	0.04	0.42

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	180	905	0	0	775	15	195	100	235	15	0	320
Future Volume (vph)	180	905	0	0	775	15	195	100	235	15	0	320
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			1.00		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00	0.95		1.00
Satd. Flow (prot)	1735	4988			4975		1633	1734	1599	1805		1583
Flt Permitted	0.24	1.00			1.00		0.95	0.98	1.00	0.62		1.00
Satd. Flow (perm)	439	4988			4975		1633	1734	1599	1170		1583
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)	198	995	0	0	852	16	214	110	258	16	0	352
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	110	0	0	214
Lane Group Flow (vph)	198	995	0	0	867	0	158	166	148	16	0	138
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	4%	4%	0%	0%	4%	0%	5%	1%	1%	0%	0%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.57	0.31		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Grp Cap (vph)	454	2853			1949		511	543	914	366		620
v/s Ratio Prot	c0.07	0.20			0.17							
v/s Ratio Perm	c0.18						c0.10	0.10	0.09	0.01		0.09
v/c Ratio	0.44	0.35			0.44		0.31	0.31	0.16	0.04		0.22
Uniform Delay, d1	14.1	14.6			28.6		33.3	33.3	12.9	30.5		25.8
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	3.0	0.3			0.7		1.6	1.5	0.4	0.2		0.8
Delay (s)	17.2	14.9			29.3		34.9	34.7	13.2	30.7		26.7
Level of Service	B	B			C		C	C	B	C		C
Approach Delay (s)		15.3			29.3			25.2			26.9	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	980	465	0	895	0	0	0	0	190	0	115
Future Volume (vph)	0	980	465	0	895	0	0	0	0	190	0	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.952										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4703	0	0	4988	0	0	0	0	3242	0	1455
Flt Permitted										0.950		
Satd. Flow (perm)	0	4703	0	0	4988	0	0	0	0	3242	0	1455
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		176										121
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	1					1						
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%	5%	5%	0%	4%	0%	0%	0%	0%	8%	0%	11%
Adj. Flow (vph)	0	1032	489	0	942	0	0	0	0	200	0	121
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1521	0	0	942	0	0	0	0	200	0	121
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			29.9					24.7		29.9
Total Split (s)		56.9			56.9					41.7		56.9
Total Split (%)		57.7%			57.7%					42.3%		57.7%
Maximum Green (s)		50.0			50.0					35.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		0.0			7.0					0.0		7.0
Flash Dont Walk (s)		0.0			16.0					0.0		16.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
v/c Ratio		0.62			0.37					0.17		0.15

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

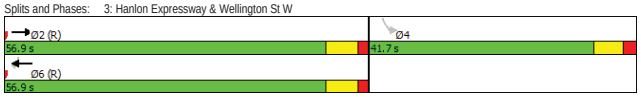
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		16.4			15.3					22.4		2.9
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		16.4			15.3					22.4		2.9
LOS		B			B					C		A
Approach Delay		16.4			15.3						15.0	
Approach LOS		B			B						B	

Intersection Summary

Area Type: Other
Cycle Length: 98.6
Actuated Cycle Length: 98.6
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 55
Control Type: Pretimed
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 15.9 — Intersection LOS: B
Intersection Capacity Utilization 43.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1521	942	200	121
v/c Ratio	0.62	0.37	0.17	0.15
Control Delay	16.4	15.3	22.4	2.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.4	15.3	22.4	2.9
Queue Length 50th (m)	67.7	40.2	14.0	0.0
Queue Length 95th (m)	83.0	50.2	22.3	8.6
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	2471	2529	1150	797
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.62	0.37	0.17	0.15

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	980	465	0	895	0	0	0	0	190	0	115
Future Volume (vph)	0	980	465	0	895	0	0	0	0	190	0	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.95			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4702			4988					3242		1455
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4702			4988					3242		1455
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)	0	1032	489	0	942	0	0	0	0	200	0	121
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	0	0	0	60
Lane Group Flow (vph)	0	1434	0	0	942	0	0	0	0	200	0	61
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	0%	5%	5%	0%	4%	0%	0%	0%	0%	8%	0%	11%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					35.0		50.0
Effective Green, g (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2384			2529					1150		737
v/s Ratio Prot		c0.31			0.19							
v/s Ratio Perm										c0.06		0.04
v/c Ratio		0.60			0.37					0.17		0.08
Uniform Delay, d1		17.2			14.8					21.9		12.5
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		1.1			0.4					0.3		0.2
Delay (s)		18.4			15.2					22.2		12.7
Level of Service		B			B					C		B
Approach Delay (s)		18.4			15.2			0.0			18.6	
Approach LOS		B			B			A			B	

Intersection Summary

HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	990	725	175	445	75
Future Volume (vph)	65	990	725	175	445	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	1.00			
Frt			0.971			0.850
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3397	3318	0	1770	1599
Flt Permitted		0.808			0.950	
Satd. Flow (perm)	0	2753	3318	0	1770	1599
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			51			78
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	6%	5%	6%	2%	1%
Adj. Flow (vph)	68	1031	755	182	464	78
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1099	937	0	464	78
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

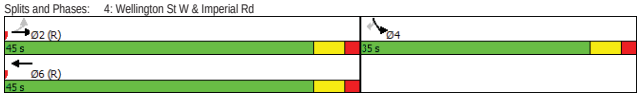
Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	-1.0
Total Lost Time (s)		6.0	6.0		6.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		43.0	43.0		25.0	26.0
Actuated g/C Ratio		0.54	0.54		0.31	0.32
v/c Ratio		0.74	0.52		0.84	0.14
Control Delay		19.4	13.2		39.6	5.0
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		19.4	13.2		39.6	5.0
LOS		B	B		D	A
Approach Delay		19.4	13.2		34.6	
Approach LOS		B	B		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.84			
Intersection Signal Delay: 20.3		Intersection LOS: C	
Intersection Capacity Utilization 94.6%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1099	937	464	78
v/c Ratio	0.74	0.52	0.84	0.14
Control Delay	19.4	13.2	39.6	5.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.4	13.2	39.6	5.0
Queue Length 50th (m)	68.8	45.8	67.0	0.0
Queue Length 95th (m)	103.8	68.2	98.4	8.3
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1479	1806	641	648
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.74	0.52	0.72	0.12

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	990	725	175	445	75
Future Volume (vph)	65	990	725	175	445	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	5.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.97		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3397	3318		1770	1599
Flt Permitted		0.81	1.00		0.95	1.00
Satd. Flow (perm)		2754	3318		1770	1599
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	68	1031	755	182	464	78
RTOR Reduction (vph)	0	0	24	0	0	53
Lane Group Flow (vph)	0	1099	913	0	464	25
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	5%	6%	5%	6%	2%	1%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		43.0	43.0		25.0	25.0
Effective Green, g (s)		43.0	43.0		25.0	26.0
Actuated g/C Ratio		0.54	0.54		0.31	0.32
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1480	1783		553	519
v/s Ratio Prot			0.28		c0.26	
v/s Ratio Perm		c0.40				0.02
v/c Ratio		0.74	0.51		0.84	0.05
Uniform Delay, d1		14.2	11.8		25.6	18.5
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		3.4	1.1		10.8	0.0
Delay (s)		17.6	12.9		36.4	18.6
Level of Service		B	B		D	B
Approach Delay (s)		17.6	12.9		33.8	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	94.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	345	0	200	220	70	170	1445	0	40	1085	45
Future Volume (vph)	100	345	0	200	220	70	170	1445	0	40	1085	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Frt					0.964							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1687	3438	0	1787	3396	0	3303	3343	0	1597	3282	1482
Flt Permitted	0.572			0.285			0.194			0.950		
Satd. Flow (perm)	1016	3438	0	536	3396	0	675	3343	0	1597	3282	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					21							102
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	7%	5%	2%	1%	2%	4%	6%	8%	3%	13%	10%	9%
Adj. Flow (vph)	102	352	0	204	224	71	173	1474	0	41	1107	46
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	352	0	204	295	0	173	1474	0	41	1107	46
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	

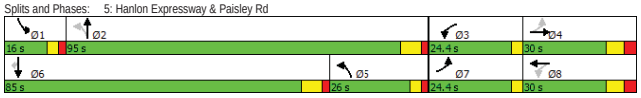
Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2					6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	1.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	30.0		9.5	30.0		10.0	59.4		10.0	59.4	59.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		None	Min		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	37.5	19.8		46.2	25.5		90.7	88.3		8.9	78.1	78.1
Actuated g/C Ratio	0.24	0.13		0.30	0.16		0.58	0.56		0.06	0.50	0.50
v/c Ratio	0.34	0.81		0.67	0.52		0.26	0.78		0.45	0.68	0.06
Control Delay	45.5	82.3		55.7	59.8		22.9	32.2		90.0	33.8	0.1
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	45.5	82.3		55.7	59.8		22.9	32.2		90.0	33.8	0.1
LOS	D	F		E	E		C	C		F	C	A
Approach Delay		74.0			58.1			31.2			34.4	
Approach LOS		E			E			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 156.3			
Natural Cycle: 110			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 40.9		Intersection LOS: D	
Intersection Capacity Utilization 85.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	102	352	204	295	173	1474	41	1107	46
v/c Ratio	0.34	0.81	0.67	0.52	0.26	0.78	0.45	0.68	0.06
Control Delay	45.5	82.3	55.7	59.8	22.9	32.2	90.0	33.8	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.5	82.3	55.7	59.8	22.9	32.2	90.0	33.8	0.1
Queue Length 50th (m)	25.7	61.6	54.5	44.4	13.8	211.9	13.7	153.8	0.0
Queue Length 95th (m)	43.0	82.3	80.7	63.7	21.1	255.3	28.2	187.3	0.0
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	383	487	330	585	766	1887	113	1639	791
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.72	0.62	0.50	0.23	0.78	0.36	0.68	0.06

Intersection Summary

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	345	0	200	220	70	170	1445	0	40	1085	45
Future Volume (vph)	100	345	0	200	220	70	170	1445	0	40	1085	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frt	1.00	1.00		1.00	0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1687	3438		1787	3395		3303	3343		1597	3282	1482
Flt Permitted	0.57	1.00		0.29	1.00		0.19	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1015	3438		536	3395		675	3343		1597	3282	1482
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)	102	352	0	204	224	71	173	1474	0	41	1107	46
RTOR Reduction (vph)	0	0	0	0	18	0	0	0	0	0	0	23
Lane Group Flow (vph)	102	352	0	204	277	0	173	1474	0	41	1107	23
Heavy Vehicles (%)	7%	5%	2%	1%	2%	4%	6%	8%	3%	13%	10%	9%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2					6
Actuated Green, G (s)	32.4	19.8		41.1	25.5		90.7	88.3		7.6	78.1	78.1
Effective Green, g (s)	32.4	19.8		41.1	25.5		90.7	88.3		7.6	78.1	78.1
Actuated g/C Ratio	0.21	0.13		0.26	0.16		0.58	0.56		0.05	0.50	0.50
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	262	432		285	550		686	1875		77	1628	735
v/s Ratio Prot	0.03	c0.10		c0.08	0.08		0.03	c0.44		0.03	c0.34	
v/s Ratio Perm	0.05			0.10			0.12					0.02
v/c Ratio	0.39	0.81		0.72	0.50		0.25	0.79		0.53	0.68	0.03
Uniform Delay, d1	52.8	67.0		49.0	60.2		28.2	27.1		73.2	30.1	20.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	11.2		8.3	0.7		0.2	3.4		6.9	2.3	0.1
Delay (s)	53.8	78.3		57.2	60.9		28.4	30.5		80.1	32.5	20.4
Level of Service	D	E		E	E		C	C		F	C	C
Approach Delay (s)		72.8			59.4			30.3			33.6	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	157.4	Sum of lost time (s)	23.4
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	250	55	75	140	25	25	580	95	45	490	50
Future Volume (vph)	85	250	55	75	140	25	25	580	95	45	490	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.973			0.977			0.979			0.986	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1774	0	1752	1789	0	1805	1820	0	1770	1834	0
Flt Permitted	0.602			0.326			0.359			0.265		
Satd. Flow (perm)	1112	1774	0	596	1789	0	679	1820	0	492	1834	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			15			10			6	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	8		12	12		8	11		10	10		11
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
Heavy Vehicles (%)	2%	3%	7%	3%	4%	0%	0%	2%	0%	2%	2%	0%
Adj. Flow (vph)	92	272	60	82	152	27	27	630	103	49	533	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	332	0	82	179	0	27	733	0	49	587	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

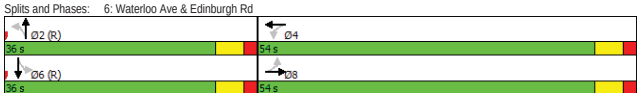
Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	22.3	22.3		22.3	22.3		55.7	55.7		55.7	55.7	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.62	0.62		0.62	0.62	
v/c Ratio	0.33	0.73		0.56	0.39		0.06	0.65		0.16	0.52	
Control Delay	29.1	38.2		42.5	26.8		22.2	32.9		11.2	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.1	38.2		42.5	26.8		22.2	32.9		11.2	12.9	
LOS	C	D		D	C		C	C		B	B	
Approach Delay		36.2			31.7			32.5			12.8	
Approach LOS		D			C			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 27.1		Intersection LOS: C	
Intersection Capacity Utilization 73.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	92	332	82	179	27	733	49	587
v/c Ratio	0.33	0.73	0.56	0.39	0.06	0.65	0.16	0.52
Control Delay	29.1	38.2	42.5	26.8	22.2	32.9	11.2	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	38.2	42.5	26.8	22.2	32.9	11.2	12.9
Queue Length 50th (m)	13.8	52.4	13.0	24.7	2.6	100.9	3.4	53.6
Queue Length 95th (m)	24.3	72.2	25.4	37.9	m8.1	160.3	11.6	104.2
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	593	955	317	961	419	1129	304	1136
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	0.16	0.35	0.26	0.19	0.06	0.65	0.16	0.52

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	250	55	75	140	25	25	580	95	45	490	50
Future Volume (vph)	85	250	55	75	140	25	25	580	95	45	490	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1756	1773		1739	1790		1794	1820		1763	1834	
Flt Permitted	0.60	1.00		0.33	1.00		0.36	1.00		0.26	1.00	
Satd. Flow (perm)	1112	1773		598	1790		678	1820		491	1834	
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)	92	272	60	82	152	27	27	630	103	49	533	54
RTOR Reduction (vph)	0	14	0	0	11	0	0	4	0	0	2	0
Lane Group Flow (vph)	92	318	0	82	168	0	27	729	0	49	585	0
Confl. Peds. (#/hr)	8		12	12		8	11		10	10		11
Heavy Vehicles (%)	2%	3%	7%	3%	4%	0%	0%	2%	0%	2%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	22.3	22.3		22.3	22.3		55.7	55.7		55.7	55.7	
Effective Green, g (s)	22.3	22.3		22.3	22.3		55.7	55.7		55.7	55.7	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.62	0.62		0.62	0.62	
Clearance Time (s)	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	
Lane Grp Cap (vph)	275	439		148	443		419	1126		303	1135	
v/s Ratio Prot		c0.18			0.09			c0.40			0.32	
v/s Ratio Perm	0.08			0.14			0.04			0.10		
v/c Ratio	0.33	0.72		0.55	0.38		0.06	0.65		0.16	0.52	
Uniform Delay, d1	27.8	31.0		29.5	28.1		6.8	10.9		7.3	9.6	
Progression Factor	1.00	1.00		1.00	1.00		2.36	2.36		1.00	1.00	
Incremental Delay, d2	0.7	5.8		4.4	0.5		0.2	2.4		1.1	1.7	
Delay (s)	28.5	36.9		33.9	28.6		16.3	28.1		8.4	11.3	
Level of Service	C	D		C	C		B	C		A	B	
Approach Delay (s)		35.0			30.3			27.7			11.0	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	65	80	255	40	45	260
Future Volume (vph)	65	80	255	40	45	260
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1568
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1568
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		7	7			1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	3%
Adj. Flow (vph)	71	87	277	43	49	283
Shared Lane Traffic (%)						
Lane Group Flow (vph)	71	87	277	43	49	283
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.1%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	65	80	255	40	45	260
Future Volume (Veh/h)	65	80	255	40	45	260
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	87	277	43	49	283
Pedestrians				1	7	
Lane Width (m)				3.6	3.6	
Walking Speed (m/s)				1.2	1.2	
Percent Blockage				0	1	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			165		675	79
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			165		675	79
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			80		85	71
cM capacity (veh/h)			1405		337	972

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	71	87	277	43	332
Volume Left	0	0	277	0	49
Volume Right	0	87	0	0	283
cSH	1700	1700	1405	1700	1140
Volume to Capacity	0.04	0.05	0.20	0.03	0.29
Queue Length 95th (m)	0.0	0.0	5.9	0.0	9.7
Control Delay (s)	0.0	0.0	8.2	0.0	11.3
Lane LOS			A		B
Approach Delay (s)	0.0		7.1		11.3
Approach LOS					B

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	360	70	50	255	80	80	495	60	95	420	85
Future Volume (vph)	95	360	70	50	255	80	80	495	60	95	420	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99		0.99	0.99		0.99	1.00		1.00	0.99	
Frt		0.976			0.964			0.984			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1703	1762	0	1805	1751	0	1770	1830	0	1656	1796	0
Flt Permitted	0.399			0.267			0.335			0.291		
Satd. Flow (perm)	699	1762	0	505	1751	0	618	1830	0	506	1796	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		14			23			12			20	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	29		9	9		29	20		7	7		20
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
Heavy Vehicles (%)	6%	5%	3%	0%	4%	0%	2%	1%	9%	9%	2%	4%
Adj. Flow (vph)	103	391	76	54	277	87	87	538	65	103	457	92
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	467	0	54	364	0	87	603	0	103	549	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.44	0.78		0.32	0.61		0.28	0.65		0.40	0.60	
Control Delay	24.0	30.8		25.2	24.7		13.7	17.3		17.5	15.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.0	30.8		25.2	24.7		13.7	17.3		17.5	15.9	
LOS	C	C		C	C		B	B		B	B	
Approach Delay		29.6			24.7			16.9			16.2	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 21.2		Intersection LOS: C	
Intersection Capacity Utilization 82.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd

Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	103	467	54	364	87	603	103	549
v/c Ratio	0.44	0.78	0.32	0.61	0.28	0.65	0.40	0.60
Control Delay	24.0	30.8	25.2	24.7	13.7	17.3	17.5	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.0	30.8	25.2	24.7	13.7	17.3	17.5	15.9
Queue Length 50th (m)	13.3	67.5	5.9	41.7	7.0	60.6	8.9	52.1
Queue Length 95th (m)	m29.5	#112.9	16.1	69.3	16.7	95.0	22.2	82.8
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	233	596	168	599	313	933	256	919
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	0.44	0.78	0.32	0.61	0.28	0.65	0.40	0.60

Intersection Summary

\# 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.

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	360	70	50	255	80	80	495	60	95	420	85
Future Volume (vph)	95	360	70	50	255	80	80	495	60	95	420	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1664	1761		1795	1751		1752	1829		1651	1796	
Flt Permitted	0.40	1.00		0.27	1.00		0.34	1.00		0.29	1.00	
Satd. Flow (perm)	699	1761		504	1751		618	1829		506	1796	
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)	103	391	76	54	277	87	87	538	65	103	457	92
RTOR Reduction (vph)	0	9	0	0	15	0	0	6	0	0	10	0
Lane Group Flow (vph)	103	458	0	54	349	0	87	597	0	103	539	0
Confl. Peds. (#/hr)	29		9	9		29	20		7	7		20
Heavy Vehicles (%)	6%	5%	3%	0%	4%	0%	2%	1%	9%	9%	2%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	233	587		168	583		313	926		256	909	
v/s Ratio Prot		c0.26			0.20			c0.33			0.30	
v/s Ratio Perm	0.15			0.11			0.14			0.20		
v/c Ratio	0.44	0.78		0.32	0.60		0.28	0.64		0.40	0.59	
Uniform Delay, d1	19.5	22.5		18.7	20.8		10.6	13.6		11.5	13.0	
Progression Factor	0.90	0.95		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	8.7		5.0	4.5		2.2	3.5		4.7	2.8	
Delay (s)	22.7	30.0		23.7	25.3		12.8	17.0		16.1	15.9	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		28.7			25.1			16.5			15.9	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	360	55	35	315	155	95	30	50	170	20	130
Future Volume (vph)	210	360	55	35	315	155	95	30	50	170	20	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.98	1.00	0.98		0.99	0.95		0.94	0.98	
Frt			0.850		0.951			0.907			0.870	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1792	1615	1805	1714	0	1805	1637	0	1770	1564	0
Flt Permitted	0.346			0.531			0.618			0.565		
Satd. Flow (perm)	632	1792	1587	1006	1714	0	1163	1637	0	994	1564	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		35			54			141	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
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
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Adj. Flow (vph)	228	391	60	38	342	168	103	33	54	185	22	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	228	391	60	38	510	0	103	87	0	185	163	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	64.0	61.0	61.0	48.7	48.7		17.2	8.2		17.6	8.2	
Actuated g/C Ratio	0.71	0.68	0.68	0.54	0.54		0.19	0.09		0.20	0.09	
v/c Ratio	0.40	0.32	0.05	0.07	0.54		0.37	0.44		0.70	0.61	
Control Delay	7.5	7.9	1.6	13.4	17.1		30.8	24.5		44.3	19.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	7.5	7.9	1.6	13.4	17.1		30.8	24.5		44.3	19.3	
LOS	A	A	A	B	B		C	C		D	B	
Approach Delay		7.2			16.8			27.9			32.6	
Approach LOS		A			B			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 14.5 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 72.4%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd

Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	228	391	60	38	510	103	87	185	163
v/c Ratio	0.40	0.32	0.05	0.07	0.54	0.37	0.44	0.70	0.61
Control Delay	7.5	7.9	1.6	13.4	17.1	30.8	24.5	44.3	19.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	7.9	1.6	13.4	17.1	30.8	24.5	44.3	19.3
Queue Length 50th (m)	12.4	27.1	0.0	3.2	54.7	15.2	5.7	28.8	3.8
Queue Length 95th (m)	26.0	51.3	3.7	10.0	102.6	26.6	19.0	44.7	21.5
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	592	1215	1099	544	943	282	282	264	346
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.32	0.05	0.07	0.54	0.37	0.31	0.70	0.47

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	360	55	35	315	155	95	30	50	170	20	130
Future Volume (vph)	210	360	55	35	315	155	95	30	50	170	20	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.98		1.00	0.95		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		0.99	1.00		0.97	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1746	1792	1587	1799	1713		1794	1636		1720	1565	
Flt Permitted	0.35	1.00	1.00	0.53	1.00		0.62	1.00		0.57	1.00	
Satd. Flow (perm)	635	1792	1587	1005	1713		1168	1636		1023	1565	
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)	228	391	60	38	342	168	103	33	54	185	22	141
RTOR Reduction (vph)	0	0	20	0	17	0	0	50	0	0	127	0
Lane Group Flow (vph)	228	391	40	38	493	0	103	37	0	185	36	0
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	59.8	59.8	59.8	47.5	47.5		13.5	7.1		16.9	8.8	
Effective Green, g (s)	59.8	59.8	59.8	47.5	47.5		13.5	7.1		16.9	8.8	
Actuated g/C Ratio	0.66	0.66	0.66	0.53	0.53		0.15	0.08		0.19	0.10	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	536	1190	1054	530	904		219	129		254	153	
v/s Ratio Prot	c0.04	0.22			c0.29		0.03	0.02		c0.07	0.02	
v/s Ratio Perm	0.24		0.03	0.04			0.04			c0.07		
v/c Ratio	0.43	0.33	0.04	0.07	0.55		0.47	0.29		0.73	0.23	
Uniform Delay, d1	7.3	6.5	5.2	10.4	14.1		34.5	39.1		33.4	37.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.7	0.1	0.3	2.4		1.6	1.2		10.0	0.8	
Delay (s)	7.8	7.2	5.3	10.7	16.5		36.1	40.3		43.4	38.3	
Level of Service	A	A	A	B	B		D	D		D	D	
Approach Delay (s)		7.2			16.1			38.0			41.0	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	4	40	25	4	30	25	80	10	10	55	45
Future Volume (vph)	45	4	40	25	4	30	25	80	10	10	55	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.940			0.930			0.983			0.933	
Flt Protected		0.975			0.979		0.950			0.950		
Satd. Flow (prot)	0	1707	0	0	1696	0	1770	1831	0	1770	1738	0
Flt Permitted		0.975			0.979		0.950			0.950		
Satd. Flow (perm)	0	1707	0	0	1696	0	1770	1831	0	1770	1738	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	4	43	27	4	33	27	87	11	11	60	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	96	0	0	64	0	27	98	0	11	109	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 21.8%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	4	40	25	4	30	25	80	10	10	55	45
Future Volume (Veh/h)	45	4	40	25	4	30	25	80	10	10	55	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	49	4	43	27	4	33	27	87	11	11	60	49
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	282	258	84	274	278	92	109			98		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	282	258	84	274	278	92	109			98		
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 %	92	99	96	96	99	97	98			99		
cM capacity (veh/h)	631	629	975	633	614	965	1481			1495		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	96	64	27	98	11	109
Volume Left	49	27	27	0	11	0
Volume Right	43	33	0	11	0	49
cSH	749	768	1481	1700	1495	1700
Volume to Capacity	0.13	0.08	0.02	0.06	0.01	0.06
Queue Length 95th (m)	3.5	2.2	0.4	0.0	0.2	0.0
Control Delay (s)	10.5	10.1	7.5	0.0	7.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	10.5	10.1	1.6		0.7	
Approach LOS	B	B				

Intersection Summary

Average Delay	4.8		
Intersection Capacity Utilization	21.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	4	40	25	4	30	30	35	10	10	65	45
Future Volume (vph)	50	4	40	25	4	30	30	35	10	10	65	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.943			0.930			0.966			0.939	
Flt Protected		0.974			0.979		0.950			0.950		
Satd. Flow (prot)	0	1711	0	0	1696	0	1770	1799	0	1770	1749	0
Flt Permitted		0.974			0.979		0.950			0.950		
Satd. Flow (perm)	0	1711	0	0	1696	0	1770	1799	0	1770	1749	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	4	43	27	4	33	33	38	11	11	71	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	101	0	0	64	0	33	49	0	11	120	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 22.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	4	40	25	4	30	30	35	10	10	65	45
Future Volume (Veh/h)	50	4	40	25	4	30	30	35	10	10	65	45
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	54	4	43	27	4	33	33	38	11	11	71	49
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	256	232	96	248	252	44	120			49		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	256	232	96	248	252	44	120			49		
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 %	92	99	96	96	99	97	98			99		
cM capacity (veh/h)	656	648	961	656	632	1027	1468			1558		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	101	64	33	49	11	120
Volume Left	54	27	33	0	11	0
Volume Right	43	33	0	11	0	49
cSH	758	804	1468	1700	1558	1700
Volume to Capacity	0.13	0.08	0.02	0.03	0.01	0.07
Queue Length 95th (m)	3.7	2.1	0.6	0.0	0.2	0.0
Control Delay (s)	10.5	9.9	7.5	0.0	7.3	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.5	9.9	3.0		0.6	
Approach LOS	B	A				

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	22.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	670	0	240	780	0	200	700	0	60	685	0
Future Volume (vph)	115	670	0	240	780	0	200	700	0	60	685	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			1.00		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3539	0	1770	3539	0	1805	3610	0	1770	3610	0
Flt Permitted	0.201			0.237			0.211			0.338		
Satd. Flow (perm)	381	3539	0	441	3539	0	400	3610	0	627	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Adj. Flow (vph)	117	684	0	245	796	0	204	714	0	61	699	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	117	684	0	245	796	0	204	714	0	61	699	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

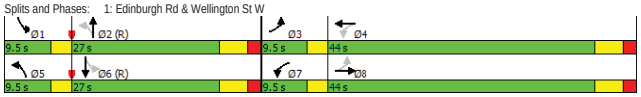
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	35.7	26.2		36.3	28.1		45.1	33.8		37.2	27.0	
Actuated g/C Ratio	0.40	0.29		0.40	0.31		0.50	0.38		0.41	0.30	
v/c Ratio	0.46	0.66		0.90	0.72		0.52	0.53		0.17	0.65	
Control Delay	20.4	30.7		54.1	31.4		19.1	26.0		14.0	27.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.4	30.7		54.1	31.4		19.1	26.0		14.0	27.3	
LOS	C	C		D	C		B	C		B	C	
Approach Delay		29.2			36.8			24.5			26.3	
Approach LOS		C			D			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 71 (79%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 29.6		Intersection LOS: C	
Intersection Capacity Utilization 78.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	117	684	245	796	204	714	61	699
v/c Ratio	0.46	0.66	0.90	0.72	0.52	0.53	0.17	0.65
Control Delay	20.4	30.7	54.1	31.4	19.1	26.0	14.0	27.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.4	30.7	54.1	31.4	19.1	26.0	14.0	27.3
Queue Length 50th (m)	12.4	56.7	28.3	68.7	20.1	54.5	4.2	57.2
Queue Length 95th (m)	20.0	67.6	#53.2	80.8	39.1	84.5	m9.5	#89.6
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	254	1494	273	1494	392	1354	356	1083
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	0.46	0.46	0.90	0.53	0.52	0.53	0.17	0.65

Intersection Summary

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.

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	670	0	240	780	0	200	700	0	60	685	0
Future Volume (vph)	115	670	0	240	780	0	200	700	0	60	685	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3539		1769	3539		1804	3610		1767	3610	
Flt Permitted	0.20	1.00		0.24	1.00		0.21	1.00		0.34	1.00	
Satd. Flow (perm)	381	3539		441	3539		400	3610		628	3610	
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)	117	684	0	245	796	0	204	714	0	61	699	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	117	684	0	245	796	0	204	714	0	61	699	0
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	32.0	26.8		34.6	28.1		41.7	32.6		32.5	26.4	
Effective Green, g (s)	32.0	26.8		34.6	28.1		41.7	32.6		32.5	26.4	
Actuated g/C Ratio	0.36	0.30		0.38	0.31		0.46	0.36		0.36	0.29	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	217	1053		265	1104		377	1307		303	1058	
v/s Ratio Prot	0.03	0.19		c0.07	0.22		c0.07	0.20		0.01	c0.19	
v/s Ratio Perm	0.16			c0.29			0.18			0.06		
v/c Ratio	0.54	0.65		0.92	0.72		0.54	0.55		0.20	0.66	
Uniform Delay, d1	20.9	27.5		24.0	27.5		16.0	22.8		19.1	27.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.93	0.83	
Incremental Delay, d2	2.6	1.4		35.5	2.3		1.6	1.6		0.3	2.8	
Delay (s)	23.4	28.9		59.5	29.8		17.6	24.5		18.0	26.0	
Level of Service	C	C		E	C		B	C		B	C	
Approach Delay (s)		28.1			36.8			22.9			25.4	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	775	0	0	1015	50	415	155	150	40	0	350
Future Volume (vph)	220	775	0	0	1015	50	415	155	150	40	0	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.993				0.850			0.850
Flt Protected	0.950						0.950	0.977		0.950		
Satd. Flow (prot)	1787	5136	0	0	5097	0	1698	1755	1599	1805	0	1599
Flt Permitted	0.163						0.950	0.977		0.419		
Satd. Flow (perm)	307	5136	0	0	5097	0	1698	1755	1599	796	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					7				155			361
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	227	799	0	0	1046	52	428	160	155	41	0	361
Shared Lane Traffic (%)							32%					
Lane Group Flow (vph)	227	799	0	0	1098	0	291	297	155	41	0	361
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	34.1	24.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	80.1	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	62.8%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	5.0	3.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	2.1	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	20.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

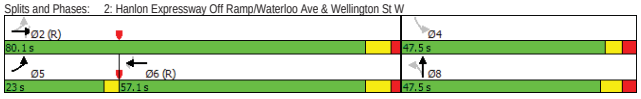
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.57	0.32		0.39
v/c Ratio	0.54	0.27			0.55		0.55	0.54	0.16	0.16		0.43
Control Delay	17.5	14.1			31.1		41.0	40.6	2.2	33.2		4.2
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	17.5	14.1			31.1		41.0	40.6	2.2	33.2		4.2
LOS	B	B			C		D	D	A	C		A
Approach Delay		14.9			31.1			32.7			7.1	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type: Other
Cycle Length: 127.6
Actuated Cycle Length: 127.6
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 95
Control Type: Pretimed
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 23.4 — Intersection LOS: C
Intersection Capacity Utilization 77.8% — ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	227	799	1098	291	297	155	41	361
v/c Ratio	0.54	0.27	0.55	0.55	0.54	0.16	0.16	0.43
Control Delay	17.5	14.1	31.1	41.0	40.6	2.2	33.2	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	14.1	31.1	41.0	40.6	2.2	33.2	4.2
Queue Length 50th (m)	25.7	37.4	81.0	67.0	68.3	0.0	7.8	0.0
Queue Length 95th (m)	41.5	45.6	95.8	98.6	99.8	9.5	17.5	19.3
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	417	2938	2001	532	550	981	255	846
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	0.54	0.27	0.55	0.55	0.54	0.16	0.16	0.43

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	775	0	0	1015	50	415	155	150	40	0	350
Future Volume (vph)	220	775	0	0	1015	50	415	155	150	40	0	350
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			0.99		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.98	1.00	0.95		1.00
Satd. Flow (prot)	1787	5136			5096		1698	1756	1599	1805		1599
Flt Permitted	0.16	1.00			1.00		0.95	0.98	1.00	0.42		1.00
Satd. Flow (perm)	306	5136			5096		1698	1756	1599	795		1599
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)	227	799	0	0	1046	52	428	160	155	41	0	361
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	66	0	0	220
Lane Group Flow (vph)	227	799	0	0	1094	0	291	297	89	41	0	141
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	73.0	41.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.57	0.32		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	6.5		7.1
Lane Grp Cap (vph)	407	2938			1996		532	550	914	255		626
v/s Ratio Prot	c0.09	0.16			0.21							
v/s Ratio Perm	c0.23						c0.17	0.17	0.06	0.05		0.09
v/c Ratio	0.56	0.27			0.55		0.55	0.54	0.10	0.16		0.23
Uniform Delay, d1	15.9	13.8			30.0		36.3	36.2	12.4	31.0		25.9
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	5.4	0.2			1.1		4.0	3.8	0.2	1.3		0.8
Delay (s)	21.3	14.1			31.1		40.3	40.0	12.6	32.3		26.7
Level of Service	C	B			C		D	D	B	C		C
Approach Delay (s)		15.7			31.1			34.4			27.3	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	900	515	0	1325	0	0	0	0	205	0	100
Future Volume (vph)	0	900	515	0	1325	0	0	0	0	205	0	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.945										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4823	0	0	5136	0	0	0	0	3467	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	4823	0	0	5136	0	0	0	0	3467	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		212										105
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	2					2						
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%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Adj. Flow (vph)	0	947	542	0	1395	0	0	0	0	216	0	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1489	0	0	1395	0	0	0	0	216	0	105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			24.9					24.7		24.9
Total Split (s)		56.9			56.9					41.7		56.9
Total Split (%)		57.7%			57.7%					42.3%		57.7%
Maximum Green (s)		50.0			50.0					35.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		7.0			7.0					7.0		7.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
v/c Ratio		0.58			0.54					0.18		0.13

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

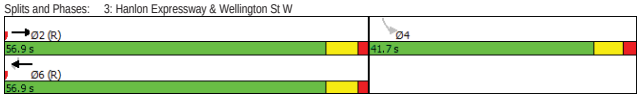
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		15.4			17.4					22.4		3.0
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		15.4			17.4					22.4		3.0
LOS		B			B					C		A
Approach Delay		15.4			17.4						16.0	
Approach LOS		B			B						B	

Intersection Summary

Area Type:	Other
Cycle Length: 98.6	
Actuated Cycle Length: 98.6	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 50	
Control Type: Pretimed	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 16.3	Intersection LOS: B
Intersection Capacity Utilization 43.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1489	1395	216	105
v/c Ratio	0.58	0.54	0.18	0.13
Control Delay	15.4	17.4	22.4	3.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	15.4	17.4	22.4	3.0
Queue Length 50th (m)	62.6	66.4	15.2	0.0
Queue Length 95th (m)	77.0	79.8	23.7	8.1
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	2550	2604	1230	824
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.58	0.54	0.18	0.13

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	900	515	0	1325	0	0	0	0	205	0	100
Future Volume (vph)	0	900	515	0	1325	0	0	0	0	205	0	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.95			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4825			5136					3467		1524
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4825			5136					3467		1524
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)	0	947	542	0	1395	0	0	0	0	216	0	105
RTOR Reduction (vph)	0	104	0	0	0	0	0	0	0	0	0	52
Lane Group Flow (vph)	0	1385	0	0	1395	0	0	0	0	216	0	53
Confl. Peds. (#/hr)	2					2						
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					35.0		50.0
Effective Green, g (s)		50.0			50.0					35.0		50.0
Actuated g/C Ratio		0.51			0.51					0.35		0.51
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2446			2604					1230		772
v/s Ratio Prot		c0.29			0.27							
v/s Ratio Perm										c0.06		0.03
v/c Ratio		0.57			0.54					0.18		0.07
Uniform Delay, d1		16.8			16.4					21.9		12.4
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		1.0			0.8					0.3		0.2
Delay (s)		17.8			17.2					22.2		12.6
Level of Service		B			B					C		B
Approach Delay (s)		17.8			17.2			0.0			19.0	
Approach LOS		B			B			A			B	

Intersection Summary

HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	985	890	410	370	60
Future Volume (vph)	70	985	890	410	370	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99			
Frt			0.953			0.850
Flt Protected		0.997			0.950	
Satd. Flow (prot)	0	3566	3348	0	1787	1615
Flt Permitted		0.689			0.950	
Satd. Flow (perm)	0	2464	3348	0	1787	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			131			62
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	3%	0%	1%	0%
Adj. Flow (vph)	72	1015	918	423	381	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1087	1341	0	381	62
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

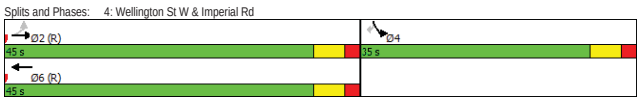
10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		45.8	45.8		22.2	22.2
Actuated g/C Ratio		0.57	0.57		0.28	0.28
v/c Ratio		0.77	0.68		0.77	0.13
Control Delay		19.7	13.9		36.9	5.9
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		19.7	13.9		36.9	5.9
LOS		B	B		D	A
Approach Delay		19.7	13.9		32.5	
Approach LOS		B	B		C	

Intersection Summary

Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 19.0		Intersection LOS: B	
Intersection Capacity Utilization 102.5%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1087	1341	381	62
v/c Ratio	0.77	0.68	0.77	0.13
Control Delay	19.7	13.9	36.9	5.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.7	13.9	36.9	5.9
Queue Length 50th (m)	64.6	65.5	55.6	0.0
Queue Length 95th (m)	#125.4	109.3	76.7	7.5
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1411	1973	647	624
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	0.68	0.59	0.10

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	985	890	410	370	60
Future Volume (vph)	70	985	890	410	370	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.95		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3565	3347		1787	1615
Flt Permitted		0.69	1.00		0.95	1.00
Satd. Flow (perm)		2464	3347		1787	1615
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	72	1015	918	423	381	62
RTOR Reduction (vph)	0	0	56	0	0	45
Lane Group Flow (vph)	0	1087	1285	0	381	17
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	0%	1%	3%	0%	1%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		45.8	45.8		22.2	22.2
Effective Green, g (s)		45.8	45.8		22.2	22.2
Actuated g/C Ratio		0.57	0.57		0.28	0.28
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1410	1916		495	448
v/s Ratio Prot			0.38		c0.21	
v/s Ratio Perm		c0.44				0.01
v/c Ratio		0.77	0.67		0.77	0.04
Uniform Delay, d1		13.1	11.9		26.6	21.1
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		4.1	1.9		7.1	0.0
Delay (s)		17.2	13.8		33.6	21.1
Level of Service		B	B		C	C
Approach Delay (s)		17.2	13.8		31.9	
Approach LOS		B	B		C	

Intersection Summary

HCM 2000 Control Delay	17.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	102.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	400	0	280	470	70	420	1215	0	95	1625	140
Future Volume (vph)	120	400	0	280	470	70	420	1215	0	95	1625	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00	1.00							
Frt					0.981							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3574	0	1805	3535	0	3467	3374	0	1805	3471	1615
Flt Permitted	0.225			0.209			0.950			0.950		
Satd. Flow (perm)	423	3574	0	397	3535	0	3467	3374	0	1805	3471	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					8							143
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Adj. Flow (vph)	122	408	0	286	480	71	429	1240	0	97	1658	143
Shared Lane Traffic (%)												
Lane Group Flow (vph)	122	408	0	286	551	0	429	1240	0	97	1658	143
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

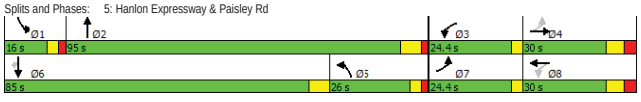
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	10.0	28.0		9.5	29.4		10.0	60.4		10.0	60.4	60.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	79.6	79.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	5.4	5.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	40.3	21.4		50.7	28.9		21.0	87.8		10.8	79.6	79.6
Actuated g/C Ratio	0.24	0.13		0.31	0.18		0.13	0.53		0.07	0.48	0.48
v/c Ratio	0.56	0.88		0.94	0.88		0.97	0.69		0.82	0.99	0.17
Control Delay	53.1	90.8		86.0	80.8		106.6	31.1		120.1	61.3	3.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	53.1	90.8		86.0	80.8		106.6	31.1		120.1	61.3	3.7
LOS	D	F		F	F		F	C		F	E	A
Approach Delay		82.1			82.6			50.5			59.9	
Approach LOS		F			F			D			E	

Intersection Summary

Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 164.8			
Natural Cycle: 130			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 63.0		Intersection LOS: E	
Intersection Capacity Utilization 102.3%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	122	408	286	551	429	1240	97	1658	143
v/c Ratio	0.56	0.88	0.94	0.88	0.97	0.69	0.82	0.99	0.17
Control Delay	53.1	90.8	86.0	80.8	106.6	31.1	120.1	61.3	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	90.8	86.0	80.8	106.6	31.1	120.1	61.3	3.7
Queue Length 50th (m)	31.4	74.0	81.6	97.6	77.6	164.8	33.8	296.4	0.0
Queue Length 95th (m)	49.8	#101.7	#133.1	#147.6	#114.2	191.1	#68.9	#354.1	12.8
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	299	477	304	626	442	1797	120	1676	854
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.86	0.94	0.88	0.97	0.69	0.81	0.99	0.17

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	400	0	280	470	70	420	1215	0	95	1625	140
Future Volume (vph)	120	400	0	280	470	70	420	1215	0	95	1625	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	5.4	5.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.98		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3574		1805	3534		3467	3374		1805	3471	1615
Flt Permitted	0.23	1.00		0.21	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	423	3574		398	3534		3467	3374		1805	3471	1615
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)	122	408	0	286	480	71	429	1240	0	97	1658	143
RTOR Reduction (vph)	0	0	0	0	7	0	0	0	0	0	0	74
Lane Group Flow (vph)	122	408	0	286	544	0	429	1240	0	97	1658	69
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	35.3	21.4		45.8	28.9		21.0	87.8		10.8	79.6	79.6
Effective Green, g (s)	35.3	21.4		45.8	28.9		21.0	87.8		10.8	79.6	79.6
Actuated g/C Ratio	0.21	0.13		0.28	0.18		0.13	0.53		0.07	0.48	0.48
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	5.4	5.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	205	464		293	619		441	1797		118	1676	780
v/s Ratio Prot	0.05	0.11		c0.13	0.15		c0.12	0.37		0.05	c0.48	
v/s Ratio Perm	0.08			c0.14								0.04
v/c Ratio	0.60	0.88		0.98	0.88		0.97	0.69		0.82	0.99	0.09
Uniform Delay, d1	55.0	70.4		52.6	66.3		71.6	28.4		76.1	42.2	23.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.6	17.0		45.6	13.5		35.6	2.2		34.9	19.6	0.2
Delay (s)	59.6	87.5		98.2	79.7		107.2	30.6		111.0	61.8	23.2
Level of Service	E	F		F	E		F	C		F	E	C
Approach Delay (s)		81.1			86.0			50.3			61.4	
Approach LOS		F			F			D			E	

Intersection Summary

HCM 2000 Control Delay	63.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	164.8	Sum of lost time (s)	23.4
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	175	50	90	265	45	50	645	85	50	635	75
Future Volume (vph)	70	175	50	90	265	45	50	645	85	50	635	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.966			0.978			0.982			0.984	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1805	0	1805	1836	0	1805	1856	0	1770	1865	0
Flt Permitted	0.331			0.493			0.273			0.260		
Satd. Flow (perm)	612	1805	0	931	1836	0	518	1856	0	483	1865	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			14			8			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Adj. Flow (vph)	72	180	52	93	273	46	52	665	88	52	655	77
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	232	0	93	319	0	52	753	0	52	732	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

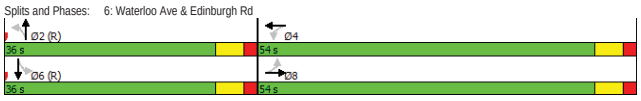
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	21.2	21.2		21.2	21.2		56.8	56.8		56.8	56.8	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.63	0.63		0.63	0.63	
v/c Ratio	0.50	0.52		0.42	0.72		0.16	0.64		0.17	0.62	
Control Delay	40.3	29.7		33.5	38.9		9.8	21.8		10.7	14.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.3	29.7		33.5	38.9		9.8	21.8		10.7	14.3	
LOS	D	C		C	D		A	C		B	B	
Approach Delay		32.2			37.7			21.0			14.1	
Approach LOS		C			D			C			B	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 23.1		Intersection LOS: C	
Intersection Capacity Utilization 77.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	232	93	319	52	753	52	732
v/c Ratio	0.50	0.52	0.42	0.72	0.16	0.64	0.17	0.62
Control Delay	40.3	29.7	33.5	38.9	9.8	21.8	10.7	14.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.3	29.7	33.5	38.9	9.8	21.8	10.7	14.3
Queue Length 50th (m)	11.4	32.8	14.4	51.3	1.9	56.9	3.5	72.0
Queue Length 95th (m)	23.0	48.9	26.1	71.2	m8.5	125.2	11.7	138.5
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	326	974	496	985	326	1173	304	1178
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	0.22	0.24	0.19	0.32	0.16	0.64	0.17	0.62

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	175	50	90	265	45	50	645	85	50	635	75
Future Volume (vph)	70	175	50	90	265	45	50	645	85	50	635	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1758	1805		1794	1837		1802	1857		1764	1865	
Flt Permitted	0.33	1.00		0.49	1.00		0.27	1.00		0.26	1.00	
Satd. Flow (perm)	613	1805		931	1837		518	1857		483	1865	
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)	72	180	52	93	273	46	52	665	88	52	655	77
RTOR Reduction (vph)	0	19	0	0	11	0	0	3	0	0	3	0
Lane Group Flow (vph)	72	213	0	93	308	0	52	750	0	52	729	0
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	21.2	21.2		21.2	21.2		56.8	56.8		56.8	56.8	
Effective Green, g (s)	21.2	21.2		21.2	21.2		56.8	56.8		56.8	56.8	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.63	0.63		0.63	0.63	
Clearance Time (s)	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	
Lane Grp Cap (vph)	144	425		219	432		326	1171		304	1177	
v/s Ratio Prot		0.12			c0.17			c0.40			0.39	
v/s Ratio Perm	0.12			0.10			0.10			0.11		
v/c Ratio	0.50	0.50		0.42	0.71		0.16	0.64		0.17	0.62	
Uniform Delay, d1	29.8	29.8		29.2	31.6		6.8	10.3		6.9	10.1	
Progression Factor	1.00	1.00		1.00	1.00		0.96	1.60		1.00	1.00	
Incremental Delay, d2	2.7	0.9		1.3	5.5		0.9	2.3		1.2	2.5	
Delay (s)	32.5	30.7		30.5	37.1		7.4	18.8		8.1	12.5	
Level of Service	C	C		C	D		A	B		A	B	
Approach Delay (s)		31.2			35.6			18.1			12.2	
Approach LOS		C			D			B			B	

Intersection Summary

HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	60	125	265	75	150	280
Future Volume (vph)	60	125	265	75	150	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1599
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	1%
Adj. Flow (vph)	65	136	288	82	163	304
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	136	288	82	163	304
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.3%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	60	125	265	75	150	280
Future Volume (Veh/h)	60	125	265	75	150	280
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	136	288	82	163	304
Pedestrians					1	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			202		724	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			202		724	66
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			79		48	70
cM capacity (veh/h)			1369		312	1000

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	65	136	288	82	467
Volume Left	0	0	288	0	163
Volume Right	0	136	0	0	304
cSH	1700	1700	1369	1700	894
Volume to Capacity	0.04	0.08	0.21	0.05	0.52
Queue Length 95th (m)	0.0	0.0	6.4	0.0	24.8
Control Delay (s)	0.0	0.0	8.3	0.0	16.6
Lane LOS			A		C
Approach Delay (s)	0.0		6.5		16.6
Approach LOS					C

Intersection Summary

Average Delay	9.8		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	335	125	60	405	45	115	550	55	100	570	110
Future Volume (vph)	90	335	125	60	405	45	115	550	55	100	570	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.959			0.985			0.986			0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1793	0	1805	1848	0	1805	1865	0	1736	1842	0
Flt Permitted	0.247			0.233			0.191			0.254		
Satd. Flow (perm)	466	1793	0	440	1848	0	362	1865	0	463	1842	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		27			8			10			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Adj. Flow (vph)	97	360	134	65	435	48	124	591	59	108	613	118
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	494	0	65	483	0	124	650	0	108	731	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

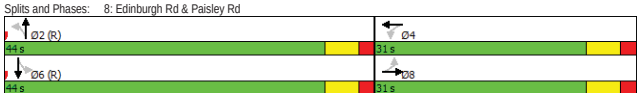
Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.63	0.80		0.45	0.78		0.68	0.68		0.46	0.78	
Control Delay	40.6	32.7		31.3	32.7		36.9	18.4		20.0	21.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.6	32.7		31.3	32.7		36.9	18.4		20.0	21.8	
LOS	D	C		C	C		D	B		C	C	
Approach Delay		34.0			32.5			21.3			21.6	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 26.4		Intersection LOS: C	
Intersection Capacity Utilization 92.8%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd



Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	494	65	483	124	650	108	731
v/c Ratio	0.63	0.80	0.45	0.78	0.68	0.68	0.46	0.78
Control Delay	40.6	32.7	31.3	32.7	36.9	18.4	20.0	21.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.6	32.7	31.3	32.7	36.9	18.4	20.0	21.8
Queue Length 50th (m)	13.5	70.6	7.5	62.7	13.0	67.4	9.7	81.0
Queue Length 95th (m)	#36.9	#118.5	20.3	#109.8	#42.4	105.6	24.9	127.8
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	155	615	146	621	183	949	234	942
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	0.63	0.80	0.45	0.78	0.68	0.68	0.46	0.78

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

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	335	125	60	405	45	115	550	55	100	570	110
Future Volume (vph)	90	335	125	60	405	45	115	550	55	100	570	110
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1791	1793		1796	1848		1800	1866		1732	1842	
Flt Permitted	0.25	1.00		0.23	1.00		0.19	1.00		0.25	1.00	
Satd. Flow (perm)	466	1793		441	1848		361	1866		463	1842	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	97	360	134	65	435	48	124	591	59	108	613	118
RTOR Reduction (vph)	0	18	0	0	5	0	0	5	0	0	9	0
Lane Group Flow (vph)	97	476	0	65	478	0	124	645	0	108	722	0
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	155	597		147	616		182	945		234	933	
v/s Ratio Prot		c0.27			0.26			0.35			c0.39	
v/s Ratio Perm	0.21			0.15			0.34			0.23		
v/c Ratio	0.63	0.80		0.44	0.78		0.68	0.68		0.46	0.77	
Uniform Delay, d1	21.1	22.7		19.5	22.5		13.9	14.0		11.9	15.0	
Progression Factor	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	16.0	9.7		9.4	9.2		18.7	4.0		6.4	6.2	
Delay (s)	36.7	32.4		28.9	31.7		32.6	17.9		18.3	21.2	
Level of Service	D	C		C	C		C	B		B	C	
Approach Delay (s)		33.1			31.4			20.3			20.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		

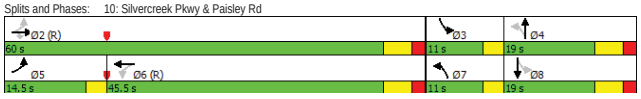
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	405	115	65	420	195	90	30	50	215	40	295
Future Volume (vph)	290	405	115	65	420	195	90	30	50	215	40	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.99	1.00	0.99		1.00	0.98		0.99	0.99	
Frt			0.850		0.952			0.907			0.868	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1783	0	1770	1695	0	1787	1629	0
Flt Permitted	0.204			0.507			0.500			0.578		
Satd. Flow (perm)	388	1881	1594	963	1783	0	931	1695	0	1081	1629	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			125		33			54			321	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	315	440	125	71	457	212	98	33	54	234	43	321
Shared Lane Traffic (%)												
Lane Group Flow (vph)	315	440	125	71	669	0	98	87	0	234	364	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		2.5	5.0		4.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		7.5	19.0		9.0	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	63.1	60.1	60.1	45.7	45.7		18.0	9.1		18.5	9.1	
Actuated g/C Ratio	0.70	0.67	0.67	0.51	0.51		0.20	0.10		0.21	0.10	
v/c Ratio	0.70	0.35	0.11	0.15	0.73		0.38	0.40		0.82	0.81	
Control Delay	16.6	8.6	1.8	15.7	24.5		30.2	22.3		53.3	21.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.6	8.6	1.8	15.7	24.5		30.2	22.3		53.3	21.4	
LOS	B	A	A	B	C		C	C		D	C	
Approach Delay		10.5			23.7			26.5			33.9	
Approach LOS		B			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 14.5 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 21.6		Intersection LOS: C	
Intersection Capacity Utilization 92.2%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	315	440	125	71	669	98	87	234	364
v/c Ratio	0.70	0.35	0.11	0.15	0.73	0.38	0.40	0.82	0.81
Control Delay	16.6	8.6	1.8	15.7	24.5	30.2	22.3	53.3	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	8.6	1.8	15.7	24.5	30.2	22.3	53.3	21.4
Queue Length 50th (m)	19.1	32.6	0.0	7.3	95.7	14.2	5.7	36.8	7.4
Queue Length 95th (m)	#41.2	57.7	6.5	16.6	#166.3	25.5	18.9	#56.6	36.1
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	462	1256	1106	488	921	264	291	285	509
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.35	0.11	0.15	0.73	0.37	0.30	0.82	0.72

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	405	115	65	420	195	90	30	50	215	40	295
Future Volume (vph)	290	405	115	65	420	195	90	30	50	215	40	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1881	1594	1804	1784		1769	1694		1781	1628	
Flt Permitted	0.20	1.00	1.00	0.51	1.00		0.50	1.00		0.58	1.00	
Satd. Flow (perm)	387	1881	1594	964	1784		931	1694		1083	1628	
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)	315	440	125	71	457	212	98	33	54	234	43	321
RTOR Reduction (vph)	0	0	43	0	17	0	0	49	0	0	286	0
Lane Group Flow (vph)	315	440	82	71	652	0	98	38	0	234	78	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	58.9	58.9	58.9	44.5	44.5		14.4	8.0		17.8	9.7	
Effective Green, g (s)	58.9	58.9	58.9	44.5	44.5		14.4	8.0		17.8	9.7	
Actuated g/C Ratio	0.65	0.65	0.65	0.49	0.49		0.16	0.09		0.20	0.11	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	432	1231	1043	476	882		208	150		277	175	
v/s Ratio Prot	c0.09	0.23			0.37		0.03	0.02		c0.08	0.05	
v/s Ratio Perm	c0.38		0.05	0.07			0.04			c0.09		
v/c Ratio	0.73	0.36	0.08	0.15	0.74		0.47	0.25		0.84	0.44	
Uniform Delay, d1	11.8	7.0	5.7	12.4	18.1		33.7	38.2		33.9	37.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.1	0.8	0.1	0.7	5.5		1.7	0.9		20.4	1.8	
Delay (s)	17.9	7.8	5.8	13.1	23.7		35.4	39.1		54.3	39.4	
Level of Service	B	A	A	B	C		D	D		D	D	
Approach Delay (s)		11.1			22.7			37.1			45.2	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	3	45	15	3	20	50	85	25	30	100	70
Future Volume (vph)	65	3	45	15	3	20	50	85	25	30	100	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.946			0.928			0.966			0.938	
Flt Protected		0.972			0.981		0.950			0.950		
Satd. Flow (prot)	0	1713	0	0	1696	0	1770	1799	0	1770	1747	0
Flt Permitted		0.972			0.981		0.950			0.950		
Satd. Flow (perm)	0	1713	0	0	1696	0	1770	1799	0	1770	1747	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	3	49	16	3	22	54	92	27	33	109	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	123	0	0	41	0	54	119	0	33	185	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.8%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	3	45	15	3	20	50	85	25	30	100	70
Future Volume (Veh/h)	65	3	45	15	3	20	50	85	25	30	100	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	71	3	49	16	3	22	54	92	27	33	109	76
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	436	440	147	439	464	106	185			119		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	436	440	147	439	464	106	185			119		
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 %	86	99	95	97	99	98	96			98		
cM capacity (veh/h)	492	480	900	474	465	949	1390			1469		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	123	41	54	119	33	185
Volume Left	71	16	54	0	33	0
Volume Right	49	22	0	27	0	76
cSH	600	647	1390	1700	1469	1700
Volume to Capacity	0.21	0.06	0.04	0.07	0.02	0.11
Queue Length 95th (m)	6.1	1.6	1.0	0.0	0.6	0.0
Control Delay (s)	12.5	10.9	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.5	10.9	2.4		1.1	
Approach LOS	B	B				

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	3	85	15	3	20	95	75	25	30	60	70
Future Volume (vph)	65	3	85	15	3	20	95	75	25	30	60	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.925			0.928			0.963			0.919	
Flt Protected		0.979			0.981		0.950			0.950		
Satd. Flow (prot)	0	1687	0	0	1696	0	1770	1794	0	1770	1712	0
Flt Permitted		0.979			0.981		0.950			0.950		
Satd. Flow (perm)	0	1687	0	0	1696	0	1770	1794	0	1770	1712	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	3	92	16	3	22	103	82	27	33	65	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	166	0	0	41	0	103	109	0	33	141	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	3	85	15	3	20	95	75	25	30	60	70
Future Volume (Veh/h)	65	3	85	15	3	20	95	75	25	30	60	70
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	71	3	92	16	3	22	103	82	27	33	65	76
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	480	484	103	526	508	96	141			109		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480	484	103	526	508	96	141			109		
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 %	84	99	90	96	99	98	93			98		
cM capacity (veh/h)	448	438	952	386	424	961	1442			1481		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	166	41	103	109	33	141
Volume Left	71	16	103	0	33	0
Volume Right	92	22	0	27	0	76
cSH	634	574	1442	1700	1481	1700
Volume to Capacity	0.26	0.07	0.07	0.06	0.02	0.08
Queue Length 95th (m)	8.4	1.8	1.8	0.0	0.5	0.0
Control Delay (s)	12.7	11.7	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.7	11.7	3.7		1.4	
Approach LOS	B	B				

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	580	0	170	545	0	125	465	0	60	490	0
Future Volume (vph)	80	580	0	170	545	0	125	465	0	60	490	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		45.0	50.0		40.0	40.0		20.0	40.0		40.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00			1.00			0.99		
Frt												
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	3539	0	1770	3539	0	1805	3610	0	1770	3610	0
Flt Permitted	0.326			0.248			0.392			0.481		
Satd. Flow (perm)	617	3539	0	462	3539	0	742	3610	0	890	3610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		904.0			320.9			339.0			212.9	
Travel Time (s)		65.1			23.1			24.4			15.3	
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Adj. Flow (vph)	82	592	0	173	556	0	128	474	0	61	500	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	592	0	173	556	0	128	474	0	61	500	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

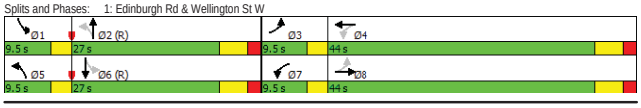
Lanes, Volumes, Timings
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Detector Phase	3	8		7	4		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	22.5		9.5	24.0		9.5	24.0		9.5	24.0	
Total Split (s)	9.5	44.0		9.5	44.0		9.5	27.0		9.5	27.0	
Total Split (%)	10.6%	48.9%		10.6%	48.9%		10.6%	30.0%		10.6%	30.0%	
Maximum Green (s)	6.5	38.0		6.5	38.0		6.5	21.0		6.5	21.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0		0.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	C-Max		None	C-Max	
Walk Time (s)					7.0			7.0			7.0	
Flash Dont Walk (s)					10.0			10.0			10.0	
Pedestrian Calls (#/hr)					0			0			0	
Act Effct Green (s)	30.4	21.0		31.1	22.9		49.6	39.2		45.8	35.8	
Actuated g/C Ratio	0.34	0.23		0.35	0.25		0.55	0.44		0.51	0.40	
v/c Ratio	0.28	0.72		0.68	0.62		0.25	0.30		0.12	0.35	
Control Delay	19.8	36.5		34.1	32.9		11.8	18.9		8.4	19.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.8	36.5		34.1	32.9		11.8	18.9		8.4	19.2	
LOS	B	D		C	C		B	B		A	B	
Approach Delay		34.5			33.2			17.4			18.0	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 80.5 (89%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 26.5		Intersection LOS: C	
Intersection Capacity Utilization 63.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 1: Edinburgh Rd & Wellington St W



Queues
1: Edinburgh Rd & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	82	592	173	556	128	474	61	500
v/c Ratio	0.28	0.72	0.68	0.62	0.25	0.30	0.12	0.35
Control Delay	19.8	36.5	34.1	32.9	11.8	18.9	8.4	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.8	36.5	34.1	32.9	11.8	18.9	8.4	19.2
Queue Length 50th (m)	9.7	52.6	21.7	48.8	10.2	29.3	3.1	35.6
Queue Length 95th (m)	17.3	65.1	33.1	60.8	21.9	48.1	7.4	56.4
Internal Link Dist (m)		880.0		296.9		315.0		188.9
Turn Bay Length (m)	60.0		50.0		40.0		40.0	
Base Capacity (vph)	295	1494	254	1494	512	1572	526	1436
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	0.28	0.40	0.68	0.37	0.25	0.30	0.12	0.35

Intersection Summary

HCM Signalized Intersection Capacity Analysis
1: Edinburgh Rd & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	580	0	170	545	0	125	465	0	60	490	0
Future Volume (vph)	80	580	0	170	545	0	125	465	0	60	490	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1803	3539		1769	3539		1802	3610		1763	3610	
Flt Permitted	0.33	1.00		0.25	1.00		0.39	1.00		0.48	1.00	
Satd. Flow (perm)	619	3539		463	3539		744	3610		892	3610	
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)	82	592	0	173	556	0	128	474	0	61	500	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	82	592	0	173	556	0	128	474	0	61	500	0
Confl. Peds. (#/hr)	3		1	1		3	6		10	10		6
Heavy Vehicles (%)	0%	2%	1%	2%	2%	1%	0%	0%	2%	2%	0%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	3	8		7	4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	26.8	21.6		29.4	22.9		46.7	38.0		41.1	35.2	
Effective Green, g (s)	26.8	21.6		29.4	22.9		46.7	38.0		41.1	35.2	
Actuated g/C Ratio	0.30	0.24		0.33	0.25		0.52	0.42		0.46	0.39	
Clearance Time (s)	3.0	6.0		3.0	6.0		3.0	6.0		3.0	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)	252	849		245	900		488	1524		464	1411	
v/s Ratio Prot	0.02	0.17		c0.05	0.16		c0.03	0.13		0.01	c0.14	
v/s Ratio Perm	0.08			c0.18			0.11			0.05		
v/c Ratio	0.33	0.70		0.71	0.62		0.26	0.31		0.13	0.35	
Uniform Delay, d1	23.4	31.2		23.4	29.7		11.5	17.3		13.8	19.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.75	0.90	
Incremental Delay, d2	0.8	2.5		8.9	1.3		0.3	0.5		0.1	0.7	
Delay (s)	24.2	33.7		32.3	30.9		11.7	17.8		10.5	18.2	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		32.6			31.3			16.5			17.3	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	555	0	0	715	50	290	80	160	45	0	255
Future Volume (vph)	150	555	0	0	715	50	290	80	160	45	0	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	150.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		0	0		0	1		1	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	0.91	0.95	0.95	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00				1.00							
Frt					0.990				0.850			0.850
Flt Protected	0.950						0.950	0.972		0.950		
Satd. Flow (prot)	1787	5136	0	0	5080	0	1698	1744	1599	1805	0	1599
Flt Permitted	0.272						0.950	0.972		0.573		
Satd. Flow (perm)	511	5136	0	0	5080	0	1698	1744	1599	1089	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					10				165			263
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		447.0			904.0			367.9			138.7	
Travel Time (s)		32.2			65.1			26.5			10.0	
Confl. Peds. (#/hr)	1					1						
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Adj. Flow (vph)	155	572	0	0	737	52	299	82	165	46	0	263
Shared Lane Traffic (%)							37%					
Lane Group Flow (vph)	155	572	0	0	789	0	188	193	165	46	0	263
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Minimum Split (s)	9.5	34.1			34.1		47.5	47.5	34.1	25.5		34.1
Total Split (s)	23.0	80.1			57.1		47.5	47.5	80.1	47.5		57.1
Total Split (%)	18.0%	62.8%			44.7%		37.2%	37.2%	62.8%	37.2%		44.7%
Maximum Green (s)	20.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Yellow Time (s)	3.0	5.0			5.0		4.5	4.5	5.0	4.5		5.0
All-Red Time (s)	0.0	2.1			2.1		3.0	3.0	2.1	3.0		2.1
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Lost Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lead/Lag	Lead				Lag							Lag
Lead-Lag Optimize?	Yes				Yes							Yes
Walk Time (s)		7.0			7.0		7.0	7.0	7.0	0.0		7.0
Flash Dont Walk (s)		20.0			20.0		33.0	33.0	20.0	0.0		20.0
Pedestrian Calls (#/hr)		0			0		0	0	0	0		0

Lanes, Volumes, Timings
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

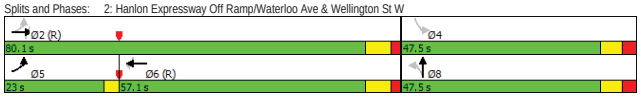
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	77.1	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.60	0.57			0.39		0.31	0.31	0.57	0.31		0.39
v/c Ratio	0.31	0.19			0.40		0.35	0.35	0.17	0.13		0.33
Control Delay	12.6	13.4			28.3		36.2	36.1	2.2	32.9		4.1
Queue Delay	0.0	0.0			0.0		0.0	0.0	0.0	0.0		0.0
Total Delay	12.6	13.4			28.3		36.2	36.1	2.2	32.9		4.1
LOS	B	B			C		D	D	A	C		A
Approach Delay		13.2			28.3			25.9			8.4	
Approach LOS		B			C			C			A	

Intersection Summary

Area Type:	Other		
Cycle Length: 127.6			
Actuated Cycle Length: 127.6			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 95			
Control Type: Pretimed			
Maximum v/c Ratio: 0.40			
Intersection Signal Delay: 20.5		Intersection LOS: C	
Intersection Capacity Utilization 66.5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W



Queues
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Lane Group	EBL	EBT	WBT	NBL	NBT	NBR	SBL	SBR
Lane Group Flow (vph)	155	572	789	188	193	165	46	263
v/c Ratio	0.31	0.19	0.40	0.35	0.35	0.17	0.13	0.33
Control Delay	12.6	13.4	28.3	36.2	36.1	2.2	32.9	4.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.6	13.4	28.3	36.2	36.1	2.2	32.9	4.1
Queue Length 50th (m)	16.8	25.4	53.6	40.4	41.4	0.0	8.7	0.0
Queue Length 95th (m)	27.2	32.2	65.7	63.2	64.5	9.6	18.9	17.4
Internal Link Dist (m)		423.0	880.0		343.9			
Turn Bay Length (m)	150.0							
Base Capacity (vph)	508	2938	1996	532	546	985	341	786
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	0.31	0.19	0.40	0.35	0.35	0.17	0.13	0.33

Intersection Summary

HCM Signalized Intersection Capacity Analysis
2: Hanlon Expressway Off Ramp/Waterloo Ave & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	555	0	0	715	50	290	80	160	45	0	255
Future Volume (vph)	150	555	0	0	715	50	290	80	160	45	0	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Util. Factor	1.00	0.91			0.91		0.95	0.95	1.00	1.00		1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Frt	1.00	1.00			0.99		1.00	1.00	0.85	1.00		0.85
Flt Protected	0.95	1.00			1.00		0.95	0.97	1.00	0.95		1.00
Satd. Flow (prot)	1787	5136			5081		1698	1745	1599	1805		1599
Flt Permitted	0.27	1.00			1.00		0.95	0.97	1.00	0.57		1.00
Satd. Flow (perm)	512	5136			5081		1698	1745	1599	1089		1599
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)	155	572	0	0	737	52	299	82	165	46	0	263
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	71	0	0	160
Lane Group Flow (vph)	155	572	0	0	783	0	188	193	94	46	0	103
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	0%	0%	1%	0%	1%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA			NA		Perm	NA	custom	Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8		2	4		6
Actuated Green, G (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Effective Green, g (s)	73.0	73.0			50.0		40.0	40.0	73.0	40.0		50.0
Actuated g/C Ratio	0.57	0.57			0.39		0.31	0.31	0.57	0.31		0.39
Clearance Time (s)	3.0	7.1			7.1		7.5	7.5	7.1	7.5		7.1
Lane Grp Cap (vph)	492	2938			1990		532	547	914	341		626
v/s Ratio Prot	c0.05	0.11			c0.15							
v/s Ratio Perm	0.13						c0.11	0.11	0.06	0.04		0.06
v/c Ratio	0.32	0.19			0.39		0.35	0.35	0.10	0.13		0.16
Uniform Delay, d1	13.4	13.1			27.9		33.8	33.8	12.4	31.4		25.2
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00		1.00
Incremental Delay, d2	1.7	0.1			0.6		1.8	1.8	0.2	0.8		0.6
Delay (s)	15.1	13.3			28.5		35.7	35.6	12.6	32.2		25.8
Level of Service	B	B			C		D	D	B	C		C
Approach Delay (s)		13.7			28.5			28.7			26.7	
Approach LOS		B			C			C			C	

Intersection Summary

HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	127.6	Sum of lost time (s)	17.6
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	660	395	0	905	0	0	0	0	175	0	165
Future Volume (vph)	0	660	395	0	905	0	0	0	0	175	0	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.91	0.91	1.00	0.91	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Ped Bike Factor												
Frt		0.944										0.850
Flt Protected										0.950		
Satd. Flow (prot)	0	4818	0	0	5136	0	0	0	0	3467	0	1524
Flt Permitted										0.950		
Satd. Flow (perm)	0	4818	0	0	5136	0	0	0	0	3467	0	1524
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		341										174
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		635.4			447.0			133.0			1053.0	
Travel Time (s)		45.7			32.2			9.6			75.8	
Confl. Peds. (#/hr)	2					2						
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%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Adj. Flow (vph)	0	695	416	0	953	0	0	0	0	184	0	174
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1111	0	0	953	0	0	0	0	184	0	174
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			14.4			14.4	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Minimum Split (s)		24.9			24.9					24.7		24.9
Total Split (s)		56.9			56.9					24.7		56.9
Total Split (%)		69.7%			69.7%					30.3%		69.7%
Maximum Green (s)		50.0			50.0					18.0		50.0
Yellow Time (s)		5.0			5.0					4.5		5.0
All-Red Time (s)		1.9			1.9					2.2		1.9
Lost Time Adjust (s)		0.0			0.0					0.0		0.0
Total Lost Time (s)		6.9			6.9					6.7		6.9
Lead/Lag												
Lead-Lag Optimize?												
Walk Time (s)		7.0			7.0					7.0		7.0
Flash Dont Walk (s)		11.0			11.0					11.0		11.0
Pedestrian Calls (#/hr)		0			0					0		0
Act Effct Green (s)		50.0			50.0					18.0		50.0
Actuated g/C Ratio		0.61			0.61					0.22		0.61
v/c Ratio		0.36			0.30					0.24		0.17

Lanes, Volumes, Timings
3: Hanlon Expressway & Wellington St W

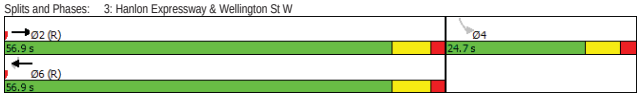
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		5.5			7.8					27.2		1.6
Queue Delay		0.0			0.0					0.0		0.0
Total Delay		5.5			7.8					27.2		1.6
LOS		A			A					C		A
Approach Delay		5.5			7.8						14.7	
Approach LOS		A			A						B	

Intersection Summary

Area Type: Other
Cycle Length: 81.6
Actuated Cycle Length: 81.6
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 50
Control Type: Pretimed
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 7.8 — Intersection LOS: A
Intersection Capacity Utilization 39.2% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 3: Hanlon Expressway & Wellington St W



Queues
3: Hanlon Expressway & Wellington St W

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	1111	953	184	174
v/c Ratio	0.36	0.30	0.24	0.17
Control Delay	5.5	7.8	27.2	1.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.5	7.8	27.2	1.6
Queue Length 50th (m)	19.0	24.3	12.8	0.0
Queue Length 95th (m)	26.1	31.3	21.5	6.9
Internal Link Dist (m)	611.4	423.0		
Turn Bay Length (m)				
Base Capacity (vph)	3084	3147	764	1001
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.36	0.30	0.24	0.17

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Hanlon Expressway & Wellington St W

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	660	395	0	905	0	0	0	0	175	0	165
Future Volume (vph)	0	660	395	0	905	0	0	0	0	175	0	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.9			6.9					6.7		6.9
Lane Util. Factor		0.91			0.91					0.97		1.00
Frpb, ped/bikes		1.00			1.00					1.00		1.00
Flpb, ped/bikes		1.00			1.00					1.00		1.00
Frt		0.94			1.00					1.00		0.85
Flt Protected		1.00			1.00					0.95		1.00
Satd. Flow (prot)		4817			5136					3467		1524
Flt Permitted		1.00			1.00					0.95		1.00
Satd. Flow (perm)		4817			5136					3467		1524
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)	0	695	416	0	953	0	0	0	0	184	0	174
RTOR Reduction (vph)	0	132	0	0	0	0	0	0	0	0	0	67
Lane Group Flow (vph)	0	979	0	0	953	0	0	0	0	184	0	107
Confl. Peds. (#/hr)	2					2						
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	0%	0%	0%	1%	0%	6%
Turn Type		NA			NA					Perm		Perm
Protected Phases		2			6							
Permitted Phases										4		6
Actuated Green, G (s)		50.0			50.0					18.0		50.0
Effective Green, g (s)		50.0			50.0					18.0		50.0
Actuated g/C Ratio		0.61			0.61					0.22		0.61
Clearance Time (s)		6.9			6.9					6.7		6.9
Lane Grp Cap (vph)		2951			3147					764		933
v/s Ratio Prot		c0.20			0.19							
v/s Ratio Perm										c0.05		0.07
v/c Ratio		0.33			0.30					0.24		0.11
Uniform Delay, d1		7.7			7.5					26.2		6.6
Progression Factor		1.00			1.00					1.00		1.00
Incremental Delay, d2		0.3			0.2					0.7		0.2
Delay (s)		8.0			7.8					26.9		6.8
Level of Service		A			A					C		A
Approach Delay (s)		8.0			7.8			0.0			17.2	
Approach LOS		A			A			A			B	

Intersection Summary

HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	81.6	Sum of lost time (s)	13.6
Intersection Capacity Utilization	39.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	650	625	310	395	60
Future Volume (vph)	65	650	625	310	395	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor		1.00	0.99			
Frt			0.950			0.850
Flt Protected		0.995			0.950	
Satd. Flow (prot)	0	3528	3338	0	1787	1615
Flt Permitted		0.776			0.950	
Satd. Flow (perm)	0	2751	3338	0	1787	1615
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			150			62
Link Speed (k/h)		50	50		50	
Link Distance (m)		73.9	635.4		730.2	
Travel Time (s)		5.3	45.7		52.6	
Confl. Peds. (#/hr)	1			1		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	2%	3%	0%	1%	0%
Adj. Flow (vph)	67	670	644	320	407	62
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	737	964	0	407	62
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25			15	25	15
Number of Detectors	1	2	2		1	1
Detector Template	Left	Thru	Thru		Left	Right
Leading Detector (m)	2.0	10.0	10.0		2.0	2.0
Trailing Detector (m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0		0.0	0.0
Detector 1 Size(m)	2.0	0.6	0.6		2.0	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0
Detector 2 Position(m)		9.4	9.4			
Detector 2 Size(m)		0.6	0.6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4

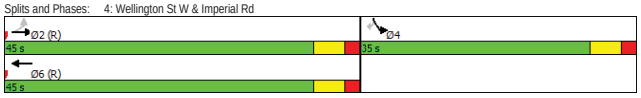
Lanes, Volumes, Timings
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	2	2	6		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		5.0	5.0
Minimum Split (s)	36.0	36.0	33.0		24.0	24.0
Total Split (s)	45.0	45.0	45.0		35.0	35.0
Total Split (%)	56.3%	56.3%	56.3%		43.8%	43.8%
Maximum Green (s)	39.0	39.0	39.0		29.0	29.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0
Total Lost Time (s)		6.0	6.0		6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	C-Max	C-Max	C-Max		None	None
Walk Time (s)	17.0	17.0	14.0		7.0	7.0
Flash Dont Walk (s)	13.0	13.0	13.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effct Green (s)		45.0	45.0		23.0	23.0
Actuated g/C Ratio		0.56	0.56		0.29	0.29
v/c Ratio		0.48	0.50		0.79	0.12
Control Delay		12.8	10.6		37.6	5.8
Queue Delay		0.0	0.0		0.0	0.0
Total Delay		12.8	10.6		37.6	5.8
LOS		B	B		D	A
Approach Delay		12.8	10.6		33.4	
Approach LOS		B	B		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 10 (13%), Referenced to phase 2:EBTL and 6:WBT, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 16.3		Intersection LOS: B	
Intersection Capacity Utilization 84.0%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 4: Wellington St W & Imperial Rd



Queues
4: Wellington St W & Imperial Rd

10-05-2020

Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	737	964	407	62
v/c Ratio	0.48	0.50	0.79	0.12
Control Delay	12.8	10.6	37.6	5.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.8	10.6	37.6	5.8
Queue Length 50th (m)	34.6	38.0	59.1	0.0
Queue Length 95th (m)	57.8	63.3	83.1	7.5
Internal Link Dist (m)	49.9	611.4	706.2	
Turn Bay Length (m)				
Base Capacity (vph)	1546	1942	647	624
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.50	0.63	0.10

Intersection Summary

HCM Signalized Intersection Capacity Analysis
4: Wellington St W & Imperial Rd

10-05-2020

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	650	625	310	395	60
Future Volume (vph)	65	650	625	310	395	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0		6.0	6.0
Lane Util. Factor		0.95	0.95		1.00	1.00
Frpb, ped/bikes		1.00	0.99		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		1.00	0.95		1.00	0.85
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		3529	3339		1787	1615
Flt Permitted		0.78	1.00		0.95	1.00
Satd. Flow (perm)		2750	3339		1787	1615
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	67	670	644	320	407	62
RTOR Reduction (vph)	0	0	66	0	0	44
Lane Group Flow (vph)	0	737	898	0	407	18
Confl. Peds. (#/hr)	1			1		
Heavy Vehicles (%)	0%	2%	3%	0%	1%	0%
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	6		4	
Permitted Phases	2					4
Actuated Green, G (s)		45.0	45.0		23.0	23.0
Effective Green, g (s)		45.0	45.0		23.0	23.0
Actuated g/C Ratio		0.56	0.56		0.29	0.29
Clearance Time (s)		6.0	6.0		6.0	6.0
Vehicle Extension (s)		3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		1546	1878		513	464
v/s Ratio Prot			c0.27		c0.23	
v/s Ratio Perm		0.27				0.01
v/c Ratio		0.48	0.48		0.79	0.04
Uniform Delay, d1		10.5	10.5		26.3	20.5
Progression Factor		1.00	1.00		1.00	1.00
Incremental Delay, d2		1.1	0.9		8.2	0.0
Delay (s)		11.5	11.4		34.5	20.6
Level of Service		B	B		C	C
Approach Delay (s)		11.5	11.4		32.7	
Approach LOS		B	B		C	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	335	0	235	345	70	370	1200	0	85	1100	135
Future Volume (vph)	130	335	0	235	345	70	370	1200	0	85	1100	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	65.0		45.0	65.0		0.0	160.0		180.0	210.0		210.0
Storage Lanes	1		0	1		0	2		0	1		1
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.97	0.95	1.00	1.00	0.95	1.00
Ped Bike Factor	1.00			1.00	1.00							
Frt					0.975							0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	3574	0	1805	3511	0	3467	3374	0	1805	3471	1615
Flt Permitted	0.342			0.284			0.184			0.950		
Satd. Flow (perm)	643	3574	0	539	3511	0	672	3374	0	1805	3471	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					12							139
Link Speed (k/h)		50			50			70			70	
Link Distance (m)		275.1			202.0			1053.0			279.1	
Travel Time (s)		19.8			14.5			54.2			14.4	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.97	0.97	0.40	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Adj. Flow (vph)	134	345	0	242	356	72	381	1237	0	88	1134	139
Shared Lane Traffic (%)												
Lane Group Flow (vph)	134	345	0	242	428	0	381	1237	0	88	1134	139
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

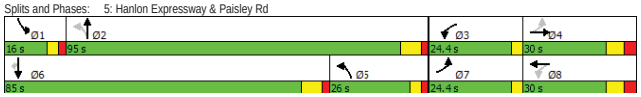
Lanes, Volumes, Timings
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2					6
Detector Phase	7	4		3	8		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	1.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	30.0		9.5	30.0		10.0	59.4		10.0	60.4	60.4
Total Split (s)	24.4	30.0		24.4	30.0		26.0	95.0		16.0	85.0	85.0
Total Split (%)	14.8%	18.1%		14.8%	18.1%		15.7%	57.4%		9.7%	51.4%	51.4%
Maximum Green (s)	21.4	22.0		21.4	22.0		21.0	87.6		11.0	77.6	77.6
Yellow Time (s)	3.0	4.5		3.0	4.5		3.0	5.4		3.0	5.4	5.4
All-Red Time (s)	0.0	3.5		0.0	3.5		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lead/Lag	Lead	Lag		Lead	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		5.0			5.0			42.0			42.0	42.0
Flash Dont Walk (s)		15.0			15.0			10.0			10.0	10.0
Pedestrian Calls (#/hr)		0			0			0			0	0
Act Effct Green (s)	39.4	19.7		47.2	24.9		90.1	87.7		10.5	77.7	77.7
Actuated g/C Ratio	0.24	0.12		0.29	0.15		0.56	0.54		0.07	0.48	0.48
v/c Ratio	0.51	0.79		0.77	0.78		0.52	0.67		0.75	0.68	0.16
Control Delay	50.7	82.8		63.5	74.1		39.2	29.4		109.6	35.3	3.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	50.7	82.8		63.5	74.1		39.2	29.4		109.6	35.3	3.9
LOS	D	F		E	E		D	C		F	D	A
Approach Delay		73.8			70.3			31.7			36.9	
Approach LOS		E			E			C			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 165.4			
Actuated Cycle Length: 161.2			
Natural Cycle: 110			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 44.6		Intersection LOS: D	
Intersection Capacity Utilization 83.8%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 5: Hanlon Expressway & Paisley Rd



Queues
5: Hanlon Expressway & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	134	345	242	428	381	1237	88	1134	139
v/c Ratio	0.51	0.79	0.77	0.78	0.52	0.67	0.75	0.68	0.16
Control Delay	50.7	82.8	63.5	74.1	39.2	29.4	109.6	35.3	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.7	82.8	63.5	74.1	39.2	29.4	109.6	35.3	3.9
Queue Length 50th (m)	34.8	61.4	67.1	72.3	33.5	161.8	30.3	159.2	0.0
Queue Length 95th (m)	54.4	80.4	95.2	#102.1	44.1	190.4	#60.3	187.7	12.7
Internal Link Dist (m)		251.1		178.0		1029.0		255.1	
Turn Bay Length (m)	65.0		65.0		160.0		210.0		210.0
Base Capacity (vph)	333	488	326	557	742	1835	123	1673	850
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.71	0.74	0.77	0.51	0.67	0.72	0.68	0.16

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

HCM Signalized Intersection Capacity Analysis
5: Hanlon Expressway & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	335	0	235	345	70	370	1200	0	85	1100	135
Future Volume (vph)	130	335	0	235	345	70	370	1200	0	85	1100	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Lane Util. Factor	1.00	0.95		1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	0.97		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3574		1805	3510		3467	3374		1805	3471	1615
Flt Permitted	0.34	1.00		0.28	1.00		0.18	1.00		0.95	1.00	1.00
Satd. Flow (perm)	643	3574		539	3510		672	3374		1805	3471	1615
Peak-hour factor, PHF	0.97	0.97	0.40	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	134	345	0	242	356	72	381	1237	0	88	1134	139
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	72
Lane Group Flow (vph)	134	345	0	242	418	0	381	1237	0	88	1134	67
Confl. Peds. (#/hr)	1		1	1		1						
Heavy Vehicles (%)	1%	1%	0%	0%	0%	0%	1%	7%	1%	0%	4%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2					6
Actuated Green, G (s)	34.4	19.7		42.6	24.9		90.1	87.7		10.5	77.7	77.7
Effective Green, g (s)	34.4	19.7		42.6	24.9		90.1	87.7		10.5	77.7	77.7
Actuated g/C Ratio	0.21	0.12		0.26	0.15		0.56	0.54		0.07	0.48	0.48
Clearance Time (s)	3.0	8.0		3.0	8.0		5.0	7.4		5.0	7.4	7.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	241	436		298	542		731	1835		117	1673	778
v/s Ratio Prot	0.05	0.10		c0.10	0.12		0.07	c0.37		0.05	c0.33	
v/s Ratio Perm	0.07			c0.11			0.23					0.04
v/c Ratio	0.56	0.79		0.81	0.77		0.52	0.67		0.75	0.68	0.09
Uniform Delay, d1	54.1	68.8		50.9	65.4		39.4	26.5		74.1	32.1	22.6
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.8	9.5		15.4	6.7		0.7	2.0		23.5	2.2	0.2
Delay (s)	56.8	78.2		66.2	72.1		40.1	28.5		97.6	34.3	22.8
Level of Service	E	E		E	E		D	C		F	C	C
Approach Delay (s)		72.2			70.0			31.2			37.3	
Approach LOS		E			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	161.2	Sum of lost time (s)	23.4
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	115	35	55	105	40	45	505	65	35	500	55
Future Volume (vph)	80	115	35	55	105	40	45	505	65	35	500	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	45.0		0.0	60.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		0.99	0.99		1.00	1.00		1.00	1.00	
Frt		0.965			0.959			0.983			0.985	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1802	0	1805	1797	0	1805	1859	0	1770	1867	0
Flt Permitted	0.606			0.586			0.414			0.404		
Satd. Flow (perm)	1117	1802	0	1105	1797	0	785	1859	0	750	1867	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			33			8			7	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		372.2			272.5			212.9			802.4	
Travel Time (s)		26.8			19.6			15.3			57.8	
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Adj. Flow (vph)	82	119	36	57	108	41	46	521	67	36	515	57
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	155	0	57	149	0	46	588	0	36	572	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

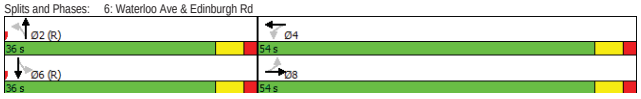
Lanes, Volumes, Timings
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		36.0	36.0		36.0	36.0	
Total Split (s)	54.0	54.0		54.0	54.0		36.0	36.0		36.0	36.0	
Total Split (%)	60.0%	60.0%		60.0%	60.0%		40.0%	40.0%		40.0%	40.0%	
Maximum Green (s)	48.0	48.0		48.0	48.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	7.0	7.0		7.0	7.0		16.0	16.0		16.0	16.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	12.1	12.1		12.1	12.1		65.9	65.9		65.9	65.9	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.73	0.73		0.73	0.73	
v/c Ratio	0.55	0.59		0.39	0.55		0.08	0.43		0.07	0.42	
Control Delay	49.2	38.7		41.7	35.2		4.3	11.2		4.7	6.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	49.2	38.7		41.7	35.2		4.3	11.2		4.7	6.2	
LOS	D	D		D	D		A	B		A	A	
Approach Delay		42.4			37.0			10.7			6.1	
Approach LOS		D			D			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 69 (77%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 16.7		Intersection LOS: B	
Intersection Capacity Utilization 67.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Waterloo Ave & Edinburgh Rd



Queues
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	82	155	57	149	46	588	36	572
v/c Ratio	0.55	0.59	0.39	0.55	0.08	0.43	0.07	0.42
Control Delay	49.2	38.7	41.7	35.2	4.3	11.2	4.7	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.2	38.7	41.7	35.2	4.3	11.2	4.7	6.2
Queue Length 50th (m)	14.2	22.2	9.6	19.8	1.6	28.5	1.5	32.5
Queue Length 95th (m)	27.2	39.5	20.3	36.4	5.6	89.3	5.2	62.9
Internal Link Dist (m)		348.2		248.5		188.9		778.4
Turn Bay Length (m)	45.0		45.0		60.0		50.0	
Base Capacity (vph)	595	973	589	973	575	1364	549	1369
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	0.14	0.16	0.10	0.15	0.08	0.43	0.07	0.42

Intersection Summary

HCM Signalized Intersection Capacity Analysis
6: Waterloo Ave & Edinburgh Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	115	35	55	105	40	45	505	65	35	500	55
Future Volume (vph)	80	115	35	55	105	40	45	505	65	35	500	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.97		1.00	0.96		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	1803		1792	1796		1801	1858		1760	1867	
Flt Permitted	0.61	1.00		0.59	1.00		0.41	1.00		0.40	1.00	
Satd. Flow (perm)	1117	1803		1105	1796		784	1858		749	1867	
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)	82	119	36	57	108	41	46	521	67	36	515	57
RTOR Reduction (vph)	0	23	0	0	29	0	0	2	0	0	2	0
Lane Group Flow (vph)	82	132	0	57	120	0	46	586	0	36	570	0
Confl. Peds. (#/hr)	10		7	7		10	4		9	9		4
Heavy Vehicles (%)	2%	1%	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	12.1	12.1		12.1	12.1		65.9	65.9		65.9	65.9	
Effective Green, g (s)	12.1	12.1		12.1	12.1		65.9	65.9		65.9	65.9	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.73	0.73		0.73	0.73	
Clearance Time (s)	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	
Lane Grp Cap (vph)	150	242		148	241		574	1360		548	1367	
v/s Ratio Prot		c0.07			0.07			c0.32			0.31	
v/s Ratio Perm	0.07			0.05			0.06			0.05		
v/c Ratio	0.55	0.55		0.39	0.50		0.08	0.43		0.07	0.42	
Uniform Delay, d1	36.4	36.4		35.6	36.1		3.4	4.7		3.4	4.6	
Progression Factor	1.00	1.00		1.00	1.00		0.90	1.90		1.00	1.00	
Incremental Delay, d2	4.0	2.5		1.7	1.6		0.3	1.0		0.2	0.9	
Delay (s)	40.4	38.9		37.2	37.8		3.3	9.9		3.6	5.6	
Level of Service	D	D		D	D		A	A		A	A	
Approach Delay (s)		39.4			37.6			9.5			5.5	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	70	140	175	70	135	165
Future Volume (vph)	70	140	175	70	135	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)		0.0	0.0		0.0	60.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1900	1615	1770	1900	1805	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1900	1615	1770	1900	1805	1599
Link Speed (k/h)	50			50	50	
Link Distance (m)	117.5			538.7	138.7	
Travel Time (s)	8.5			38.8	10.0	
Confl. Peds. (#/hr)		1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	2%	0%	0%	1%
Adj. Flow (vph)	76	152	190	76	147	179
Shared Lane Traffic (%)						
Lane Group Flow (vph)	76	152	190	76	147	179
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)		15	25		25	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.5%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	70	140	175	70	135	165
Future Volume (Veh/h)	70	140	175	70	135	165
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	76	152	190	76	147	179
Pedestrians					1	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						8
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			229		533	77
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			229		533	77
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			86		66	82
cM capacity (veh/h)			1338		438	986

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	76	152	190	76	326
Volume Left	0	0	190	0	147
Volume Right	0	152	0	0	179
cSH	1700	1700	1338	1700	971
Volume to Capacity	0.04	0.09	0.14	0.04	0.34
Queue Length 95th (m)	0.0	0.0	4.0	0.0	11.9
Control Delay (s)	0.0	0.0	8.1	0.0	13.0
Lane LOS			A		B
Approach Delay (s)	0.0		5.8		13.0
Approach LOS					B

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	30.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	305	100	35	280	60	115	470	30	55	445	85
Future Volume (vph)	105	305	100	35	280	60	115	470	30	55	445	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	60.0		0.0	120.0		0.0	0.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99	0.99		1.00	1.00		1.00	1.00	
Frt		0.963			0.973			0.991			0.976	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1801	0	1805	1821	0	1805	1878	0	1736	1842	0
Flt Permitted	0.396			0.306			0.319			0.345		
Satd. Flow (perm)	745	1801	0	578	1821	0	604	1878	0	629	1842	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			16			6			19	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		390.9			78.0			802.4			259.2	
Travel Time (s)		28.1			5.6			57.8			18.7	
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Adj. Flow (vph)	113	328	108	38	301	65	124	505	32	59	478	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	113	436	0	38	366	0	124	537	0	59	569	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			7.2			7.2	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Detector Phase	8	8		4	4		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		34.0	34.0		34.0	34.0	
Total Split (s)	31.0	31.0		31.0	31.0		44.0	44.0		44.0	44.0	
Total Split (%)	41.3%	41.3%		41.3%	41.3%		58.7%	58.7%		58.7%	58.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		C-Max	C-Max		C-Max	C-Max	
Walk Time (s)	9.0	9.0		9.0	9.0		13.0	13.0		13.0	13.0	
Flash Dont Walk (s)	16.0	16.0		16.0	16.0		15.0	15.0		15.0	15.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
v/c Ratio	0.46	0.71		0.20	0.59		0.41	0.56		0.19	0.60	
Control Delay	26.5	27.9		21.2	24.6		16.6	15.5		12.0	16.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.5	27.9		21.2	24.6		16.6	15.5		12.0	16.0	
LOS	C	C		C	C		B	B		B	B	
Approach Delay		27.6			24.3			15.7			15.7	
Approach LOS		C			C			B			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 4 (5%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 81.7%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 8: Edinburgh Rd & Paisley Rd

Queues
8: Edinburgh Rd & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	113	436	38	366	124	537	59	569
v/c Ratio	0.46	0.71	0.20	0.59	0.41	0.56	0.19	0.60
Control Delay	26.5	27.9	21.2	24.6	16.6	15.5	12.0	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	27.9	21.2	24.6	16.6	15.5	12.0	16.0
Queue Length 50th (m)	14.6	59.3	4.0	42.6	10.8	51.1	4.5	54.4
Queue Length 95th (m)	32.1	95.2	11.4	69.8	24.9	79.9	11.5	86.0
Internal Link Dist (m)		366.9		54.0		778.4		235.2
Turn Bay Length (m)	60.0		120.0				55.0	
Base Capacity (vph)	248	616	192	617	306	954	318	942
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	0.46	0.71	0.20	0.59	0.41	0.56	0.19	0.60

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: Edinburgh Rd & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	305	100	35	280	60	115	470	30	55	445	85
Future Volume (vph)	105	305	100	35	280	60	115	470	30	55	445	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1787	1801		1794	1822		1798	1878		1731	1842	
Flt Permitted	0.40	1.00		0.31	1.00		0.32	1.00		0.35	1.00	
Satd. Flow (perm)	745	1801		578	1822		604	1878		629	1842	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	113	328	108	38	301	65	124	505	32	59	478	91
RTOR Reduction (vph)	0	16	0	0	11	0	0	3	0	0	9	0
Lane Group Flow (vph)	113	420	0	38	355	0	124	534	0	59	560	0
Confl. Peds. (#/hr)	13		9	9		13	8		5	5		8
Heavy Vehicles (%)	0%	1%	0%	0%	1%	0%	0%	0%	2%	4%	0%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		8			4			2			6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	25.0	25.0		25.0	25.0		38.0	38.0		38.0	38.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.51	0.51		0.51	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	248	600		192	607		306	951		318	933	
v/s Ratio Prot		c0.23			0.20			0.28			c0.30	
v/s Ratio Perm	0.15			0.07			0.21			0.09		
v/c Ratio	0.46	0.70		0.20	0.59		0.41	0.56		0.19	0.60	
Uniform Delay, d1	19.7	21.7		17.8	20.7		11.5	12.8		10.1	13.1	
Progression Factor	1.00	1.02		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.5	6.2		2.3	4.1		3.9	2.4		1.3	2.8	
Delay (s)	25.1	28.3		20.1	24.8		15.4	15.2		11.4	16.0	
Level of Service	C	C		C	C		B	B		B	B	
Approach Delay (s)		27.7			24.4			15.2			15.5	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	330	120	70	325	150	115	40	65	190	40	205
Future Volume (vph)	215	330	120	70	325	150	115	40	65	190	40	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.99	1.00	0.99		1.00	0.98		0.99	0.99	
Frt			0.850		0.953			0.907			0.874	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1785	0	1770	1695	0	1787	1641	0
Flt Permitted	0.322			0.547			0.519			0.526		
Satd. Flow (perm)	611	1881	1594	1039	1785	0	966	1695	0	984	1641	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			130		33			71			223	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	234	359	130	76	353	163	125	43	71	207	43	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	234	359	130	76	516	0	125	114	0	207	266	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	14.5	60.0	60.0	45.5	45.5		11.0	19.0		11.0	19.0	
Total Split (%)	16.1%	66.7%	66.7%	50.6%	50.6%		12.2%	21.1%		12.2%	21.1%	
Maximum Green (s)	11.5	54.0	54.0	39.5	39.5		8.0	13.0		8.0	13.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	61.4	58.4	58.4	45.8	45.8		17.9	8.8		20.2	8.8	
Actuated g/C Ratio	0.68	0.65	0.65	0.51	0.51		0.20	0.10		0.22	0.10	
v/c Ratio	0.43	0.29	0.12	0.14	0.56		0.48	0.50		0.67	0.74	
Control Delay	8.4	8.2	1.7	14.6	18.2		33.3	24.1		40.0	21.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	8.4	8.2	1.7	14.6	18.2		33.3	24.1		40.0	21.5	
LOS	A	A	A	B	B		C	C		D	C	
Approach Delay		7.1			17.7			28.9			29.6	
Approach LOS		A			B			C			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 14.5 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 18.0		Intersection LOS: B	
Intersection Capacity Utilization 76.1%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd

Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	234	359	130	76	516	125	114	207	266
v/c Ratio	0.43	0.29	0.12	0.14	0.56	0.48	0.50	0.67	0.74
Control Delay	8.4	8.2	1.7	14.6	18.2	33.3	24.1	40.0	21.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.4	8.2	1.7	14.6	18.2	33.3	24.1	40.0	21.5
Queue Length 50th (m)	13.2	24.8	0.0	6.9	56.4	18.5	7.5	32.2	7.5
Queue Length 95th (m)	26.5	45.5	6.7	17.4	102.0	31.4	22.6	49.6	31.2
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	569	1220	1080	529	925	265	305	311	427
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.29	0.12	0.14	0.56	0.47	0.37	0.67	0.62

Intersection Summary

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	330	120	70	325	150	115	40	65	190	40	205
Future Volume (vph)	215	330	120	70	325	150	115	40	65	190	40	205
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	0.99		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	1881	1594	1804	1784		1769	1694		1782	1642	
Flt Permitted	0.32	1.00	1.00	0.55	1.00		0.52	1.00		0.53	1.00	
Satd. Flow (perm)	611	1881	1594	1038	1784		967	1694		988	1642	
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)	234	359	130	76	353	163	125	43	71	207	43	223
RTOR Reduction (vph)	0	0	47	0	17	0	0	65	0	0	198	0
Lane Group Flow (vph)	234	359	83	76	499	0	125	49	0	207	68	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	57.2	57.2	57.2	44.6	44.6		15.5	7.7		20.1	10.0	
Effective Green, g (s)	57.2	57.2	57.2	44.6	44.6		15.5	7.7		20.1	10.0	
Actuated g/C Ratio	0.64	0.64	0.64	0.50	0.50		0.17	0.09		0.22	0.11	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	515	1195	1013	514	884		236	144		309	182	
v/s Ratio Prot	c0.05	0.19			c0.28		0.05	0.03		c0.07	0.04	
v/s Ratio Perm	0.24		0.05	0.07			0.05			c0.07		
v/c Ratio	0.45	0.30	0.08	0.15	0.56		0.53	0.34		0.67	0.37	
Uniform Delay, d1	8.6	7.4	6.3	12.4	15.9		33.3	38.8		30.7	37.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.6	0.2	0.6	2.6		2.1	1.4		5.4	1.3	
Delay (s)	9.3	8.0	6.5	13.0	18.5		35.4	40.2		36.2	38.4	
Level of Service	A	A	A	B	B		D	D		D	D	
Approach Delay (s)		8.1			17.8			37.7			37.4	
Approach LOS		A			B			D			D	

Intersection Summary

HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
11: Silvercreek Pkwy & North Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	4	50	25	4	25	55	105	20	25	105	80
Future Volume (vph)	75	4	50	25	4	25	55	105	20	25	105	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948			0.937			0.976			0.935	
Flt Protected		0.972			0.977		0.950			0.950		
Satd. Flow (prot)	0	1716	0	0	1705	0	1770	1818	0	1770	1742	0
Flt Permitted		0.972			0.977		0.950			0.950		
Satd. Flow (perm)	0	1716	0	0	1705	0	1770	1818	0	1770	1742	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		48.2			109.9			286.0			209.5	
Travel Time (s)		3.5			7.9			20.6			15.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	4	54	27	4	27	60	114	22	27	114	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	140	0	0	58	0	60	136	0	27	201	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.1%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
11: Silvercreek Pkwy & North Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	4	50	25	4	25	55	105	20	25	105	80
Future Volume (Veh/h)	75	4	50	25	4	25	55	105	20	25	105	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	82	4	54	27	4	27	60	114	22	27	114	87
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)											209	
pX, platoon unblocked												
vC, conflicting volume	474	468	158	469	500	125	201			136		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	474	468	158	469	500	125	201			136		
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 %	82	99	94	94	99	97	96			98		
cM capacity (veh/h)	460	463	888	449	444	926	1371			1448		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	140	58	60	136	27	201
Volume Left	82	27	60	0	27	0
Volume Right	54	27	0	22	0	87
cSH	565	590	1371	1700	1448	1700
Volume to Capacity	0.25	0.10	0.04	0.08	0.02	0.12
Queue Length 95th (m)	7.8	2.6	1.1	0.0	0.5	0.0
Control Delay (s)	13.5	11.8	7.7	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.5	11.8	2.4		0.9	
Approach LOS	B	B				

Intersection Summary

Average Delay	5.2		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
12: Silvercreek Pkwy & South Access

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	4	90	25	4	25	95	75	20	25	75	80
Future Volume (vph)	80	4	90	25	4	25	95	75	20	25	75	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.930			0.937			0.968			0.923	
Flt Protected		0.978			0.977		0.950			0.950		
Satd. Flow (prot)	0	1694	0	0	1705	0	1770	1803	0	1770	1719	0
Flt Permitted		0.978			0.977		0.950			0.950		
Satd. Flow (perm)	0	1694	0	0	1705	0	1770	1803	0	1770	1719	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		49.5			98.3			92.6			286.0	
Travel Time (s)		3.6			7.1			6.7			20.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	4	98	27	4	27	103	82	22	27	82	87
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	189	0	0	58	0	103	104	0	27	169	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 36.9%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
12: Silvercreek Pkwy & South Access

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	4	90	25	4	25	95	75	20	25	75	80
Future Volume (Veh/h)	80	4	90	25	4	25	95	75	20	25	75	80
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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)	87	4	98	27	4	27	103	82	22	27	82	87
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	496	490	126	535	522	93	169			104		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496	490	126	535	522	93	169			104		
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 %	80	99	89	93	99	97	93			98		
cM capacity (veh/h)	435	436	925	377	418	964	1409			1488		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	189	58	103	104	27	169
Volume Left	87	27	103	0	27	0
Volume Right	98	27	0	22	0	87
cSH	600	531	1409	1700	1488	1700
Volume to Capacity	0.32	0.11	0.07	0.06	0.02	0.10
Queue Length 95th (m)	10.8	2.9	1.9	0.0	0.4	0.0
Control Delay (s)	13.7	12.6	7.8	0.0	7.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.7	12.6	3.9		1.0	
Approach LOS	B	B				

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	255	40	45	260	65	80
Future Volume (vph)	255	40	45	260	65	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.872			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3069	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3069	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	7			1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	3%	0%	0%
Adj. Flow (vph)	277	43	49	283	71	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	277	43	332	0	71	87
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.6%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	255	40	45	260	65	80
Future Volume (Veh/h)	255	40	45	260	65	80
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	277	43	49	283	71	87
Pedestrians	1		7			
Lane Width (m)	3.6		3.6			
Walking Speed (m/s)	1.2		1.2			
Percent Blockage	0		1			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	384	167			333	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	384	167			333	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	50	95			94	
cM capacity (veh/h)	554	854			1237	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	277	43	33	299	71	44	44
Volume Left	277	0	0	0	71	0	0
Volume Right	0	43	0	283	0	0	0
cSH	554	854	1700	1700	1237	1700	1700
Volume to Capacity	0.50	0.05	0.02	0.18	0.06	0.03	0.03
Queue Length 95th (m)	22.2	1.3	0.0	0.0	1.5	0.0	0.0
Control Delay (s)	17.8	9.4	0.0	0.0	8.1	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	16.7		0.0		3.6		
Approach LOS	C						

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	265	75	150	280	60	125
Future Volume (vph)	265	75	150	280	60	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.902			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3235	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3235	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5
Confl. Peds. (#/hr)	1					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	288	82	163	304	65	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	288	82	467	0	65	136
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	3.6		3.6			3.6
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	4.8		4.8			4.8
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15		15	25	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 41.2%		ICU Level of Service A	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	265	75	150	280	60	125
Future Volume (Veh/h)	265	75	150	280	60	125
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	288	82	163	304	65	136
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	514	234			467	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	234			467	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	37	89			94	
cM capacity (veh/h)	461	775			1105	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	288	82	109	358	65	68	68
Volume Left	288	0	0	0	65	0	0
Volume Right	0	82	0	304	0	0	0
cSH	461	775	1700	1700	1105	1700	1700
Volume to Capacity	0.63	0.11	0.06	0.21	0.06	0.04	0.04
Queue Length 95th (m)	33.5	2.8	0.0	0.0	1.5	0.0	0.0
Control Delay (s)	25.0	10.2	0.0	0.0	8.5	0.0	0.0
Lane LOS	C	B			A		
Approach Delay (s)	21.7		0.0		2.7		
Approach LOS	C						

Intersection Summary			
Average Delay	8.3		
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes and Geometrics
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%		0%			0%
Storage Length (m)	0.0	0.0		60.0	0.0	
Storage Lanes	1	1		0	1	
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	0.95
Ped Bike Factor						
Frt		0.850	0.918			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1615	3296	0	1805	3610
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1615	3296	0	1805	3610
Link Speed (k/h)	50		50			50
Link Distance (m)	538.7		138.7			117.5
Travel Time (s)	38.8		10.0			8.5

Intersection Summary	
Area Type:	Other

HCM Unsignalized Intersection Capacity Analysis
7: Waterloo Ave & Silvercreek Pkwy

10-05-2020

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	175	70	135	165	70	140
Future Volume (Veh/h)	175	70	135	165	70	140
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	76	147	179	76	152
Pedestrians			1			
Lane Width (m)			3.6			
Walking Speed (m/s)			1.2			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			139			
pX, platoon unblocked						
vC, conflicting volume	466	163			326	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	466	163			326	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	61	91			94	
cM capacity (veh/h)	493	859			1245	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	190	76	98	228	76	76	76
Volume Left	190	0	0	0	76	0	0
Volume Right	0	76	0	179	0	0	0
cSH	493	859	1700	1700	1245	1700	1700
Volume to Capacity	0.39	0.09	0.06	0.13	0.06	0.04	0.04
Queue Length 95th (m)	14.4	2.3	0.0	0.0	1.6	0.0	0.0
Control Delay (s)	16.8	9.6	0.0	0.0	8.1	0.0	0.0
Lane LOS	C	A			A		
Approach Delay (s)	14.7		0.0		2.7		
Approach LOS	B						

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	215	1	0	180	290	10	4	5	315	1	60
Future Volume (vph)	130	215	1	0	180	290	10	4	5	315	1	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.97		0.97		0.99	0.95		0.95	0.98	
Frt			0.850		0.907			0.910			0.852	
Flt Protected	0.950						0.950			0.950		
Satd. Flow (prot)	1752	1792	1615	1900	1588	0	1805	1645	0	1770	1520	0
Flt Permitted	0.327									0.909		
Satd. Flow (perm)	597	1792	1568	1900	1588	0	1878	1645	0	1601	1520	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		105			6			67	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
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
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Adj. Flow (vph)	144	239	1	0	200	322	11	4	6	350	1	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	144	239	1	0	522	0	11	10	0	350	68	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

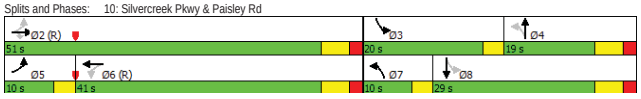
Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	10.0	51.0	51.0	41.0	41.0		10.0	19.0		20.0	29.0	
Total Split (%)	11.1%	56.7%	56.7%	45.6%	45.6%		11.1%	21.1%		22.2%	32.2%	
Maximum Green (s)	7.0	45.0	45.0	35.0	35.0		7.0	13.0		17.0	23.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	64.8	61.8	61.8		50.8		8.0	6.0		19.2	14.3	
Actuated g/C Ratio	0.72	0.69	0.69		0.56		0.09	0.07		0.21	0.16	
v/c Ratio	0.27	0.19	0.00		0.55		0.07	0.09		0.94	0.23	
Control Delay	6.1	6.5	0.0		14.1		31.1	23.2		68.3	10.7	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay	6.1	6.5	0.0		14.1		31.1	23.2		68.3	10.7	
LOS	A	A	A		B		C	C		E	B	
Approach Delay		6.4			14.1			27.3			58.9	
Approach LOS		A			B			C			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 14.5 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 26.0		Intersection LOS: C	
Intersection Capacity Utilization 73.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	144	239	1	522	11	10	350	68
v/c Ratio	0.27	0.19	0.00	0.55	0.07	0.09	0.94	0.23
Control Delay	6.1	6.5	0.0	14.1	31.1	23.2	68.3	10.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	6.5	0.0	14.1	31.1	23.2	68.3	10.7
Queue Length 50th (m)	6.0	12.3	0.0	40.0	2.0	0.3	~69.9	0.2
Queue Length 95th (m)	18.8	33.1	0.0	104.3	4.6	3.9	81.6	11.2
Internal Link Dist (m)		178.0		665.0		185.5		362.4
Turn Bay Length (m)	80.0							
Base Capacity (vph)	534	1229	1110	942	182	242	380	438
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	0.27	0.19	0.00	0.55	0.06	0.04	0.92	0.16

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

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	215	1	0	180	290	10	4	5	315	1	60
Future Volume (vph)	130	215	1	0	180	290	10	4	5	315	1	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0		6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97		0.97		1.00	0.95		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00		0.99	1.00		0.95	1.00	
Frt	1.00	1.00	0.85		0.91		1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1747	1792	1568		1588		1785	1645		1683	1521	
Flt Permitted	0.33	1.00	1.00		1.00		1.00	1.00		0.91	1.00	
Satd. Flow (perm)	602	1792	1568		1588		1878	1645		1610	1521	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	144	239	11	0	200	322	11	4	6	350	1	67
RTOR Reduction (vph)	0	0	0	0	51	0	0	6	0	0	55	0
Lane Group Flow (vph)	144	239	1	0	471	0	11	4	0	350	13	0
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	57.0	57.0	57.0		46.1		2.7	1.4		21.0	16.7	
Effective Green, g (s)	57.0	57.0	57.0		46.1		2.7	1.4		21.0	16.7	
Actuated g/C Ratio	0.63	0.63	0.63		0.51		0.03	0.02		0.23	0.19	
Clearance Time (s)	3.0	6.0	6.0		6.0		3.0	6.0		3.0	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)	481	1134	993		813		54	25		389	282	
v/s Ratio Prot	c0.03	0.13			c0.30		0.00	0.00		c0.17	0.01	
v/s Ratio Perm	0.16		0.00				0.00			c0.04		
v/c Ratio	0.30	0.21	0.00		0.58		0.20	0.16		0.90	0.05	
Uniform Delay, d1	8.1	7.0	6.1		15.2		42.6	43.7		33.4	30.1	
Progression Factor	1.00	1.00	1.00		1.00		1.02	0.76		1.00	1.00	
Incremental Delay, d2	0.4	0.4	0.0		3.0		1.9	3.1		22.7	0.1	
Delay (s)	8.4	7.4	6.1		18.2		45.4	36.5		56.2	30.2	
Level of Service	A	A	A		B		D	D		E	C	
Approach Delay (s)		7.8			18.2			41.2			51.9	
Approach LOS		A			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	73.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	190	10	5	250	365	2	0	0	430	3	185
Future Volume (vph)	150	190	10	5	250	365	2	0	0	430	3	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98	1.00	0.98		1.00			0.99	0.99	
Frt			0.850		0.911						0.852	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1685	0	1770	1900	0	1787	1596	0
Flt Permitted	0.124			0.628			0.000			0.950		
Satd. Flow (perm)	236	1881	1580	1192	1685	0	0	1900	0	1776	1596	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		96						201	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	163	207	11	5	272	397	2	0	0	467	3	201
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	207	11	5	669	0	2	0	0	467	204	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

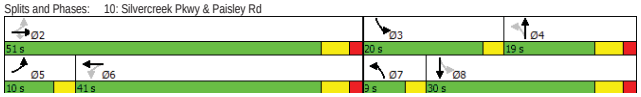
10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		2.5	5.0		4.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		7.5	19.0		9.0	19.0	
Total Split (s)	10.0	51.0	51.0	41.0	41.0		9.0	19.0		20.0	30.0	
Total Split (%)	11.1%	56.7%	56.7%	45.6%	45.6%		10.0%	21.1%		22.2%	33.3%	
Maximum Green (s)	7.0	45.0	45.0	35.0	35.0		6.0	13.0		17.0	24.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		None	None		Max	Max	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	48.1	45.1	45.1	35.1	35.1		5.7			28.7	24.0	
Actuated g/C Ratio	0.58	0.54	0.54	0.42	0.42		0.07			0.35	0.29	
v/c Ratio	0.61	0.20	0.01	0.01	0.87		0.02			0.75	0.34	
Control Delay	20.0	10.8	0.0	15.4	33.5		38.0			32.7	5.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0			0.0	0.0	
Total Delay	20.0	10.8	0.0	15.4	33.5		38.0			32.7	5.8	
LOS	C	B	A	B	C		D			C	A	
Approach Delay		14.5			33.3			38.0			24.5	
Approach LOS		B			C			D			C	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 82.8			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 25.7		Intersection LOS: C	
Intersection Capacity Utilization 87.9%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	SBL	SBT
Lane Group Flow (vph)	163	207	11	5	669	2	467	204
v/c Ratio	0.61	0.20	0.01	0.01	0.87	0.02	0.75	0.34
Control Delay	20.0	10.8	0.0	15.4	33.5	38.0	32.7	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	20.0	10.8	0.0	15.4	33.5	38.0	32.7	5.8
Queue Length 50th (m)	10.8	15.5	0.0	0.5	82.5	0.3	67.5	0.4
Queue Length 95th (m)	#33.0	33.6	0.0	2.8	#175.7	2.6	102.1	16.8
Internal Link Dist (m)		178.0			665.0			362.4
Turn Bay Length (m)	80.0							
Base Capacity (vph)	269	1024	910	505	768	128	619	606
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	0.61	0.20	0.01	0.01	0.87	0.02	0.75	0.34

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	190	10	5	250	365	2	0	0	430	3	185
Future Volume (vph)	150	190	10	5	250	365	2	0	0	430	3	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0			3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00			1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.91		1.00			1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95			0.95	1.00	
Satd. Flow (prot)	1805	1881	1580	1803	1685		1770			1787	1597	
Flt Permitted	0.12	1.00	1.00	0.63	1.00		0.00			0.95	1.00	
Satd. Flow (perm)	235	1881	1580	1192	1685		0			1787	1597	
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)	163	207	11	5	272	397	2	0	0	467	3	201
RTOR Reduction (vph)	0	0	5	0	56	0	0	0	0	0	144	0
Lane Group Flow (vph)	163	207	6	5	613	0	2	0	0	467	60	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt			pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	45.1	45.1	45.1	35.1	35.1		1.1			31.1	24.0	
Effective Green, g (s)	45.1	45.1	45.1	35.1	35.1		1.1			31.1	24.0	
Actuated g/C Ratio	0.53	0.53	0.53	0.41	0.41		0.01			0.37	0.28	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0			3.0	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)	253	995	836	491	694		22			652	449	
v/s Ratio Prot	c0.05	0.11			c0.36		0.00			c0.26	0.04	
v/s Ratio Perm	0.29		0.00	0.00								
v/c Ratio	0.64	0.21	0.01	0.01	0.88		0.09			0.72	0.13	
Uniform Delay, d1	15.6	10.6	9.5	14.8	23.1		41.6			23.3	22.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00	
Incremental Delay, d2	5.5	0.5	0.0	0.0	15.2		1.8			6.6	0.6	
Delay (s)	21.2	11.1	9.5	14.8	38.3		43.3			29.9	23.4	
Level of Service	C	B	A	B	D		D			C	C	
Approach Delay (s)		15.3			38.1			43.3			27.9	
Approach LOS		B			D			D			C	

Intersection Summary

HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	85.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	185	10	3	195	280	5	4	3	335	5	115
Future Volume (vph)	115	185	10	3	195	280	5	4	3	335	5	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00	0.99		1.00	0.99		0.99	0.99	
Frt			0.850		0.912			0.936			0.856	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1687	0	1770	1758	0	1787	1604	0
Flt Permitted	0.329			0.632						0.930		
Satd. Flow (perm)	624	1881	1580	1199	1687	0	1860	1758	0	1739	1604	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		91			3			125	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	125	201	11	3	212	304	5	4	3	364	5	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	125	201	11	3	516	0	5	7	0	364	130	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

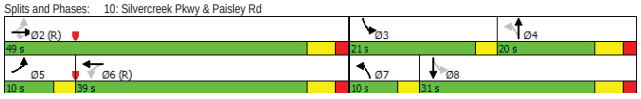
Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	10.0	49.0	49.0	39.0	39.0		10.0	20.0		21.0	31.0	
Total Split (%)	11.1%	54.4%	54.4%	43.3%	43.3%		11.1%	22.2%		23.3%	34.4%	
Maximum Green (s)	7.0	43.0	43.0	33.0	33.0		7.0	14.0		18.0	25.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	63.9	60.9	60.9	50.3	50.3		7.7	5.9		20.1	15.2	
Actuated g/C Ratio	0.71	0.68	0.68	0.56	0.56		0.09	0.07		0.22	0.17	
v/c Ratio	0.23	0.16	0.01	0.00	0.52		0.03	0.06		0.92	0.35	
Control Delay	6.1	6.6	0.0	12.7	13.9		29.8	25.5		62.7	9.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	6.1	6.6	0.0	12.7	13.9		29.8	25.5		62.7	9.4	
LOS	A	A	A	B	B		C	C		E	A	
Approach Delay		6.2			13.9			27.3			48.7	
Approach LOS		A			B			C			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 14.5 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 24.7		Intersection LOS: C	
Intersection Capacity Utilization 72.5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	125	201	11	3	516	5	7	364	130
v/c Ratio	0.23	0.16	0.01	0.00	0.52	0.03	0.06	0.92	0.35
Control Delay	6.1	6.6	0.0	12.7	13.9	29.8	25.5	62.7	9.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.1	6.6	0.0	12.7	13.9	29.8	25.5	62.7	9.4
Queue Length 50th (m)	5.4	10.5	0.0	0.2	40.8	0.9	0.5	~68.7	0.8
Queue Length 95th (m)	16.9	28.2	0.0	2.0	100.5	m2.3	m3.1	83.7	15.4
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	546	1273	1104	670	983	177	276	406	535
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.16	0.01	0.00	0.52	0.03	0.03	0.90	0.24

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-02-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	185	10	3	195	280	5	4	3	335	5	115
Future Volume (vph)	115	185	10	3	195	280	5	4	3	335	5	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.94		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	1881	1580	1803	1686		1767	1757		1777	1604	
Flt Permitted	0.33	1.00	1.00	0.63	1.00		1.00	1.00		0.93	1.00	
Satd. Flow (perm)	624	1881	1580	1198	1686		1860	1757		1740	1604	
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)	125	201	11	3	212	304	5	4	3	364	5	125
RTOR Reduction (vph)	0	0	4	0	45	0	0	3	0	0	101	0
Lane Group Flow (vph)	125	201	7	3	471	0	5	4	0	364	29	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	56.2	56.2	56.2	45.6	45.6		2.5	1.3		21.8	17.6	
Effective Green, g (s)	56.2	56.2	56.2	45.6	45.6		2.5	1.3		21.8	17.6	
Actuated g/C Ratio	0.62	0.62	0.62	0.51	0.51		0.03	0.01		0.24	0.20	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	489	1174	986	606	854		50	25		428	313	
v/s Ratio Prot	c0.02	0.11			c0.28		0.00	0.00		c0.17	0.02	
v/s Ratio Perm	0.14		0.00	0.00			0.00			c0.04		
v/c Ratio	0.26	0.17	0.01	0.00	0.55		0.10	0.16		0.85	0.09	
Uniform Delay, d1	8.2	7.1	6.4	11.0	15.2		42.7	43.8		32.5	29.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.02	0.76		1.00	1.00	
Incremental Delay, d2	0.3	0.3	0.0	0.0	2.6		0.9	3.0		14.9	0.1	
Delay (s)	8.5	7.4	6.4	11.0	17.8		44.4	36.4		47.4	29.8	
Level of Service	A	A	A	B	B		D	D		D	C	
Approach Delay (s)		7.8			17.7			39.7			42.8	
Approach LOS		A			B			D			D	

Intersection Summary				
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.63			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	72.5%	ICU Level of Service	C	
Analysis Period (min)	15			

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	215	15	35	180	290	30	95	50	315	60	60
Future Volume (vph)	130	215	15	35	180	290	30	95	50	315	60	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.97	0.99	0.97		0.99	0.97		0.96	0.99	
Frt			0.850		0.907			0.948			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1792	1615	1805	1588	0	1805	1751	0	1770	1702	0
Flt Permitted	0.243			0.610			0.671			0.454		
Satd. Flow (perm)	444	1792	1568	1152	1588	0	1262	1751	0	811	1702	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		105			25			54	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
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
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Adj. Flow (vph)	144	239	17	39	200	322	33	106	56	350	67	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	144	239	17	39	522	0	33	162	0	350	134	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

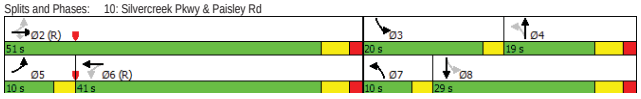
Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	10.0	51.0	51.0	41.0	41.0		10.0	19.0		20.0	29.0	
Total Split (%)	11.1%	56.7%	56.7%	45.6%	45.6%		11.1%	21.1%		22.2%	32.2%	
Maximum Green (s)	7.0	45.0	45.0	35.0	35.0		7.0	13.0		17.0	23.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	50.6	47.6	47.6	37.4	37.4		20.5	11.2		33.4	24.5	
Actuated g/C Ratio	0.56	0.53	0.53	0.42	0.42		0.23	0.12		0.37	0.27	
v/c Ratio	0.41	0.25	0.02	0.08	0.72		0.10	0.68		0.74	0.27	
Control Delay	13.8	13.1	0.1	18.0	25.2		17.0	42.3		32.1	17.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	13.8	13.1	0.1	18.0	25.2		17.0	42.3		32.1	17.7	
LOS	B	B	A	B	C		B	D		C	B	
Approach Delay		12.8			24.7			38.0			28.1	
Approach LOS		B			C			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 14.5 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 24.4		Intersection LOS: C	
Intersection Capacity Utilization 79.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	144	239	17	39	522	33	162	350	134
v/c Ratio	0.41	0.25	0.02	0.08	0.72	0.10	0.68	0.74	0.27
Control Delay	13.8	13.1	0.1	18.0	25.2	17.0	42.3	32.1	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.8	13.1	0.1	18.0	25.2	17.0	42.3	32.1	17.7
Queue Length 50th (m)	12.4	23.6	0.0	4.4	65.7	3.5	26.1	47.1	11.4
Queue Length 95th (m)	22.5	39.1	0.0	11.2	#109.2	8.6	46.8	72.5	26.6
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	355	947	880	479	721	338	274	482	503
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.25	0.02	0.08	0.72	0.10	0.59	0.73	0.27

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

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	215	15	35	180	290	30	95	50	315	60	60
Future Volume (vph)	130	215	15	35	180	290	30	95	50	315	60	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	0.97		1.00	0.97		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		0.99	1.00		0.98	1.00	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1749	1792	1568	1793	1588		1793	1751		1739	1702	
Flt Permitted	0.24	1.00	1.00	0.61	1.00		0.67	1.00		0.45	1.00	
Satd. Flow (perm)	447	1792	1568	1152	1588		1267	1751		831	1702	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	144	239	17	39	200	322	33	106	56	350	67	67
RTOR Reduction (vph)	0	0	8	0	63	0	0	22	0	0	39	0
Lane Group Flow (vph)	144	239	9	39	459	0	33	140	0	350	95	0
Confl. Peds. (#/hr)	18		5	5		18	6		18	18		6
Heavy Vehicles (%)	3%	6%	0%	0%	2%	7%	0%	0%	0%	2%	0%	4%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	46.4	46.4	46.4	36.2	36.2		16.4	12.3		31.6	24.5	
Effective Green, g (s)	46.4	46.4	46.4	36.2	36.2		16.4	12.3		31.6	24.5	
Actuated g/C Ratio	0.52	0.52	0.52	0.40	0.40		0.18	0.14		0.35	0.27	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	334	923	808	463	638		254	239		456	463	
v/s Ratio Prot	c0.03	0.13			c0.29		0.01	0.08		c0.14	0.06	
v/s Ratio Perm	0.19		0.01	0.03			0.02			c0.13		
v/c Ratio	0.43	0.26	0.01	0.08	0.72		0.13	0.59		0.77	0.20	
Uniform Delay, d1	13.9	12.2	10.6	16.6	22.6		30.7	36.5		23.9	25.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.91	0.88		1.00	1.00	
Incremental Delay, d2	0.9	0.7	0.0	0.4	6.9		0.2	3.6		7.6	0.2	
Delay (s)	14.8	12.9	10.6	17.0	29.5		28.1	35.8		31.5	25.5	
Level of Service	B	B	B	B	C		C	D		C	C	
Approach Delay (s)		13.5			28.6			34.5			29.8	
Approach LOS		B			C			C			C	

Intersection Summary				
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C	
HCM 2000 Volume to Capacity ratio	0.74			
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0	
Intersection Capacity Utilization	79.3%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	190	35	65	250	365	20	100	50	430	120	185
Future Volume (vph)	150	190	35	65	250	365	20	100	50	430	120	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98	1.00	0.98		1.00	0.99		1.00	0.99	
Frt			0.850		0.911			0.950			0.909	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1685	0	1770	1789	0	1787	1712	0
Flt Permitted	0.105			0.628			0.561			0.461		
Satd. Flow (perm)	200	1881	1580	1192	1685	0	1044	1789	0	863	1712	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		96			23			84	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	163	207	38	71	272	397	22	109	54	467	130	201
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	207	38	71	669	0	22	163	0	467	331	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

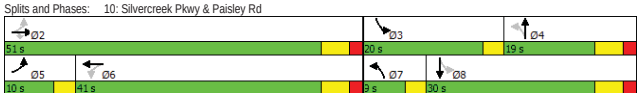
10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		2.5	5.0		4.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		7.5	19.0		9.0	19.0	
Total Split (s)	10.0	51.0	51.0	41.0	41.0		9.0	19.0		20.0	30.0	
Total Split (%)	11.1%	56.7%	56.7%	45.6%	45.6%		10.0%	21.1%		22.2%	33.3%	
Maximum Green (s)	7.0	45.0	45.0	35.0	35.0		6.0	13.0		17.0	24.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max	Max	Max	Max		None	None		Max	Max	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	48.0	45.0	45.0	35.0	35.0		19.9	11.0		34.1	27.5	
Actuated g/C Ratio	0.54	0.51	0.51	0.40	0.40		0.23	0.12		0.39	0.31	
v/c Ratio	0.69	0.22	0.04	0.15	0.92		0.08	0.67		0.91	0.56	
Control Delay	29.4	13.0	0.1	18.8	42.3		18.3	45.3		48.1	23.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.4	13.0	0.1	18.8	42.3		18.3	45.3		48.1	23.7	
LOS	C	B	A	B	D		B	D		D	C	
Approach Delay		18.3			40.1			42.1			38.0	
Approach LOS		B			D			D			D	

Intersection Summary

Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 88.1			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 35.3		Intersection LOS: D	
Intersection Capacity Utilization 93.1%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	163	207	38	71	669	22	163	467	331
v/c Ratio	0.69	0.22	0.04	0.15	0.92	0.08	0.67	0.91	0.56
Control Delay	29.4	13.0	0.1	18.8	42.3	18.3	45.3	48.1	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.4	13.0	0.1	18.8	42.3	18.3	45.3	48.1	23.7
Queue Length 50th (m)	14.1	19.8	0.0	8.1	100.0	2.4	24.0	67.5	33.3
Queue Length 95th (m)	#39.5	33.6	0.0	17.7	#175.7	7.1	44.7	#130.7	69.0
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	236	961	860	473	727	286	283	512	592
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.22	0.04	0.15	0.92	0.08	0.58	0.91	0.56

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	190	35	65	250	365	20	100	50	430	120	185
Future Volume (vph)	150	190	35	65	250	365	20	100	50	430	120	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1881	1580	1803	1685		1768	1790		1784	1712	
Flt Permitted	0.11	1.00	1.00	0.63	1.00		0.56	1.00		0.46	1.00	
Satd. Flow (perm)	200	1881	1580	1192	1685		1044	1790		865	1712	
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)	163	207	38	71	272	397	22	109	54	467	130	201
RTOR Reduction (vph)	0	0	19	0	59	0	0	20	0	0	58	0
Lane Group Flow (vph)	163	207	19	71	610	0	22	143	0	467	273	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	45.0	45.0	45.0	35.0	35.0		15.1	12.8		32.8	27.5	
Effective Green, g (s)	45.0	45.0	45.0	35.0	35.0		15.1	12.8		32.8	27.5	
Actuated g/C Ratio	0.50	0.50	0.50	0.39	0.39		0.17	0.14		0.37	0.31	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	225	942	791	464	656		194	255		489	524	
v/s Ratio Prot	c0.06	0.11			c0.36		0.00	0.08		c0.18	0.16	
v/s Ratio Perm	0.31		0.01	0.06			0.02			c0.17		
v/c Ratio	0.72	0.22	0.02	0.15	0.93		0.11	0.56		0.96	0.52	
Uniform Delay, d1	18.2	12.6	11.3	17.8	26.2		31.5	35.9		25.6	25.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.0	0.5	0.1	0.7	21.7		0.3	2.8		30.9	3.7	
Delay (s)	29.2	13.1	11.4	18.5	47.9		31.7	38.7		56.5	29.4	
Level of Service	C	B	B	B	D		C	D		E	C	
Approach Delay (s)		19.4			45.1			37.9			45.2	
Approach LOS		B			D			D			D	

Intersection Summary

HCM 2000 Control Delay	39.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	185	35	70	195	280	30	125	65	335	125	115
Future Volume (vph)	115	185	35	70	195	280	30	125	65	335	125	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	80.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00	0.99		1.00	0.99		1.00	0.99	
Frt			0.850		0.912			0.949			0.928	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1805	1881	1615	1805	1687	0	1770	1787	0	1787	1751	0
Flt Permitted	0.227			0.632			0.598			0.372		
Satd. Flow (perm)	431	1881	1580	1199	1687	0	1112	1787	0	697	1751	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109		91			25			51	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		202.0			689.0			209.5			386.4	
Travel Time (s)		14.5			49.6			15.1			27.8	
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Adj. Flow (vph)	125	201	38	76	212	304	33	136	71	364	136	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	125	201	38	76	516	0	33	207	0	364	261	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

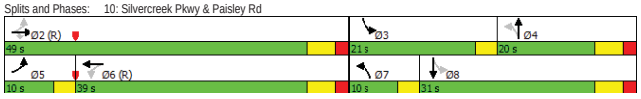
Lanes, Volumes, Timings
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Detector Phase	5	2	2	6	6		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	31.0	31.0	31.0	31.0		9.5	19.0		9.5	19.0	
Total Split (s)	10.0	49.0	49.0	39.0	39.0		10.0	20.0		21.0	31.0	
Total Split (%)	11.1%	54.4%	54.4%	43.3%	43.3%		11.1%	22.2%		23.3%	34.4%	
Maximum Green (s)	7.0	43.0	43.0	33.0	33.0		7.0	14.0		18.0	25.0	
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0		0.0	2.0		0.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	
Walk Time (s)		11.0	11.0	11.0	11.0			2.0			2.0	
Flash Dont Walk (s)		14.0	14.0	14.0	14.0			11.0			11.0	
Pedestrian Calls (#/hr)		0	0	0	0			0			0	
Act Effct Green (s)	48.4	45.4	45.4	35.4	35.4		22.0	12.7		35.6	26.7	
Actuated g/C Ratio	0.54	0.50	0.50	0.39	0.39		0.24	0.14		0.40	0.30	
v/c Ratio	0.37	0.21	0.04	0.16	0.72		0.10	0.76		0.76	0.47	
Control Delay	14.5	13.9	0.1	20.3	26.5		15.7	46.2		31.4	24.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.5	13.9	0.1	20.3	26.5		15.7	46.2		31.4	24.2	
LOS	B	B	A	C	C		B	D		C	C	
Approach Delay		12.6			25.7			42.0			28.4	
Approach LOS		B			C			D			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 14.5 (16%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 26.2		Intersection LOS: C	
Intersection Capacity Utilization 79.8%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 10: Silvercreek Pkwy & Paisley Rd



Queues
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	125	201	38	76	516	33	207	364	261
v/c Ratio	0.37	0.21	0.04	0.16	0.72	0.10	0.76	0.76	0.47
Control Delay	14.5	13.9	0.1	20.3	26.5	15.7	46.2	31.4	24.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.5	13.9	0.1	20.3	26.5	15.7	46.2	31.4	24.2
Queue Length 50th (m)	11.4	20.5	0.0	9.2	67.7	3.4	34.6	46.8	31.3
Queue Length 95th (m)	20.9	34.4	0.0	19.5	#109.2	8.4	#37.8	72.3	55.5
Internal Link Dist (m)		178.0			665.0		185.5		362.4
Turn Bay Length (m)	80.0								
Base Capacity (vph)	340	948	850	471	719	331	299	493	556
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.21	0.04	0.16	0.72	0.10	0.69	0.74	0.47

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

HCM Signalized Intersection Capacity Analysis
10: Silvercreek Pkwy & Paisley Rd

10-05-2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	185	35	70	195	280	30	125	65	335	125	115
Future Volume (vph)	115	185	35	70	195	280	30	125	65	335	125	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.91		1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1804	1881	1580	1803	1686		1768	1786		1785	1752	
Flt Permitted	0.23	1.00	1.00	0.63	1.00		0.60	1.00		0.37	1.00	
Satd. Flow (perm)	432	1881	1580	1198	1686		1113	1786		699	1752	
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)	125	201	38	76	212	304	33	136	71	364	136	125
RTOR Reduction (vph)	0	0	19	0	56	0	0	21	0	0	36	0
Lane Group Flow (vph)	125	201	19	76	460	0	33	186	0	364	225	0
Confl. Peds. (#/hr)	3		1	1		3	1		2	2		1
Heavy Vehicles (%)	0%	1%	0%	0%	0%	2%	2%	0%	0%	1%	0%	0%
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	5	2			6		7	4		3	8	
Permitted Phases	2		2	6			4			8		
Actuated Green, G (s)	44.2	44.2	44.2	34.3	34.3		18.0	13.9		33.8	26.7	
Effective Green, g (s)	44.2	44.2	44.2	34.3	34.3		18.0	13.9		33.8	26.7	
Actuated g/C Ratio	0.49	0.49	0.49	0.38	0.38		0.20	0.15		0.38	0.30	
Clearance Time (s)	3.0	6.0	6.0	6.0	6.0		3.0	6.0		3.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	923	775	456	642		252	275		466	519	
v/s Ratio Prot	c0.03	0.11			c0.27		0.01	0.10		c0.15	0.13	
v/s Ratio Perm	0.16		0.01	0.06			0.02			c0.15		
v/c Ratio	0.39	0.22	0.02	0.17	0.72		0.13	0.68		0.78	0.43	
Uniform Delay, d1	14.9	13.0	11.8	18.4	23.7		29.3	35.9		22.4	25.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.90	0.86		1.00	1.00	
Incremental Delay, d2	0.8	0.5	0.1	0.8	6.7		0.2	6.4		8.3	0.6	
Delay (s)	15.8	13.6	11.9	19.2	30.4		26.5	37.2		30.7	26.1	
Level of Service	B	B	B	B	C		C	D		C	C	
Approach Delay (s)		14.2			29.0			35.7			28.8	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX C:
Signal Warrants

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Silvercreek Parkway at North Access

What is the direction of the Main Road street? North-South

When was the data collected? 2031 Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 4

d.- What is the operating environment? Urban

Population >= 10,000 AND Speed < 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	25	80	10	45	4	40	10	55	45	25	4	30	0
8:00	28	47	14	36	2	25	17	55	39	8	2	11	0
9:00	31	52	15	40	2	28	18	61	43	9	2	12	0
12:30	34	58	17	45	2	31	21	69	48	10	2	14	0
13:30	36	62	18	47	2	33	22	73	51	11	2	15	0
16:00	43	74	22	57	3	39	26	87	61	13	3	17	0
17:00	49	83	24	63	3	44	29	97	68	15	3	19	0
18:00	50	85	25	65	3	45	30	100	70	15	3	20	0
Total	**296**	**541**	**145**	**398**	**21**	**285**	**173**	**597**	**425**	**106**	**21**	**138**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	0
13-24	0
25-36	0

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate	23%		34%		30%		100%		
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									2,000

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	0	0	0	0	0	0	0	0	
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	23%		34%		30%		100%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Silvercreek Parkway at North Access

Count Date: 2031 Total Traffic

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☑	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	12:30	13:30	16:00	17:00	18:00		
1A	480	720	600	900	373	284	313	351	372	445	497	511		
	COMPLIANCE %				52	39	43	49	52	62	69	71	437	55
1B	120	170	120	170	148	84	93	104	110	132	147	151		
	COMPLIANCE %				87	49	55	61	65	78	86	89	570	71

Restricted Flow Signal Justification 1:			
Both 1A and 1B 100% Fullfilled each of 8 hours	Yes ☐	No ☑
Lesser of 1A or 1B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☑	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	12:30	13:30	16:00	17:00	18:00		
2A	480	720	600	900	225	200	220	247	262	313	350	360		
	COMPLIANCE %				31	28	31	34	36	43	49	50	302	38
2B	50	75	50	75	74	46	51	57	60	73	81	83		
	COMPLIANCE %				99	61	68	76	80	97	100	100	681	85

Restricted Flow Signal Justification 2:		
Both 2A and 2B 100% Fullfilled each of 8 hours	Yes ☐	No ☑
Lesser of 2A or 2B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimun Vehicular Volume	YES ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YES ☐	NO ☑		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach	Required Value	Average % Compliance	Overall % Compliance
		X	Y (actual)	Y (warrant threshold)		
Justification 4	13:30	290	86	365	24 %	32 %
	16:00	348	103	334	31 %	
	17:00	390	115	313	37 %	
	18:00	400	118	308	38 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Silvercreek Parkway at North Access

Count Date: 2031 Total Traffic

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	0 %	0 %
	13-24	0 %	
	25-36	0 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440					
	1440 - 2600	Not Justified				
	2601 - 7000					
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Silvercreek Parkway at North Access

Count Date: 2031 Total Traffic

Summary Results

Justification			Compliance	Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	55 %	☐	☑
	B	Crossing Volume	71 %		
2. Delay to Cross Traffic	A	Main Road	38 %	☐	☑
	B	Crossing Road	85 %		
3. Combination	A	Justificaton 1	55 %	☐	☑
	B	Justification 2	38 %		
4. 4-Hr Volume			32 %	☐	☑
5. Collision Experience			0 %	☐	☑
6. Pedestrians	A	Volume	Justification not met	☐	☑
	B	Delay	Justification not met		

Input Data Sheet

Analysis Sheet | Results Sheet | Proposed Collision

GO TO Justification:

What are the intersecting roadways? Silvercreek Parkway at South Access

What is the direction of the Main Road street? North-South

When was the data collected? 2031 Total Traffic

Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road? 1

b.- Number of lanes on the Minor Road? 1

c.- How many approaches? 4

d.- What is the operating environment? Urban

Population >= 10,000 AND Speed < 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	30	35	10	50	4	40	10	65	45	25	4	30	0
8:00	52	41	14	36	2	47	17	33	39	8	2	11	0
9:00	58	46	15	40	2	52	18	37	43	9	2	12	0
12:30	65	51	17	45	2	58	21	41	48	10	2	14	0
13:30	69	54	18	47	2	62	22	44	51	11	2	15	0
16:00	83	65	22	57	3	74	26	52	61	13	3	17	0
17:00	93	73	24	63	3	83	29	58	68	15	3	19	0
18:00	95	75	25	65	3	85	30	60	70	15	3	20	0
Total	**545**	**440**	**145**	**403**	**21**	**501**	**173**	**390**	**425**	**106**	**21**	**138**	**0**

Justification 5: Collision Experience

Preceding Months	Number of Collisions*
1-12	0
13-24	0
25-36	0

* Include only collisions that are susceptable to correction through the installation of traffic signal control

Justification 6: Pedestrian Volume

a.- Please fill in table below summarizing total pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Factored 8 hour pedestrian volume	0		0		0		0		
% Assigned to crossing rate	23%		34%		30%		100%		
Net 8 Hour Pedestrian Volume at Crossing									0
Net 8 Hour Vehicular Volume on Street Being Crossed									2,000

b.- Please fill in table below summarizing delay to pedestrians crossing major roadway at the intersection or in proximity to the intersection (zones). Please reference Section 4.8 of the Manual for further explanation and graphical representation.

	Zone 1		Zone 2		Zone 3 (if needed)		Zone 4 (if needed)		Total
	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	Assisted	Unassisted	
Total 8 hour pedestrian volume	0	0	0	0	0	0	0	0	
Total 8 hour pedestrians delayed greater than 10 seconds	0	0	0	0	0	0	0	0	
Factored volume of total pedestrians	0		0		0		0		
Factored volume of delayed pedestrians	0		0		0		0		
% Assigned to Crossing Rate	23%		34%		30%		100%		
Net 8 Hour Volume of Total Pedestrians									0
Net 8 Hour Volume of Delayed Pedestrians									0

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Silvercreek Parkway at South Access

Count Date: 2031 Total Traffic

Justification 1: Minimum Vehicle Volumes

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☑	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	12:30	13:30	16:00	17:00	18:00		
1A	480	720	600	900	348	302	334	374	397	476	531	546		
	COMPLIANCE %				48	42	46	52	55	66	74	76	459	57
1B	120	170	120	170	153	106	117	131	139	167	186	191		
	COMPLIANCE %				90	62	69	77	82	98	100	100	678	85

Restricted Flow Signal Justification 1:			
Both 1A and 1B 100% Fullfilled each of 8 hours	Yes ☐	No ☑
Lesser of 1A or 1B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 2: Delay to Cross Traffic

Restricted Flow Urban Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW ☐	RESTR. FLOW ☑	FREE FLOW ☐	RESTR. FLOW ☐	7:00	8:00	9:00	12:30	13:30	16:00	17:00	18:00		
2A	480	720	600	900	195	196	217	243	258	309	345	355		
	COMPLIANCE %				27	27	30	34	36	43	48	49	294	37
2B	50	75	50	75	79	46	51	57	60	73	81	83		
	COMPLIANCE %				100	61	68	76	80	97	100	100	683	85

Restricted Flow Signal Justification 2:		
Both 2A and 2B 100% Fullfilled each of 8 hours	Yes ☐	No ☑
Lesser of 2A or 2B at least 80% fulfilled each of 8 hours	Yes ☐	No ☑

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimun Vehicular Volume	YES ☐	NO ☑	YES ☐	NO ☑
Justification 2	Delay Cross Traffic	YES ☐	NO ☑		NOT JUSTIFIED

Justification 4: Four Hour Volume

Justification	Time Period	Total Volume of Both Approaches (Main) X	Heaviest Minor Approach Y (actual)	Required Value Y (warrant threshold)	Average % Compliance	Overall % Compliance
Justification 4	13:30	265	118	379	31 %	42 %
	16:00	318	142	350	41 %	
	17:00	355	159	331	48 %	
	18:00	365	163	326	50 %	

Analysis Sheet

Input Sheet | Results Sheet | Proposed Collision

GO TO Justification:

Intersection: Silvercreek Parkway at South Access

Count Date: 2031 Total Traffic

Justification 5: Collision Experience

Justification	Preceding Months	% Fulfillment	Overall % Compliance
Justification 5	1-12	0 %	0 %
	13-24	0 %	
	25-36	0 %	

Justification 6: Pedestrian Volume

Pedestrian Volume Analysis

8 Hour Vehicular Volume V_8		Net 8 Hour Pedestrian Volume				
		< 200	200 - 275	276 - 475	476 - 1000	>1000
Justification 6A	< 1440					
	1440 - 2600	Not Justified				
	2601 - 7000					
	> 7000					

Pedestrian Delay Analysis

Net Total 8 Hour Volume of Total Pedestrians		Net Total 8 Hour Volume of Delayed Pedestrians		
		< 75	75 - 130	> 130
Justification 6B	< 200	Not Justified		
	200 - 300			
	> 300			

Results Sheet

Input Sheet | Analysis Sheet | Proposed Collision

GO TO Justification:

Intersection: Silvercreek Parkway at South Access

Count Date: 2031 Total Traffic

Summary Results

Justification			Compliance	Signal Justified? YES	Signal Justified? NO
1. Minimum Vehicular Volume	A	Total Volume	57 %	☐	☑
	B	Crossing Volume	85 %		
2. Delay to Cross Traffic	A	Main Road	37 %	☐	☑
	B	Crossing Road	85 %		
3. Combination	A	Justificaton 1	57 %	☐	☑
	B	Justification 2	37 %		
4. 4-Hr Volume			42 %	☐	☑
5. Collision Experience			0 %	☐	☑
6. Pedestrians	A	Volume	Justification not met	☐	☑
	B	Delay	Justification not met		

APPENDIX D:
Grade Separation Memo

BA Consulting Group Ltd.
300 – 45 St. Clair Ave. W
Toronto ON M4V 1K9
TEL 416 961 7110
EMAIL bagroup@bagroup.com

Memorandum

TO:
Carlo Stefanutti
Senior Vice President
Fieldgate Developments
5400 Yonge Street, 5th Floor
Toronto, ON M2N 5R5

FROM:
Steven Kwan
Luke Richardson

PROJECT:
6087-13
Silvercreek Junction

DATE:
October 9, 2020

SUBJECT: REVIEW OF GRADE SEPARATION ASSESSMENT CRITERIA

1.0 INTRODUCTION

This memo has been prepared to review of the projected traffic and train activity at the Metrolinx Guelph Subdivision, Kitchener Line rail crossing across Silvercreek Parkway South, located at the north end of the Site, against the *Grade Separation Assessment Guidelines* prepared by Transport Canada, based on the proposal for the development of the Site.

In undertaking this assessment, reference has been made to a number of previously prepared documents, including:

- *Traffic Impact Study* prepared by BA Group for the proposal, dated October, 2020 (herein referred to as the 2020 BA report);
- *Silvercreek Parkway Class Environmental Assessment Study* prepared by Delcan, dated June, 2012 (herein referred to as the 2012 Silvercreek EA); and
- *Noise and Vibration Feasibility Study* prepared by HGC Engineering, dated November 22, 2019 (herein referred to as the 2019 HGC report).

2.0 GRADE SEPARATION ASSESSMENT GUIDELINES

The *Grade Separation Assessment Guidelines* prepared by Transport Canada provide guidelines to help railway companies and road authorities assess when to consider grade crossings for grade separation or otherwise eliminate them, thereby removing a road/rail conflict zone. The Guidelines outline a number of qualitative criteria thresholds for grade separation candidates and are attached for reference. The criteria are outlined in **Table 1** and applied to the current and previous 2012 proposals in **Table 2.**

Given that the existing crossing is currently closed, existing data associated with queueing and delays cannot be collected, and as such, these criteria are not applicable. Additionally, there is insufficient detail with respect to the specific hours in which future trains would use the crossing which would allow the calculation of queuing, vehicle delay, and level of service.

TABLE 1 GRADE SEPARATION QUALITATIVE CRITERIA

Criteria	Threshold
Traffic Volume	AADT exceeds 100,000
Train Volume	Average of 150 or more trains per day
Vehicle Speed	Posted/Unposted highway speed equals or exceeds 90 km/h
Cross Product[2] / Exposure Index	Cross product exceeds 1 million
Queuing	Existing crossings where there are known queuing issues and an entranceway or intersection is within 30 m of the nearest rail of the proposed crossing
Maximum train speed	Train speeds exceed 177 km/h (100 mph)
Vehicle Delay	Exceeds 40 vehicle hours per day
Level of Service	If the highway/roadway facility is performing at a level of service below its intended minimum design level 10 percent or more of the time.

Notes:
1. Source: *Grade Separation Assessment Guidelines* prepared by Transport Canada
2. A product of the average number of trains per day multiplied by the AADT at a grade crossing.

TABLE 2 GRADE SEPARATION QUALITATIVE ASSESSMENT

Criteria	Projected	Met/Not Met
Traffic Volume[1]	3,700	Not Met
Train Volume[2]	34	Not Met
Vehicle Speed[3]	60 km/h	Not Met
Cross Product[4] / Exposure Index	125,800	Not Met
Queuing	--[5]	--
Maximum train speed[2]	113 km/h	Not Met
Vehicle Delay	--[5]	--
Level of Service	--[5]	--

Notes:
1. AADT assumed to equivalent to daily traffic volume. Daily traffic volume assumed to be 10 times the two-way PM peak hour traffic volume as identified in the 2020 BA report
2. Projected rail traffic data as outlined in 2019 HGC report. No additional data available from Metrolinx at time of writing.
3. Design speed used in the 2012 Silvercreek EA
4. AADT x train volume
5. Value cannot be calculated as future train forecasts are not sufficiently detailed with respect to specific hour of crossing.

3.0 RESULTS SUMMARY

Based on the foregoing and the proposal for the Site, the crossing does not meet the criteria for grade separation as outlined by Transport Canada.

While there is no mandated cross product or exposure index level at which grade separation is required, many agencies consider a cross product of 200,000 as indicative of when grade separation should start to be considered.

Moreover, with the proposal expected to generate approximately half the traffic of the previous 2012 proposal, this substantially changes the character of this crossing. The traffic volumes become more typical of a busy local road as opposed to a busy collector road.

For context, the *Grade Crossings Standards* prepared by Transport Canada (dated January 1, 2019), specifies cross product thresholds for other rail crossing treatments as follows:

- A warning system without gates is required where the forecast cross product is 2,000 or more; and
- A public grade crossing at which a warning system with gates is required where the forecast cross product is 50,000 or more.

It is notable that none of the individual criteria are met and on a relative percentage basis, are not proximate to the criteria thresholds as summarized in **Table 3**.

TABLE 3 RELATIVE ACHIEVEMENT OF GRADE SEPARATION CRITERIA

Criteria	Threshold	Projected	% Achieved
Traffic Volume[1]	100,000	3,700	3.7%
Train Volume[2]	150	34	22.7%
Vehicle Speed[3]	90 km/h	60 km/h	66.7%
Cross Product[4] / Exposure Index	1,000,000 200,000	125,800	12.6% 62.9%
Maximum train speed[2]	177 km/h	113 km/h	63.8%

Notes:
1. AADT assumed to equivalent to daily traffic volume. Daily traffic volume assumed to be 10 times the two-way PM peak hour traffic volume as identified in the 2020 BA report.
2. Projected rail traffic data as outlined in 2019 HGC report
3. Design speed used in the 2012 Silvercreek EA
4. AADT x train volume

Based on the foregoing analysis, it is concluded that based on the proposal for the Site, a grade separation crossing is not warranted

GRADE SEPARATION ASSESSMENT GUIDELINES

These guidelines help railway companies and road authorities assess when to consider grade crossings for grade separation, or otherwise eliminate them, thereby removing a road/rail conflict zone.

About these guidelines

These guidelines respond to the 2015 Transportation Safety Board (TSB) Recommendation R15-04, made after the fatal collision between an OC Transpo bus and a VIA Rail passenger train at an at-grade railway crossing in Ottawa, Ontario, on September 18, 2013. This recommendation specifies that “The Department of Transport provide specific guidance as to when grade separation should be considered.”

In February 2018, Transport Canada funded a literature review on grade separation approaches, done at the University of Manitoba. To obtain a copy of the final report of this study, "Review of Research and Practice on the Implementation of Grade Separation," please contact the Rail Safety Directorate at railsafety@tc.gc.ca

What to consider in assessing grade crossings for grade separation

Where possible, you should not assess a crossing in isolation. Rather, consider it in the context of the rail corridor in which it and adjacent crossings are located.

As well, these guidelines do not preclude further evaluation of a location. A site-specific study and feasibility analysis are essential to establish whether or not a grade separation is possible.

The table below lists:

- criteria with thresholds
- additional criteria with no established thresholds, which you may consider as part of a more detailed analysis
    - These criteria do not have thresholds because the range, or manner in which they are treated or quantified, may vary significantly from one location to another

Table 1.0: Criteria to consider in assessing grade crossings for grade separation

Criteria		***Value or threshold for grade separation candidates***
Criteria (with threshold)	***Traffic and Safety-related criteria***	
	Traffic volume	AADT* exceeds 100,000
	Train volume	Average of 150 or more trains per day*

	Vehicle speed	Posted/Unposted highway speed equals or exceeds 90 km/h.
	Cross product	Cross product exceeds 1 million*
	Queuing	Existing crossings where there are known queuing issues and an entranceway or intersection is within 30m of the nearest rail of the crossing. **Note**: New grade crossings are not permitted where the train speed is more than 25km/h, and there is an entranceway or intersection within 30m of the nearest rail of the proposed crossing.
	Maximum train speed	Train speed exceeds 177 km/h (110 mph).
	Vehicle delay	Exceeds 40 vehicle hours per day.
	Level of service	If the highway/roadway facility is performing at a level of service below its intended minimum design level 10 percent or more of the time.
Other criteria for consideration in identifying locations for further assessment		
Criteria (without threshold)	• **Collision history or predicted collisions** • **Blocked crossing issues** • **Number of highway/roadway lanes** • **Number of railway tracks** • **Type of railway traffic (i.e. passenger, dangerous goods)** • **Highway functional classification** • **Road surface type** • **Environmental impacts** • **Air quality / emissions** • **Noise disruptions in community**	• **Type of roadway traffic (pedestrians and cyclists, vulnerable road users, emergency services, school buses, dangerous goods)** • **Various adaptations of 'cross product' (i.e. consideration of the number of occupants such as passenger rail, bus or transit)** • **Development, community and social impacts (quality of life, community cohesion, aesthetics, business disruption)** • **Feasibility and constructability** • **Other (secondary) network impacts** • **General physical conditions** • **Land use**

**For further information on measuring these values, please consult the Institute of Transportation Engineers (ITE), Transportation Association of Canada (TAC) and other relevant manuals or guidance material relevant within your jurisdiction.*

Note: It may be appropriate to consider a combination of criteria when assessing a crossing for grade separation.

Terms to know

Annual average daily traffic (AADT): The average daily vehicular traffic volume for a given year at a site.

Cross product: A product of the average number of trains per day multiplied by the AADT at a grade crossing.

Highway functional classification: The category of highway that defines the role it plays in serving traffic flow through a road network.

Level of service (LOS): A qualitative measure used to relate the quality of vehicular traffic service. Used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measures like vehicle speed, density and congestion. Defined in terms of volume-capacity (V/C) to quantify the average operational condition of the grade crossing during the peak hour.

Queuing: The study of traffic behavior in a segment of a roadway, where demand exceeds available capacity. In the context of grade crossings, where nearby entrances or intersections are close to the crossing, vehicular traffic on the road approach may extend across a railway crossing or into the track area.

Vehicle delay: The time lost by a vehicle due to traffic-related causes beyond the control of the driver.

Vulnerable road users: According to the *Ontario Highway Traffic Act*, vulnerable road users include:

- pedestrians
- people on a bicycle or a motor-assisted bicycle
- people in a wheelchair or other mobility device
- roadway workers
- emergency responders outside their motor vehicle

They are vulnerable due to lack of protection they have from traffic.

APPENDIX E:
Sight Distance Figures and Functional Design

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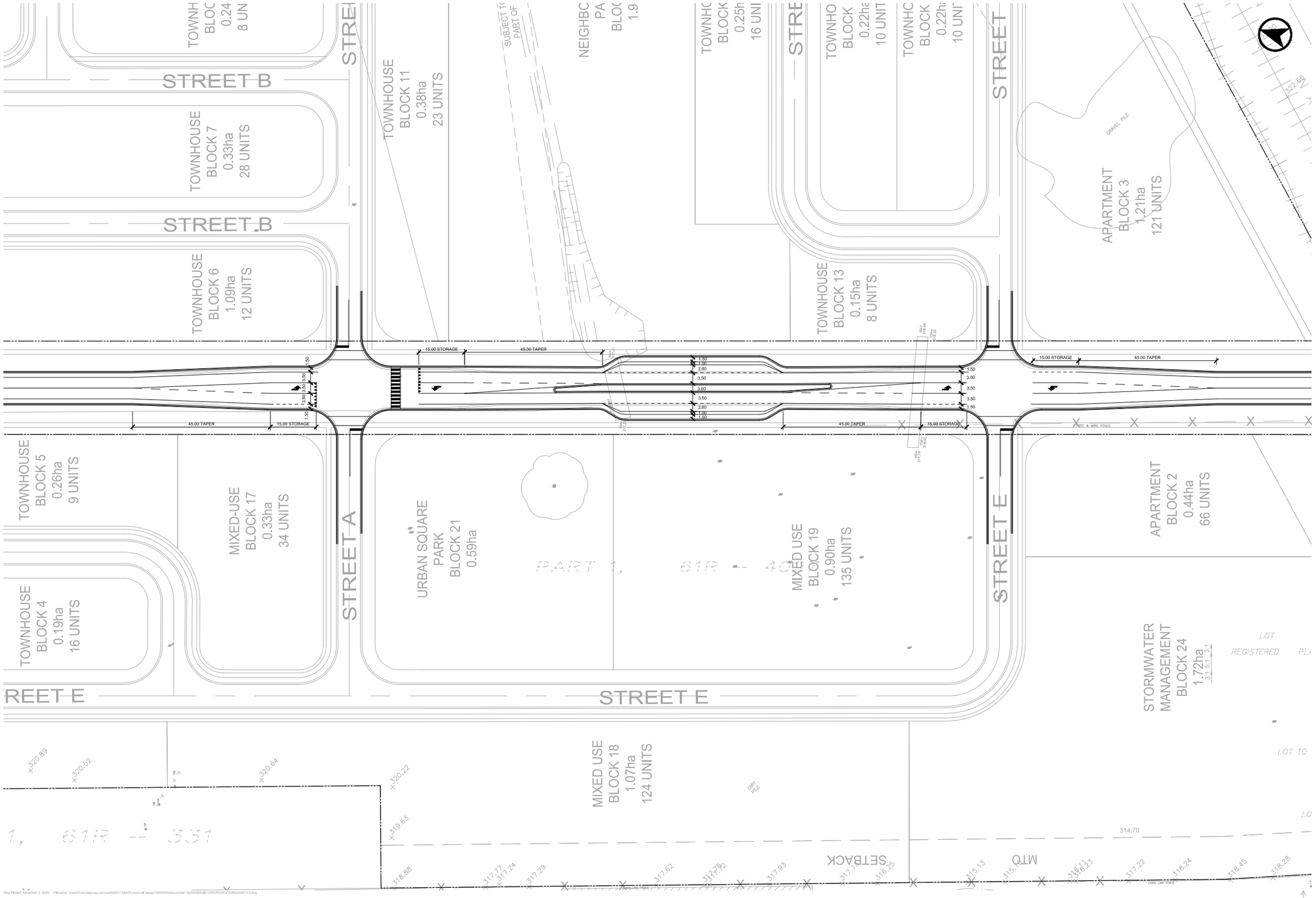
300 – 45 St. Clair Ave. W
Toronto ON M4V 1K9
TEL 416 961 7110
EMAIL bagroup@bagroup.com



03	11-03-20	MSB	ISSUED FOR SUBMISSION
02	10-07-20	MSB	ISSUED FOR TEAM REVIEW
01	09-24-20	MSB	ISSUED FOR TEAM REVIEW
00	08-07-20	MSB	ISSUED FOR TEAM REVIEW

BA Group
BA Consulting Group Ltd.
350-45 St. Clair Ave. W.,
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email. bagroup@bagroup.com
MOVEMENT IN URBAN ENVIRONMENTS
BAGROUP.COM

SILVERCREEK

FUNCTIONAL PLAN

PROPOSED SILVERCREEK PARKWAY SOUTH ROAD MODIFICATION - OPTION 2

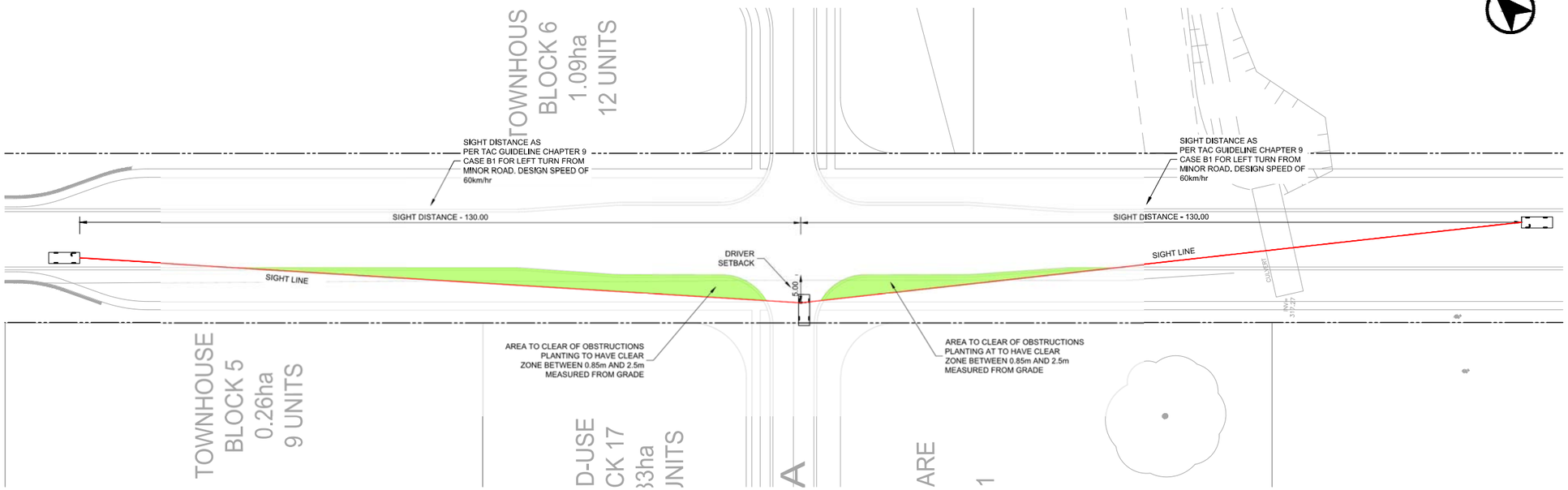
Date: AUGUST 7, 2020

Project No.: 6087-13

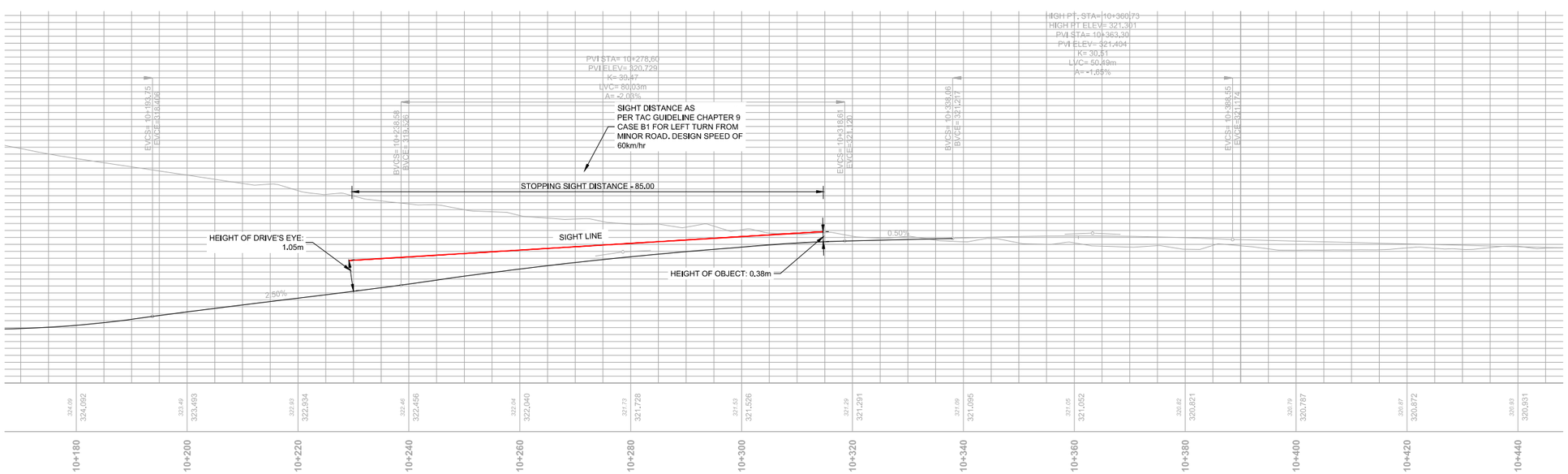
Scale: 1:500 (0, 5, 10, 15, 20m)

FD02

HORIZONTAL SIGHT DISTANCE



VERITCAL SIGHT DISTANCE



01	11-03-20	MSB	ISSUED FOR SUBMISSION
00	07-23-20	MSB	DRAFT ISSUED FOR TEAM REVIEW

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SILVERCREEK

SIGHT DISTANCE REVIEW

STREET 'A/C'

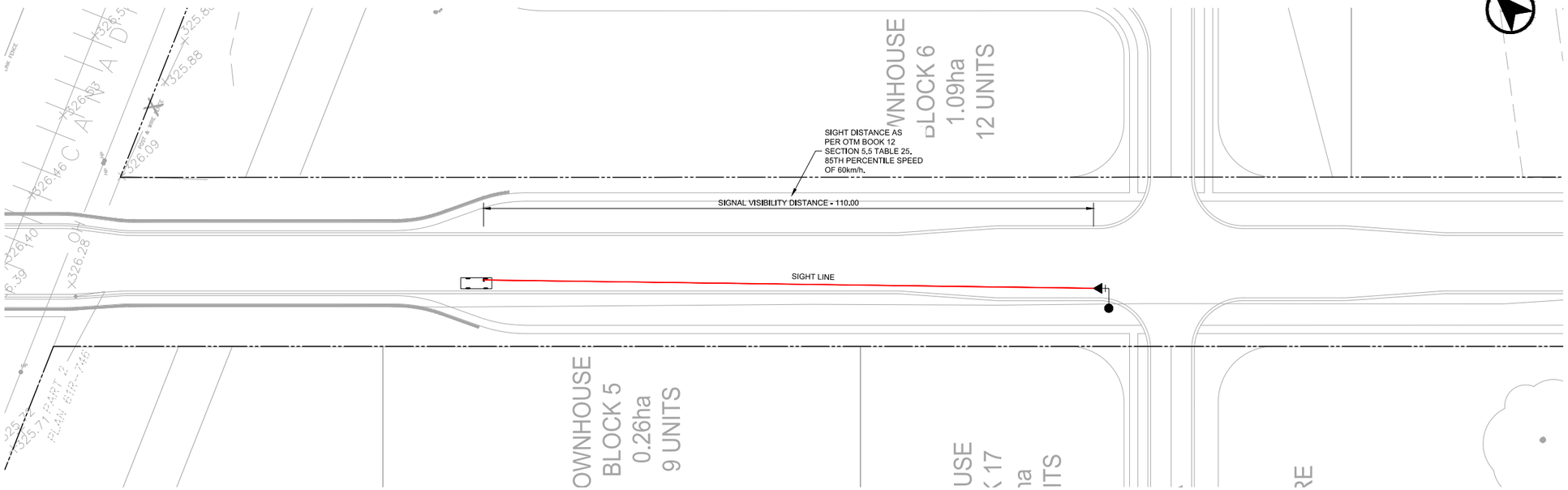
Date: JULY 23, 2020

Project No.: 6087-13

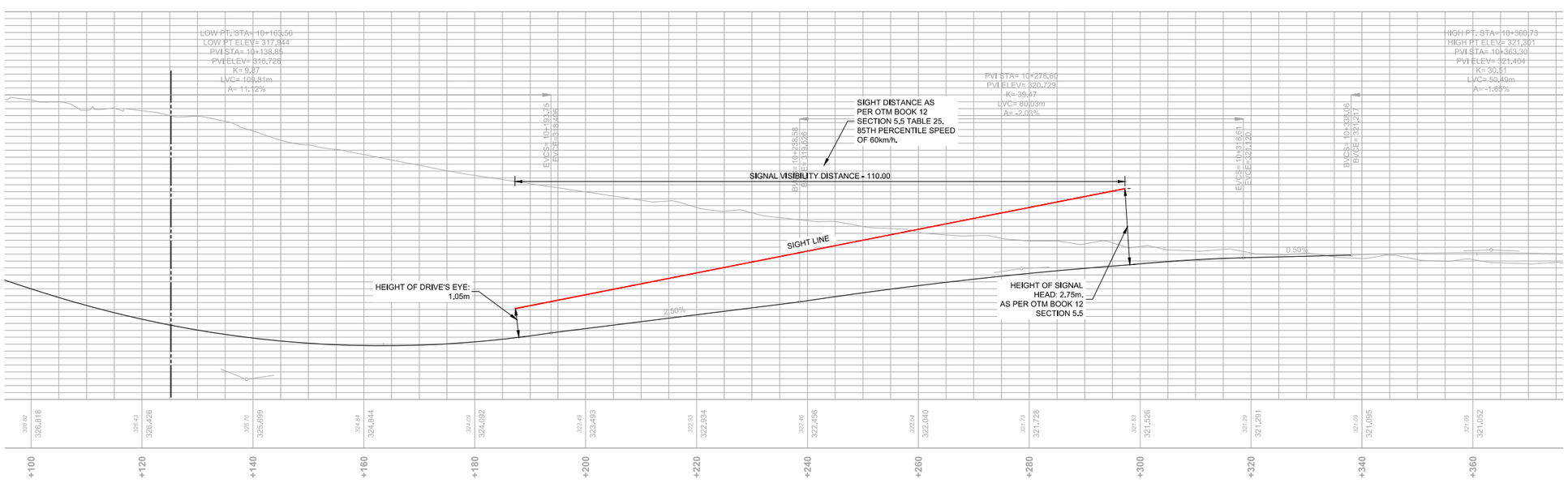
Scale: 1:400 (0 2 4 6 8 10 20m)

SD01

HORIZONTAL SIGHT DISTANCE



VERITCAL SIGHT DISTANCE



01	11-03-20	MSB	ISSUED FOR SUBMISSION
00	10-07-20	MSB	DRAFT ISSUED FOR TEAM REVIEW

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SILVERCREEK

SIGHT DISTANCE REVIEW

STREET 'A/C' - TRAFFIC SIGNAL VISIBILITY

Date: JULY 23, 2020

Project No.: 6087-13

Scale: 1:400 (0 2 4 6 8 10 20m)

SD02