

FERGUS GOLF CLUB PROPOSED RESIDENTIAL RE-DEVELOPMENT

URBAN TRANSPORTATION CONSIDERATIONS

Zoning By-Law Amendment, Official Plan Amendment, Plan of Subdivision and Plan of Condominium

Township of Centre Wellington, Wellington County

Prepared For: 883890 Ontario Limited c/o Fergus Development Inc.

February 2022



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1.0 INTRODUCTION

BA Group has been retained by 883890 Ontario Limited c/o Fergus Development Inc. to provide transportation consulting services related to a proposed residential re-development on a site municipally known as 8243 & 8282 Wellington Road 19, in the Township of Centre Wellington, in the County of Wellington. The existing golf course (the "Site") consists of two parcels; the northwest parcel ("NW Site"), situated on the north side of Wellington Road 19, and the southeast parcel ("SE Site"), situated on the south side of Wellington Road 19. The Site is surrounded by agricultural land to the north and west of the NW Site, and south of the SE Site. Third Line is adjacent to the east side of the Site and an existing residential dwelling exists on the west side of the SE Site. The Site location is illustrated in **Figure 1** and the Site context is in **Figure 2**.

This Transportation Considerations Report has been prepared as part of the **Zoning By-Law Amendment**, **Official Plan Amendment**, **Draft Plan of Subdivision and Draft Plan of Condominium** being submitted to the Township of Centre Wellington, County of Wellington and GRCA.

1.1 EXISTING SITE CONTEXT

In 2010, the Fairview and Lake Belwood Golf Clubs were merged to form the Fergus Golf Club. Fairview, which was built in 1977, referred to as the SE Site, is 39.85ha and includes a 9-hole golf course. Lake Belwood (the NW Site) was constructed in 2000, is 42.35ha and includes a total of 18 holes. The total Site area is 82.20ha, and the proposed residential redevelopment will be located on the SE Site, while the communal water and wastewater services are integrated into the existing Golf Course, which will remain, on the NW Site.

1.2 PROPOSED DEVELOPMENT

The proposed development includes the construction of 118 single detached residential dwellings. The development statistics for the proposed development are summarized in **Table 1**. The proposed development is illustrated in **Figure 3** and reduced scale architectural plans are provided in **Appendix A**.

The proposed Site circulation and access includes a network of internal private roads (12 metre right-of-ways) with two full accesses along Wellington Road 19 and two full accesses along 3 Line. All access points to Wellington Road 19 and 3 Line will be unsignalized with stop control on the minor streets only. The proposed internal private road cross-section is provided in **Appendix B**. A new access for the NW Site is also proposed to align with the proposed north access to the SE Site on Wellington Road 19.



TABLE 1 DEVELOPMENT PROPOSAL

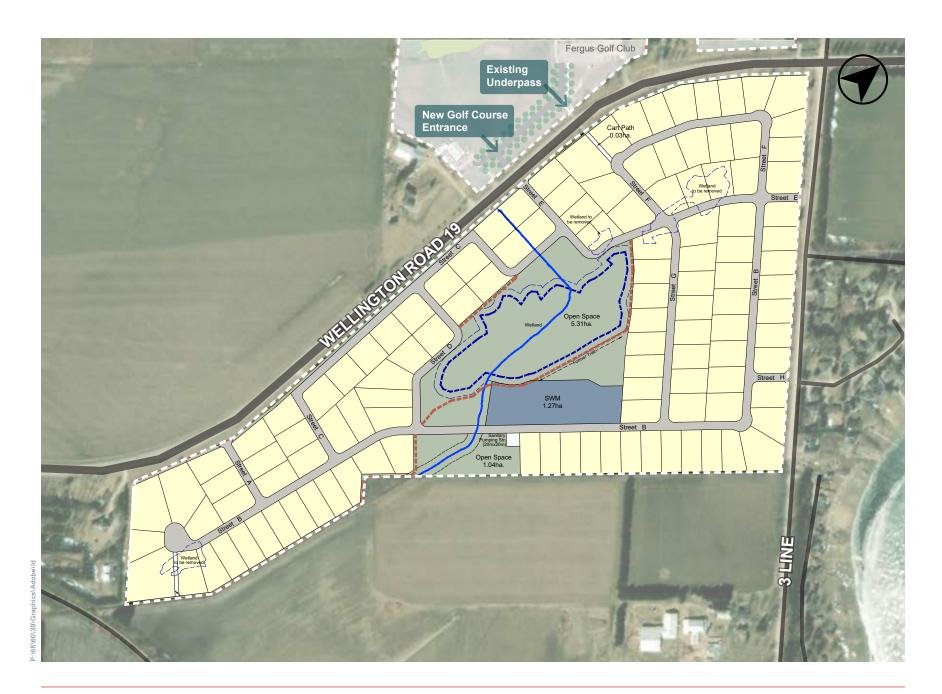
	Land Use	Proposed Statistics			
	Single Detached Residential Dwellings	118 units			
A	Site Access & Circulation	 2 full accesses along Wellington Road 19 and 2 full accesses along 3 Line. An internal network of private roads with 12 metre right-of-ways. 			

Notes: Site statistics based on site plans prepared by GSP Group dated December 10, 2021.



FIGURE 1 SITE LOCATION





1.3 STUDY SCOPE

Development Concept Plan

- A summary of the proposed development concept plan.
- An overview of the Site and the area-wide transportation system.
- A review of the transportation elements of the proposed development plan that includes access and circulation.

Transportation Context

- A description of the existing transportation context with consideration for the area road network, transit system and active transportation facilities.
- A description of future transportation changes and/or improvements to the area context such as planned road upgrades and active transportation improvements.

Site Plan

A review of the functionality and appropriateness of the proposed internal private road network.

Traffic Operations Review

- An assessment of the existing traffic patterns and traffic volumes in the study area during the key weekday morning and afternoon peak hours.
- A comprehensive review of traffic-related changes that may occur in the area with consideration for corridor growth and construction of other area development projects.
- A review of traffic operations at intersections in the area under existing and future conditions including an assessment of the operational impacts of the proposed development.
- An assessment of the need for traffic signals at the access points on Wellington Road 19.

Site Access Review

- A review of the proposed accesses at Wellington Road 19 and the proposed accesses at 3 Line.
- Confirmation of the proposed traffic control at the Site access points.
- Evaluation of the sight distance at the proposed access points.
- Evaluation of the need for left-turn lanes at the access points on Wellington Road 19.

The findings of this review are summarized in the following sections.



2.0 TRANSPORTATION CONTEXT

2.1 AREA ROAD NETWORK

The existing area network of arterial roads, collector roads and local roads are described below and illustrated in **Figure 4.** The existing and future lane configuration and traffic control are shown in **Figure 5** and **Figure 6**, respectively.

Wellington Road 19 is a northeast/southwest Wellington County arterial road that extends from Robinson Road/Tom Street in the southwest to East West Garafraxa Townline in the northeast, connecting the Town of Fergus to the border between Wellington County and Dufferin County. In the vicinity of the Site, Wellington Road 19 has a rural 2-lane cross section with paved shoulders and a defacto speed limit of 80 km/h.

3 Line is a northwest/southeast Wellington County local road that extends from Lake Belwood in the southeast to Wellington County Road 109 in the northwest. 3 Line is paved southeast of Wellington County Road 19 (adjacent to the proposed development) and the speed limit is not posted.

2.2 AREA TRANSIT NETWORK

The Township of Centre Wellington does not currently operate a local public transit system and there are no plans to establish transit service in the vicinity of the Site. The closest public transit systems to the Site are in Guelph (30 km away), Elmira (30 km away) and Orangeville (35 km away). Guelph and Elmira (through bus travel to Waterloo) have multiple GO Transit connections and a VIA Rail station in Kitchener.

2.3 AREA CYCLING NETWORK

Active Transportation Plan (2012)

In 2012, Wellington County, in association with the seven local area municipalities and Wellington-Dufferin-Guelph (WDG) completed an Active Transportation Plan. The plan is a long-term strategy to create a pedestrian and cycling supportive environment that will encourage both utilitarian and recreational travel by walking and cycling, while promoting the importance of active lifestyles for residents and tourists.

Existing cycling facilities near the Site are described below. The Active Transportation Plan includes recommendations for a variety of improvements throughout the County. On Wellington Road 19, there are future plans to extend the paved shoulders east of 3 Line.

Wellington Road 19

In the vicinity of the Site, Wellington Road 19 includes paved shoulders for cyclists.

Elora Cataract Trail

Just south of Wellington Route 19 there is an off-road "spine route" know as the Elora Cataract Trail, a 47 kilometer long trail between Elora and Forks of Credit Provincial Park. The trail is located along the southern edge of the SE Site, and crosses 2 Line, 150 metres southeast of Wellington Road 19.

The existing area cycling facilities are displayed in Figure 7.



2.4 AREA PEDESTRIAN CONTEXT

There is an existing pedestrian tunnel under Wellington Road 19 which provides connectivity between the Site and the Fergus Golf Club (East & West).



FIGURE 4 AREA ROAD NETWORK

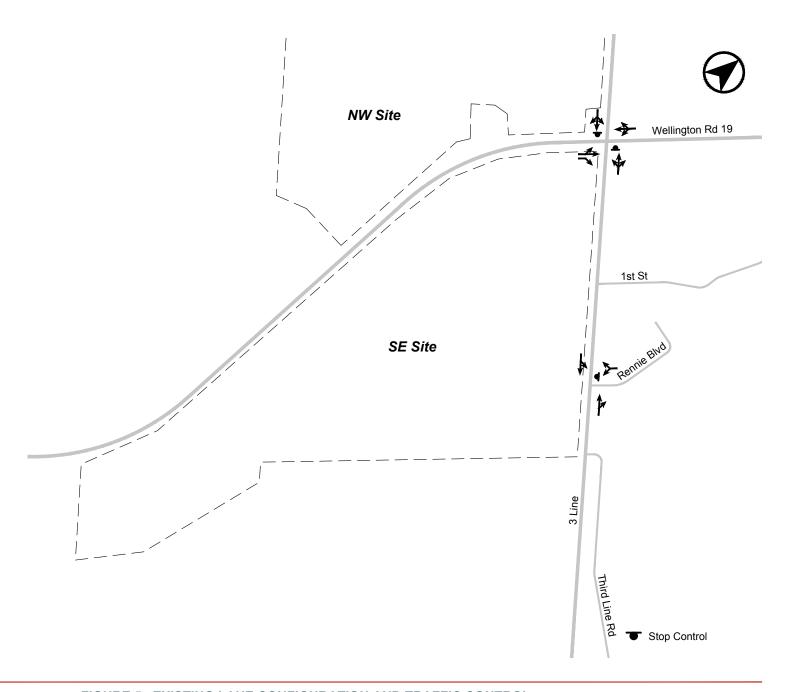


FIGURE 5 EXISTING LANE CONFIGURATION AND TRAFFIC CONTROL

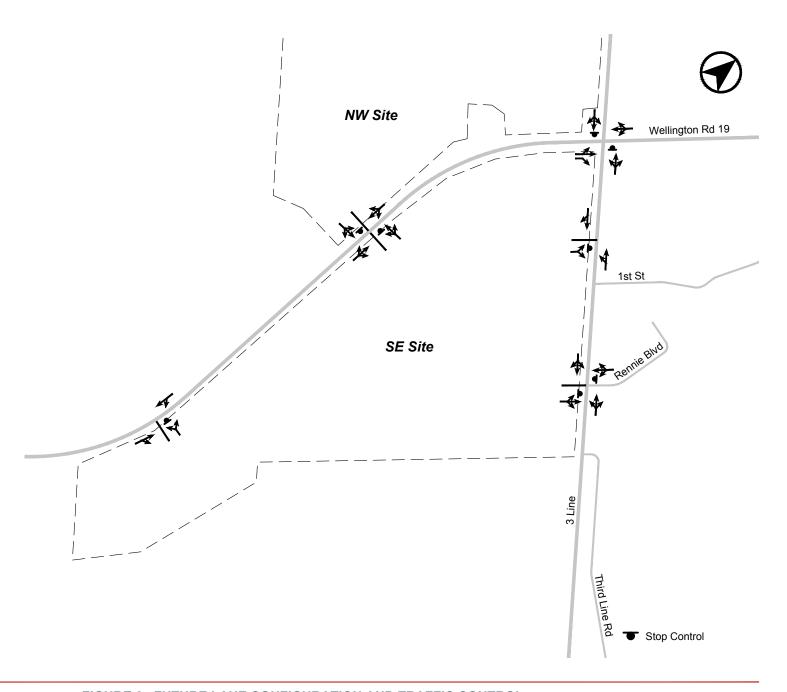


FIGURE 6 FUTURE LANE CONFIGURATION AND TRAFFIC CONTROL



FIGURE 7 EXISTING & FUTURE AREA CYCLING AND PEDESTRIAN NETWORK

3.0 TRAFFIC VOLUME FORECASTING

3.1 EXISTING TRAFFIC VOLUMES

Baseline existing turning movement volumes were established for the intersection of **Wellington Road 19 / 3 Line** based on the most recently available traffic count data, collected by Spectrum Traffic Inc. on behalf of BA Group. Typical weekday morning and afternoon peak hours were not reflected in the traffic counts taken at the intersection, as the heaviest volumes were observed between 3:15 pm and 4:15 pm. Since the proposed residential development is anticipated to generate the heaviest traffic volumes during the commuting peak hours, traffic counts taken between 8:00 am and 9:00 am and between 4:30 pm and 5:30 pm, were adopted for the purpose of the analysis to represent the weekday morning and afternoon peak hours, respectively.

The most recent traffic count information is summarized in **Table 2**. Detailed traffic count data is provided in **Appendix C**.

TABLE 2 EXISTING TRAFFIC COUNT INFORMATION

Intersection	Date of Count	Source		
Wellington Road 19 / 3 Line	Tuesday, March 2, 2021	Spectrum Traffic Inc.		

Existing turning movement volumes were rounded to the nearest 5 vehicles.

Existing traffic volumes for the weekday morning and afternoon peak hours adopted for the analysis are illustrated in **Figure 8**.

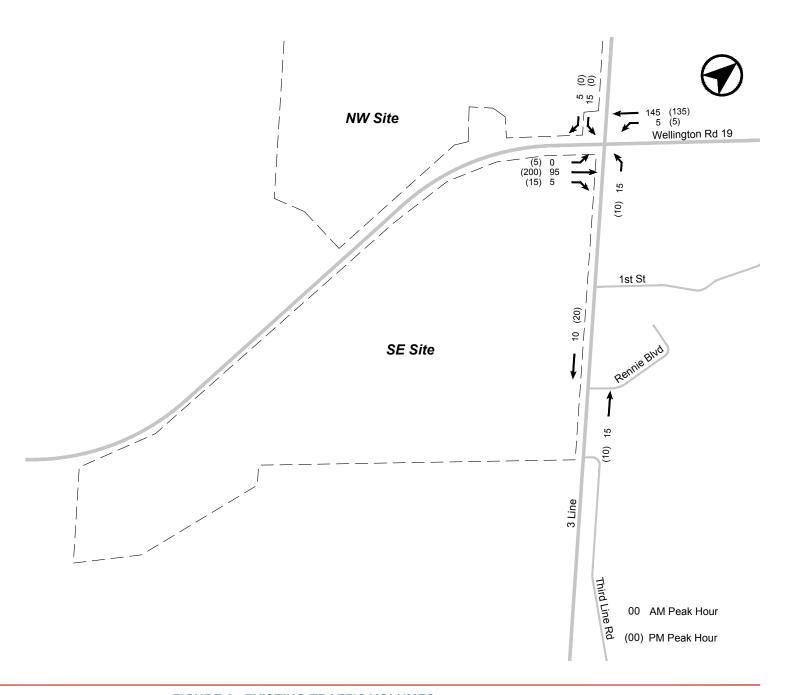


FIGURE 8 EXISTING TRAFFIC VOLUMES

3.2 BACKGROUND TRAFFIC ALLOWANCES

Forecasted background traffic volumes for the 2026 and 2031 horizon years account for changes to traffic conditions in the network over time, due to additional development in the area, and represent the summation of existing traffic volumes and growth along the Wellington Road 19 corridor. Traffic allowances for specific background developments were not included in the analysis, as there are no planned developments in the immediate vicinity of the Site.

3.2.1 General Corridor Growth

In order to conservatively capture development progress outside of the Site vicinity and study area for both horizon years of 2026 (Site build-out) and 2031 (five-years beyond build-out), the a growth rate of 2% per year was applied during the weekday morning and afternoon peak hours.

General corridor growth allowances for both the 2026 and 2031 horizon years are illustrated in **Figure 9** and **Figure 10**, respectively.

3.2.2 Future Background Traffic Volumes

Future background traffic volumes in the 2026 and 2031 horizon years, representing the summation of the existing traffic volumes plus general corridor growth allowances, are illustrated in **Figure 11** and **Figure 12**, respectively.

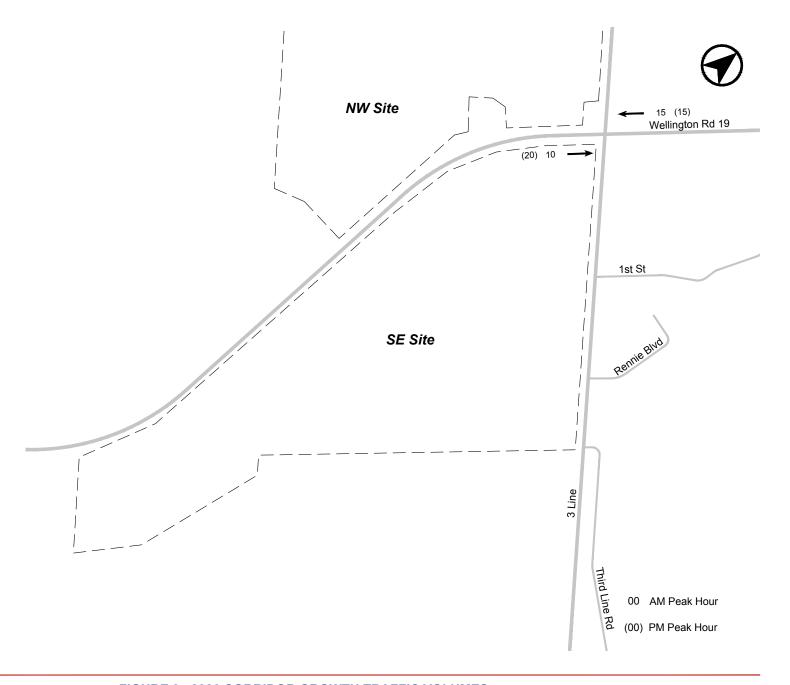


FIGURE 9 2026 CORRIDOR GROWTH TRAFFIC VOLUMES

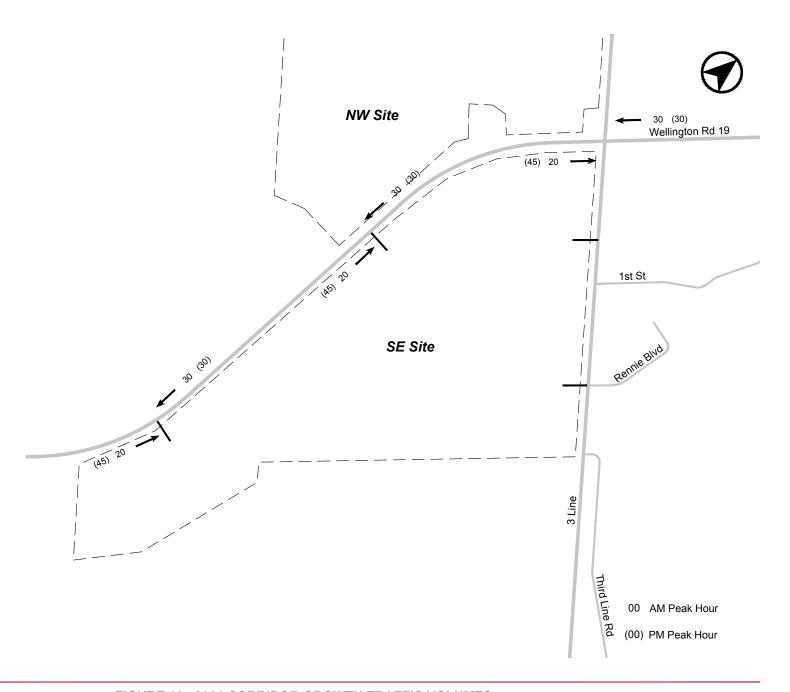


FIGURE 10 2031 CORRIDOR GROWTH TRAFFIC VOLUMES

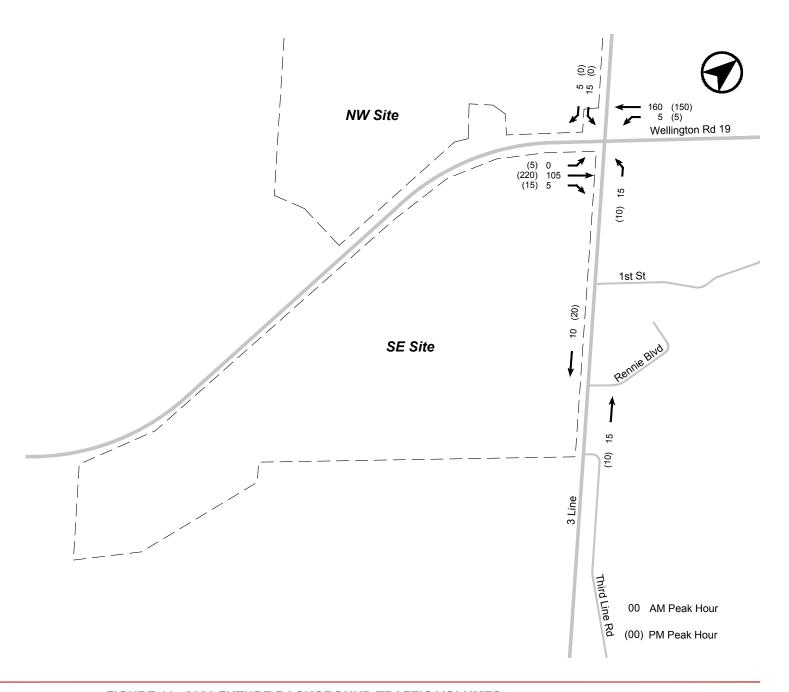


FIGURE 11 2026 FUTURE BACKGROUND TRAFFIC VOLUMES

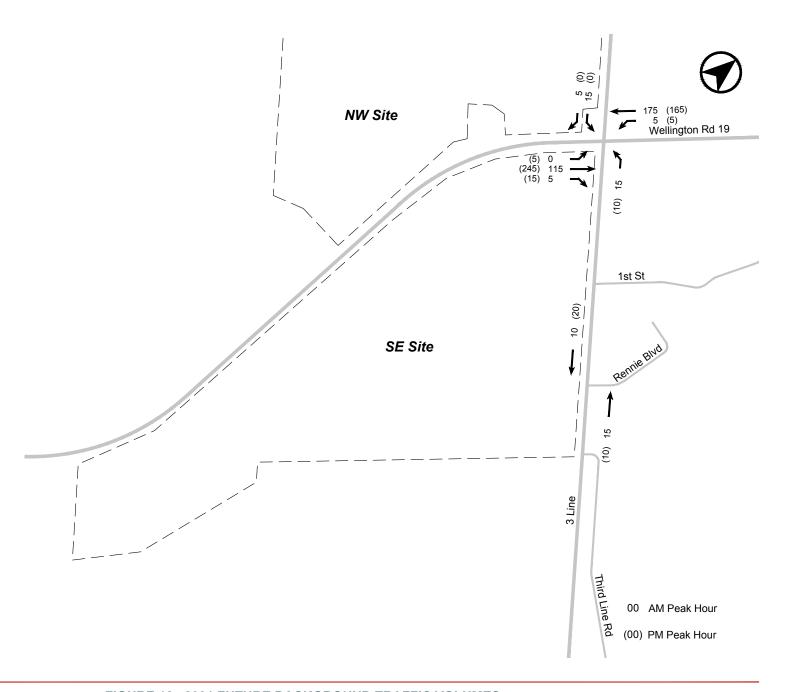


FIGURE 12 2031 FUTURE BACKGROUND TRAFFIC VOLUMES

3.3 SITE TRAFFIC VOLUMES

Residential Trip Generation

The residential trip generation potential of the proposed SE Site is based upon trip behaviour observed within the ITE Trip Generation Manual (10th Edition), Land Use Code (LUC) 210 (Single-Family Detached Housing). The trip rates and resultant trips are summarized in **Table 3**.

The Site anticipates in the order of 90 and 120 two-way residential vehicle trips during the weekday morning and afternoon peak hours, respectively.

TABLE 3 RESIDENTIAL TRIP GENERATION

	Į.	AM Peak Hou	r	PM Peak Hour				
	In	Out	2-Way	In	Out	2-Way		
Directional Distribution	25%	75%	100%	63%	37%	100%		
Residential Trip Rate (118 single-family detached housing)	0.19	0.56	0.74	0.62	0.37	0.99		
Residential Site Trips	25	65	90	75	45	120		

Notes:

Golf Course Trip Generation

The trip generation potential of the golf course on the NW Site is based upon trip behaviour observed within the ITE Trip Generation Manual (11th Edition), Land Use Code (LUC) 430 (Golf Course). The trip rates and resultant trips are summarized in **Table 3**.

The Site anticipates in the order of 35 and 55 two-way residential vehicle trips during the weekday morning and afternoon peak hours, respectively.

Table 4 Golf Course Trip Generation

	,	AM Peak Hou	r	PM Peak Hour			
	In	Out	2-Way	In	Out	2-Way	
Directional Distribution	79%	21%	100%	53%	47%	100%	
Trip Rate (vehicles/hole)	1.39	0.37	1.76	1.54	1.37	2.91	
Golf Course Site Trips (18 holes)	25	10	35	30	25	55	

Notes:

Since no information regarding existing traffic associated with the golf course on the NW Site was available, a conservative approach was adopted, wherein the trips summarized in the table above were added to the network to account for the new golf course entrance, and no traffic was removed.



^{1.} Site trips are rounded to the nearest 5 vehicles.

^{1.} Site trips are rounded to the nearest 5 vehicles.

Trip Distribution

The new trips for the Site in the weekday morning and afternoon peak hours were assigned to the study area road network based on the observed travel patterns at the intersection of **Wellington Road 19 / 3 Line.**

The Site traffic distribution is summarized in **Table 5**. Site traffic volumes on the area road network are illustrated in **Figure 13**.

TABLE 5 SITE TRAFFIC DISTRIBUTION

To / From Site	Corridor	Inbo	ound	Outbound		
10 / Floin Site	Corridor	AM	PM	АМ	РМ	
North	3 Line	5%	0%	0%	0%	
South	3 Line	5%	5%	5%	5%	
East	Wellington Road 19	50%	40%	40%	55%	
West	Wellington Road 19	40%	55%	55%	40%	
Total	•	10	0%	100%		

3.4 FUTURE TOTAL TRAFFIC VOLUMES

Future total traffic volumes in the 2026 and 2031 horizon years reflect the sum of future background traffic volumes in the respective horizons with total SE and NW Site traffic volumes, and are summarized in **Figure 14** and **Figure 15**, respectively.

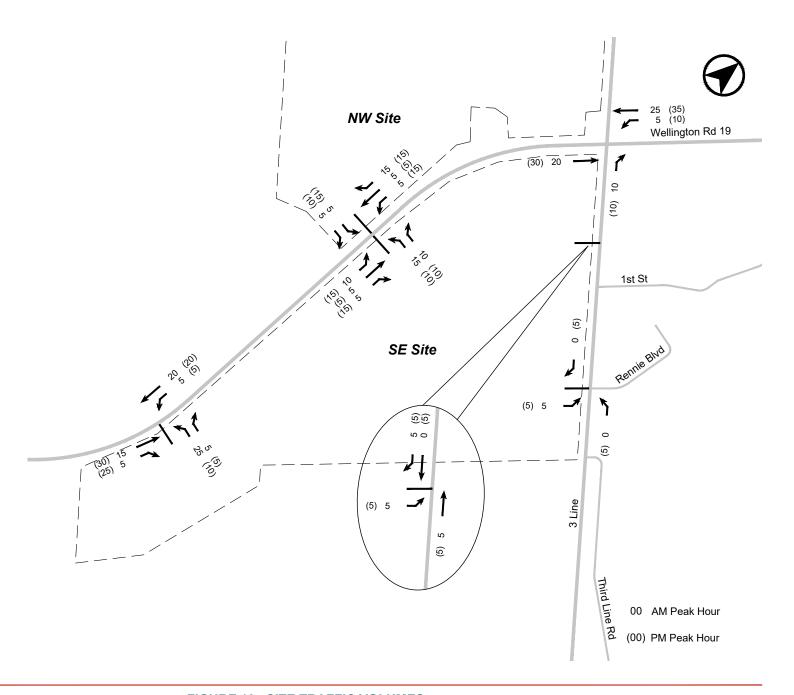


FIGURE 13 SITE TRAFFIC VOLUMES

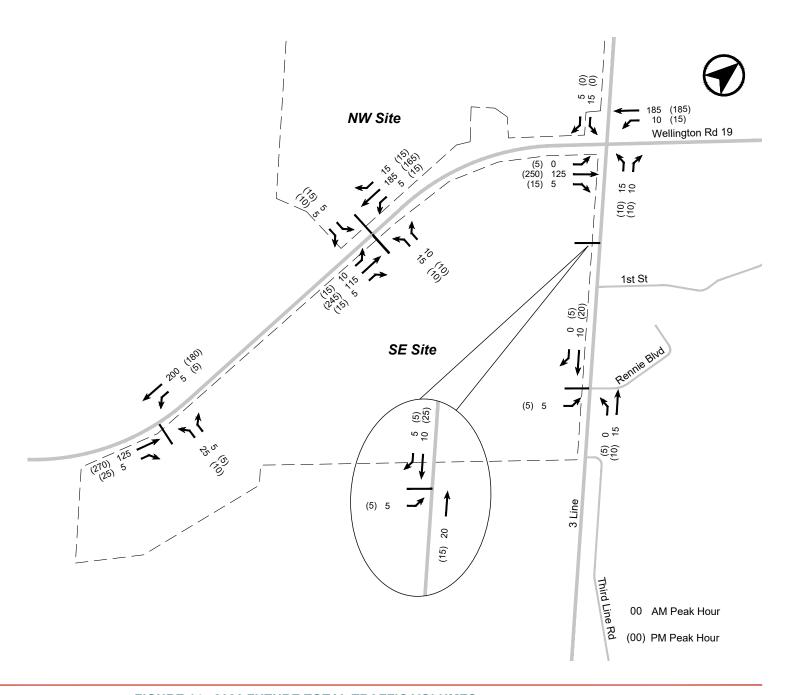


FIGURE 14 2026 FUTURE TOTAL TRAFFIC VOLUMES

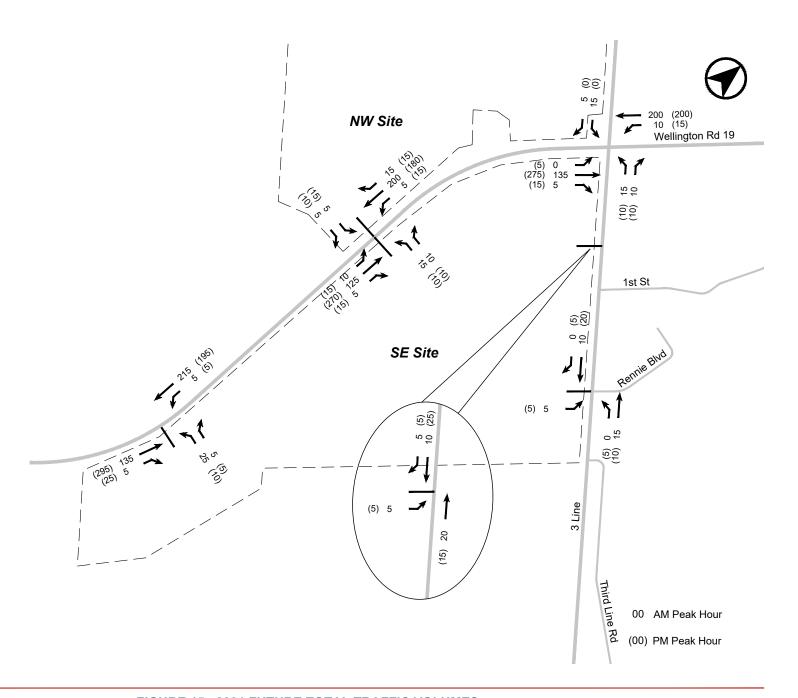


FIGURE 15 2031 FUTURE TOTAL TRAFFIC VOLUMES

4.0 TRAFFIC OPERATIONS ANALYSIS

4.1 TRAFFIC OPERATIONS SCENARIOS

A traffic operations analysis was completed for the following scenarios:

- Existing traffic conditions;
- Future background traffic conditions (2026 horizon year);
- Future total traffic conditions (2026 horizon year with full build-out);
- Future background traffic conditions (2031 horizon year at 5 years post build-out); and
- Future total traffic conditions (2031 horizon year at 5 years post build-out).

4.2 ANALYSIS METHODOLOGY

The intersection capacity analysis was completed using Synchro Version 11 and the Highway Capacity Manual (HCM 2000) methodology. For unsignalized intersections, including all intersections in the study area, level of service (LOS) characterizes operational conditions for key movements in terms of delay within the traffic stream¹. LOS A represents a good level of service with short delays. LOS E and F represent longer delays.

4.3 INPUT AND CALIBRATION PARAMETERS

Key parameters adopted in the analysis include:

Lane Configurations

Lane configurations are based on existing configurations at the intersection of **Wellington Road 19 / 3 Line**. For all Site accesses, there is assumed to be one lane in each direction of travel to and from the intersection.

Heavy Vehicle Percentages

Heavy vehicle percentages were derived from existing turning movement counts. Where the intersection is not existing, as is the case with the Site accesses, the Synchro default of 2% is assumed for all movements.

Pedestrian and Cycling Volumes

Volumes of pedestrians and cyclists were derived from existing turning movement counts.

Synchro defaults have been adopted for all other parameters.



¹ HCM Level of Service criteria for unsignalized intersections:

LOS A: Control Delay ≤ 10s

LOS B: 10s < Control Delay ≤ 15s

LOS C: 15s < Control Delay ≤ 25s

[•] LOS D: 25s < Control Delay ≤ 35s

[•] LOS E: 35s < Control Delay ≤ 50s

LOS F: Control Delay > 50s

4.4 CAPACITY ANALYSIS RESULTS

Intersections within the study area, including existing and planned for the future, operate acceptably under future conditions. No mitigation measures or improvements are recommended for any of the Site intersections, as volumes remain relatively low under future total conditions in 2026 and 2031. All movements at unsignalized intersections in the study area, including the Site accesses, are expected to operate acceptably at LOS B or better.

Table 6 summarizes the capacity analysis results for intersections in the study area. Synchro reports are provided in **Appendix D**.

TABLE 6 UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS RESULTS

l			2	2026 Hor	izon Year	2031 Horizon Year					
Key Movements	Existing		Future Background		Futu Tota		Future Background		Future Total		
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	
	•		Wel	llington	Road 19 / 3	Line					
EBLT	0.0 (0.2)	A (A)	0.0 (0.2)	A (A)	0.0 (0.2)	A (A)	0.0 (0.2)	A (A)	0.0 (0.2)	A (A)	
WBLTR	0.3 (0.3)	A (A)	0.2 (0.3)	A (A)	0.5 (0.7)	A (A)	0.2 (0.2)	A (A)	0.4 (0.7)	A (A)	
NBLTR	10.5 (11.4)	B (B)	10.7 (11.8)	B (B)	10.5 (11.5)	B (B)	11.0 (12.3) B (B)		10.7 (11.8)	B (B)	
SBLTR	10.2 (0.0)	B (A)	10.4 (0.0)	B (A)	11.0 (0.0)	B (A)	10.6 (0.0) B (A)		11.2 (0.0)	B (A)	
			Wellingto	n Road	19 / South S	ite Acce	ess				
WBLT					0.2 (0.2)	A (A)	Intersection does		0.2 (0.2)	A (A)	
NBLR	inters	section d	oes not exis	τ.	10.7 (11.5)	B (B)	not ex	ist.	10.9 (11.8)	B (B)	
			Wellingto	n Road	19 / North S	ite Acce	ss				
					0.7 (0.5)	A (A)			0.6 (0.5)	A (A)	
WBLT	Intore	soction d	oes not exis	+	0.2 (0.7)	A (A)	Intersection does		0.2 (0.7)	A (A)	
NBLR	IIILEIS	section a	ioes not exis	ι.	10.5 (11.7)	B (B)	not ex	ist.	10.7 (12.1)	B (B)	
					10.4 (11.9)	B (B)	1		10.6 (12.3)	B (B)	
			Ea	st Site	Access / 3 L	.ine					
EBLR	Intore	soction d	oes not exis	+	8.7 (8.8)	A (A)	Intersectio	n does	8.7 (8.8)	A (A)	
NBLT	inters	section 0	ioes not exis	ι.	0.0 (2.3)	A (A)	not exist.		0.0 (2.3)	A (A)	
_			We	est Site	Access / 3 L	ine					
EBLR	Inters	section d	oes not exis	t.	8.7 (8.8)	A (A)	Intersection not ex		8.7 (8.8)	A (A)	

Notes:

XX (XX) – Weekday Morning Peak Hour (Weekday Afternoon Peak Hour).

^{2.} All delay values are in seconds (s).

5.0 TRAFFIC SIGNAL WARRANTS

In order to ensure that the road network in the vicinity of the Site maintains acceptable operations in the future, traffic signals were considered at the two proposed Site accesses on Wellington Road 19, inclusive of the proposed new access for the NW Site that aligns with the north access for the SE Site, and at the intersection of **Wellington Road 19 / 3 Line**, under 2031 future conditions,. For the Site accesses on Wellington Road 19, the traffic signal warrant analysis was based on the Ontario Traffic Manual (OTM) Book 12 methodology (Justification 7), while for the four-legged existing (two-way stop control) intersection that currently exists, Justifications 1, 2 and 3 were used.

The results of the traffic signal warrant analysis are summarized in **Table 7** and **Table 8**, with the relevant excerpts and detailed analysis provided in **Appendix E**.

TABLE 7 TRAFFIC SIGNAL WARRANTS – WELLINGTON ROAD 19 / 3 LINE

Justification	Description	Required		Hour Ending								Percentage Compliance	
	Description	1 Lane [Free Flow]	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00	Average	Sectional	
	A. Vehicle volume,	480	324	354	302	330	379	439	516	443			
1. Minimum	all approaches	100%	67%	74%	63%	69%	79%	80%	100%	80%	77%	400/	
Vehicular Volume	B. Vehicle volume, minor streets	120	25	25	18	19	24	30	21	21		19%	
		100%	21%	21%	15%	16%	20%	25%	18%	17%	19%		
	A. Vehicle volume,	480	329	329	284	311	355	409	495	423			
2. Delay to	major street	100%	69%	69%	59%	65%	74%	80%	100%	80%	75%		
Cross Traffic	B. Combined vehicle/pedestrian	50	10	18	10	14	22	22	13	12		30%	
	volume crossing artery from minor street	100%	20%	36%	20%	28%	44%	44%	26%	24%	30%		
		Ove	rall Co	mplia	nce is	s 30%²	2		,				

Notes:

Relevant OTM excerpts are provided in Appendix E.

Justification 3 cannot be applied here, since neither of the other justifications reaches 80% compliance.

TRAFFIC SIGNAL WARRANTS - WELLINGTON ROAD 19 SITE ACCESSES TABLE 8

			mum	Compliance				
Justification	Description	1 Lane F	rement lighways Flow]	Sect	Entire %			
		Base	"T"	Actual Traffic Volumes	% of Required	(≥150)²		
	Wellington Road	d 19 / Sout	h Site Acc	cess				
Minimum Vehicular	A. Vehicle volume, all approaches (average hour)	480	480	231	48%	6%		
Verlicular Volume	B ⁽¹⁾ . Vehicle volume, along minor streets (average hour)	120	180	11	6%	6%		
2 Dolov to	A. Vehicle volume, major street (average hour)	480	480	220	46%			
2. Delay to Cross Traffic	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50 ⁵	50	11	23%	23%		
	Wellington Road	d 19 / Nort	h Site Acc	ess				
Minimum Vehicular	A. Vehicle volume, all approaches (average hour)	480	480	235	49%	17%		
Verlicular Volume	B ⁽¹⁾ . Vehicle volume, along minor streets (average hour)	120		20	17%	1770		
2. Delay to	A. Vehicle volume, major street (average hour)	480	480	215	45%			
Cross Traffic	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50 ⁵	50	9	18%	18%		

Notes:

- For "T" intersections, the base required values should be increased by 50% for case 1B. 1.
- 2. For future intersections, the warrant should be met with 150% (as opposed to 100% for an existing intersection with an 8-hour
- 3. Average hourly volumes were derived based on the formula presented in the OTM Book 12.
 - AHV = (weekday morning peak hour volumes + weekday afternoon peak hour volumes) ÷ 4
- 4. Relevant OTM excerpts are provided in Appendix E.
- There is an error within the OTM excerpts (confirmed in discussions with MTO staff): the 50% increase due to "T" intersections only applies to Justification 1B.

Based on the above, under future total conditions in 2031, traffic signals are not warranted at the intersection of Wellington Road 19 & 3 Line or at either of the proposed Site accesses along Wellington Road 19.

6.0 SIGHT DISTANCE EVALUATION

6.1 WELLINGTON ROAD 19

Due to COVID, a comprehensive sight distance review was completed for the two proposed access points to the SE Site utilizing aerial photos. Sight distances were evaluated in accordance with Transportation Association of Canada (TAC) guidelines for both stopping sight distance and turning sight distance, using a conservative design speed of 100 km/h (20 km/h over the speed limit).

As shown in **Table 9**, all minimum required sight distances are met along Wellington Road 19 at the proposed SE Site access points. It is however important to note that the available sight distance is dependent on the right-of-way being kept clear of vertical obstructions up to the ditch line. Tree trimming may be required to maintain adequate sight distance, particularly at the north Site access.

TABLE 9 SIGHT DISTANCE (WELLINGTON ROAD 19 AT SITE ACCESS POINTS)

Movement	TAC Minimum Requirement (metres)	Available Sight Distance (metres)
Stopping Sight Distance (Design Speed of 100 km/h)		
South Site Access		
Left turn from Wellington Road 19 to South Site Access Road ¹	185	197
North Site Access		
Left turn from Wellington Road 19 to North Site Access Road ¹	185	430
New Golf Course Driveway (NW Site)		
Left turn from Wellington Road 19 to NW Site	185	270
Turning Sight Distance (Design Speed of 100 km/h)		
South Site Access		
Left-turn from South Site Access Road to Wellington Road 19 (stop condition) ²	210	720
Right-turn from South Site Access Road to Wellington Road 19 (stop condition) ³	185	217
North Site Access		
Left-turn from North Site Access Road to Wellington Road 19 (stop condition) ²	210	210
Right-turn from North Site Access Road to Wellington Road 19 (stop condition) ³	185	430
New Golf Course Driveway (NW Site)		
Left-turn from Golf Course Driveway to Wellington Road 19 (stop condition) ²	210	300
Right-turn from Golf Course Driveway to Wellington Road 19 (stop condition) ³	185	580

Notes:

1. Transportation Association of Canada (TAC) Manual, Table 2.5.2.

2. Transportation Association of Canada (TAC) Manual, Case B1; Table 9.9.4

3. Transportation Association of Canada (TAC) Manual, Case B2; Table 9.9.6

6.2 3 LINE

Due to COVID, a review of the aerial photos for the proposed access points to the SE Site on the 3rd Line was completed to confirm the sight distance. Sight distance at the 2 proposed access points is deemed to be more than adequate since 3 Line adjacent to the NW & SE Site vicinity has limited to no horizontal or vertical curvature.

7.0 EVALUATION FOR LEFT-TURN LANES ON WELLINGTON ROAD 19

As part of this report, a detailed evaluation for left-turn lanes on Wellington Road 19 at both proposed access points (north and south) for the SE Site was completed using the Ministry of Transportation Ontario (MTO) Geometric Design Standards for Ontario Highways.

Since the defacto posted speed limit on Wellington Road 19 is 80 km/h, to be conservative, the evaluation was completed for a design speed of 90 km/h as well as 100 km/h. The highest left-turning volume at the south access for the SE Site was estimated to be 5 vehicles and occurs during both the morning and afternoon peak period. The highest left-turning volume at the north access for the SE Site was estimated to be 15 vehicles and occurs during the afternoon peak period.

As shown in the detailed evaluation in **Appendix F**, left-turn lanes are not required on Wellington Road 19 at either access to the SE Site.

8.0 SUMMARY AND CONCLUSIONS

BA Group has been retained by 883890 Ontario Limited c/o Fergus Development Inc. to provide transportation consulting services related to a proposed residential re-development on a site municipally known as 8243 & 8282 Wellington Road 19, in the Township of Centre Wellington, in the County of Wellington. The existing golf course (the "Site") consists of two parcels; the northwest parcel ("NW Site"), situated on the north side of Wellington Road 19, and the southeast parcel ("SE Site"), situated on the south side of Wellington Road 19.

The proposed development includes the construction of 118 single-detached residential dwellings.

The proposed Site circulation and access includes a network of internal private roads (12 metre right-of-ways) with two full accesses along Wellington Road 19 and two full accesses along 3 Line. All access points to Wellington Road 19 and 3 Line will be unsignalized with stop control on the minor streets only. A new access for the NW Site is also proposed to align with the proposed north access to the SE Site on Wellington Road 19.

Key findings of the Transportation Considerations Report are summarized as follows:

Transportation Context

- The Site is adjacent to Wellington Road 19 and 3 Line. Wellington Road 19 is a Wellington County arterial road and 3 Line is a Wellington County local road.
- The Township of Centre Wellington does not currently operate a local public transit system and there are no plans at this time to establish transit service in the vicinity of the Site.
- In the vicinity of the Site, Wellington Road 19 includes paved shoulders for cyclists and there are future plans to extend the paved shoulders east of 3 Line.
- Just south of Wellington Route 19 there is an off-road "spine route" know as the Elora Cataract Trail, a 47 kilometer long trail between Elora and Forks of Credit Provincial Park. The trail is located along the southern edge of the SE Site, and crosses 2 Line, 150 metres southeast of Wellington Road 19.
- There is a pedestrian tunnel under Wellington Road 19 which provides connectivity between the SE Site and the NW Site



Traffic Operations Analysis

- The proposed development is forecast to generate 90 and 120 two-way residential vehicle trips in the weekday morning and afternoon peak hours, respectively.
- Since no information regarding existing traffic associated with the golf course on the NW Site was available, a conservative approach was adopted, wherein the estimated vehicle trips were added to the network to account for the new golf course entrance, and no traffic was removed.
- The Site anticipates in the order of 35 and 55 two-way golf club vehicle trips during the weekday morning and afternoon peak hours, respectively.
- All intersections in the study area, including the Site access points, are expected to operate under capacity under future total conditions.
- Based on a detailed analysis using the Ontario Traffic Manual Book 12, under future total conditions in 2031, traffic signals are not warranted at the intersection of Wellington Road 19 & 3 Line or at either of the proposed Site accesses along Wellington Road 19.

Sight Distance Assessment

All minimum required Site distances are met along Wellington Road 19 at the proposed Site
access points. It is however important to note that the available sight distance is dependent on
the right-of-way being kept clear of vertical obstructions up to the ditch line. Tree trimming may be
required to maintain adequate sight distance, particularly at the north Site access along
Wellington Road 19.

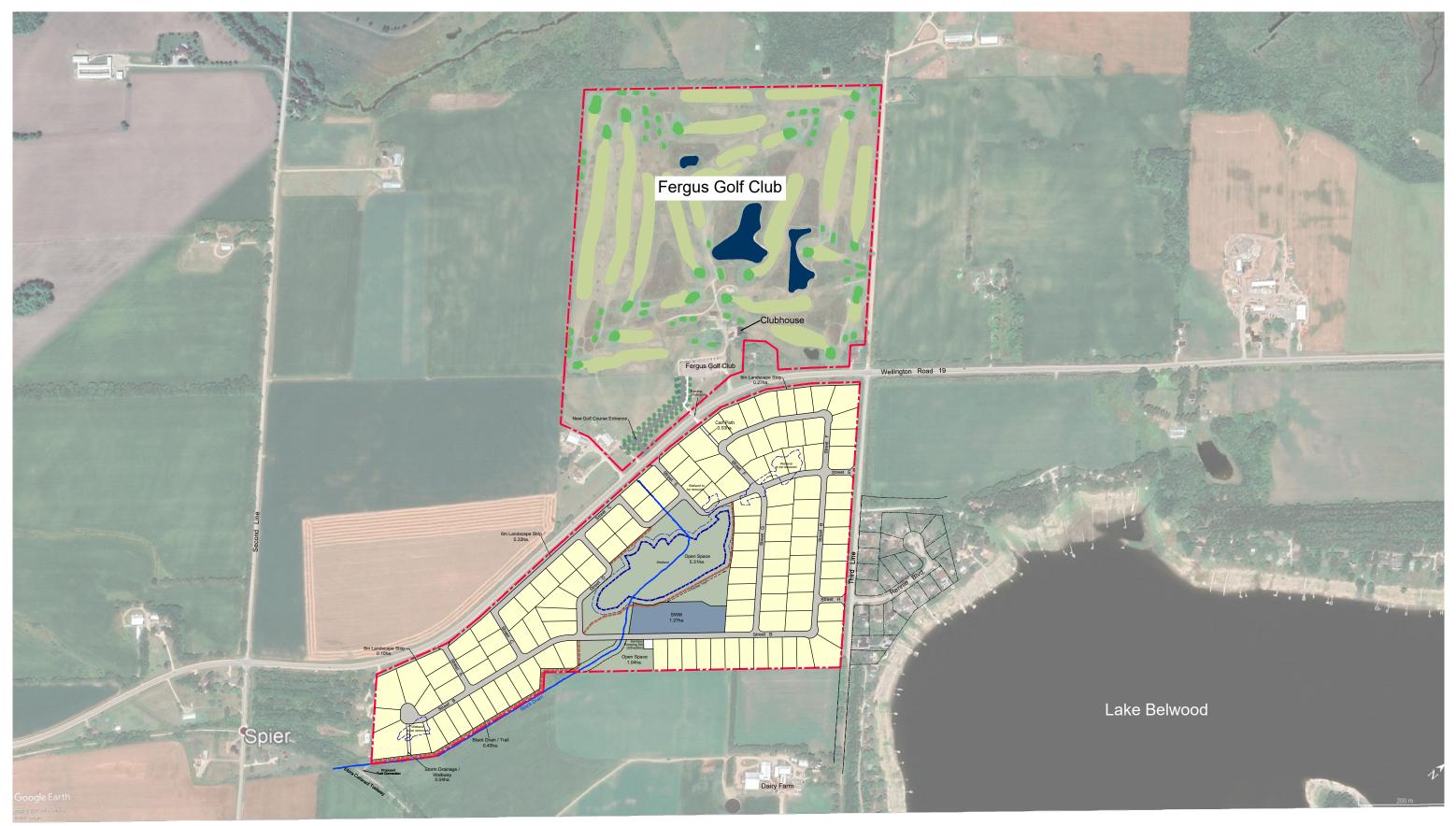
Evaluation for Left-Turn Lanes

• The evaluation for a left-turn lane on Wellington Road 19 at both of the proposed accesses was completed for a design speed of 90 km/h as well as 100 km/h. The highest left-turning volume at the south access was estimated to be 5 vehicles and occurs during both the morning and afternoon peak period. The highest left-turning volume at the north access was estimated to be 15 vehicles and occurs during the afternoon peak period. The evaluation confirmed that left-turn lanes are not required on Wellington Road 19 at either access to the SE Site.

Based on the foregoing, the proposed development can be accommodated on the future transportation network.



Appendix A Development Concept Plan



FERGUS GOLF COURSE DEVELOPMENT



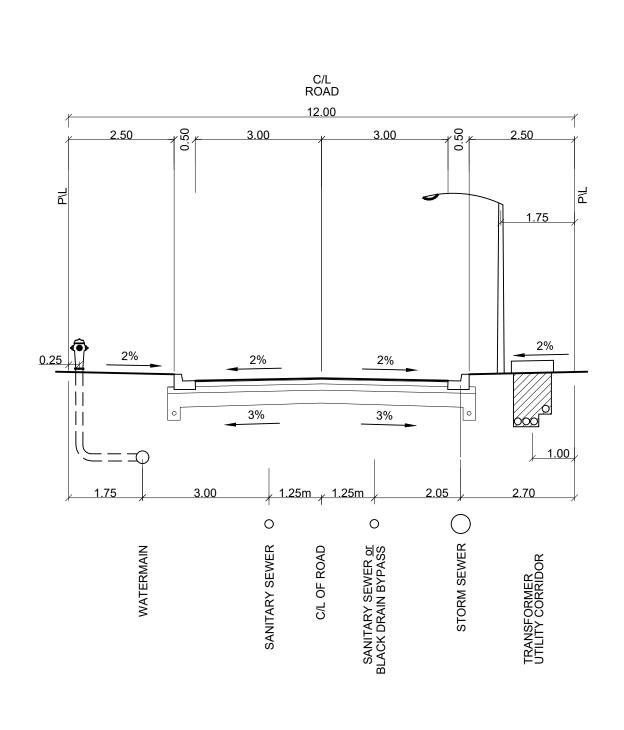
Site Area: 39.85ha. (98.5ac.) No. of Lots: 118 Area of wetlands to be removed: 7,076sq.m.

0	50	100	200	300	400	500
			Me	tres		

NOTE: This concept should be considered as a preliminary demonstration model that illustrates an 'order of magnitude' development scenario for the site. The number of lots are approximate and subject to more detailed design as well as municipal planning approvals.



Appendix B Internal Roads Cross-Section



FERGUS GOLF COURSE DEVELOPMENT PROPOSED 12m LANE ROW CROSS SECTION NTS



Appendix C Turning Movement Counts



BA Group 300 45 ST. CLAIR AVE W TORONTO ONTARIO, M4V 1K9 CANADA

Turning Movement Count (1 . WELLINGTON COUNTY RD 19 & THIRD LINE)

				N Approac	h IE				WELLIN	E Approad	h NTY RD 19	9				S Approact					WELLIN	W Approa	ch JNTY RD 11	9	Int. Total (15 min)	Int. Total (1 hr)
Start Time	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total	(10)	()
00:00:00	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	1	3	
00:15:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	
00:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
00:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	5
01:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	4
01:15:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	4
01:30:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	5
01:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	5
02:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
02:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3
02:30:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	3	5
02:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
03:00:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	5
03:15:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	3	7
03:30:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	1	0	0	0	1	3	7
03:45:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2	9
04:00:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	2	3	11
04:15:00	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3	11
04:30:00	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	3	0	0	0	3	6	14
04:45:00	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	5	0	0	0	5	12	24
05:00:00	0	0	0	0	0	0	0	6	0	0	0	6	1	0	0	0	0	1	0	0	0	0	0	0	7	28
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05:30:00	1	0	0	0	0	1	0	15	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	16	54
05:45:00	0	0	0	0	0	0	0	12	0	0	0	12	1	0	0	0	0	1	1	3	0	0	0	4	17	59
06:00:00	0	0	0	0	0	0	0	18	0	0	0	18	0	0	0	0	0	0	0	15	0	0	0	15	33	85
06:15:00	0	0	0	0	0	0	0	23	0	0	0	23	1	0	2	0	0	3	0	9	0	0	0	9	35	101
06:30:00	0	0	0	0	0	0	0	25	0	0	0	25	1	0	1	0	0	2	0	11	0	0	0	11	38	123
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07:30:00	0	0	0	0	0	0	0	43	0	0	0	43	0	0	4	0	0	4	0	20	0	0	0	20	67	193
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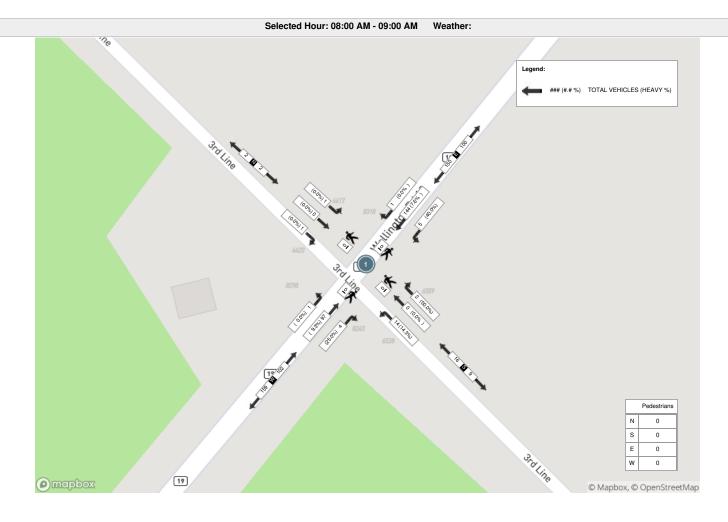
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23:00:00	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	2	24



23:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	3	15
23:30:00	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	2	4	13
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Approach%	80.8%	3.8%	15.4%	0%		-	0.3%	98%	1.7%	0%		-	22.2%	0.6%	77.2%	0%		-	7%	91.7%	1.1%	0.2%		-	-	-
Totals %	0.6%	0%	0.1%	0%		0.7%	0.1%	45.5%	0.8%	0%		46.5%	1%	0%	3.3%	0%		4.3%	3.4%	44.5%	0.5%	0.1%		48.5%	-	-
Heavy	0	1	0	0		-	0	92	3	0		-	5	1	6	0		-	8	73	0	0		-	-	-
Heavy %	0%	100%	0%	0%		-	0%	5.5%	10.3%	0%		-	14.3%	100%	4.9%	0%		-	6.5%	4.5%	0%	0%		-	-	-
Bicycles	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-	-	-		-	-	-
Bicycle %	-	-	-	-		-	-	-	-	-		-	-	-	-	-			-	-	-	-		-	-	-

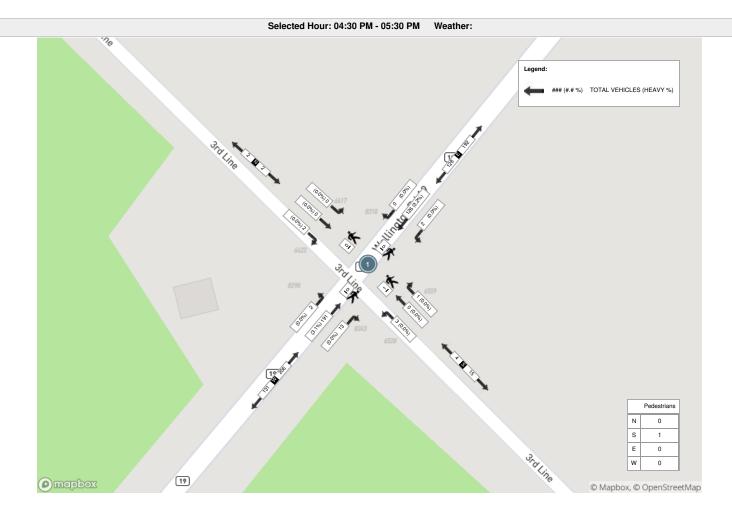
										Selec	cted Ho	our: 08:00 AM - 0	9:00 AN	ı w	eather:										
Start Time				N Approa	ach INE				WELLIN	E Approa	ch JNTY RD 1	9				S Approa	ch NE				WELLII	W Approa	ch JNTY RD 19		Int. Tota (15 min
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:00:00	0	0	0	0	0	0	0	38	0	0	0	38	1	0	3	0	0	4	1	15	0	0	0	16	58
08:15:00	0	0	0	0	0	0	0	47	3	0	0	50	0	0	7	0	0	7	0	24	0	0	0	24	81
08:30:00	1	0	1	0	0	2	1	36	1	0	0	38	0	0	2	0	0	2	0	18	0	0	0	18	60
08:45:00	0	0	0	0	0	0	0	23	1	0	0	24	1	0	2	0	0	3	3	40	1	0	0	44	71
Grand Total	1	0	1	0	0	2	1	144	5	0	0	150	2	0	14	0	0	16	4	97	1	0	0	102	270
Approach%	50%	0%	50%	0%		-	0.7%	96%	3.3%	0%		-	12.5%	0%	87.5%	0%		-	3.9%	95.1%	1%	0%		-	-
Totals %	0.4%	0%	0.4%	0%		0.7%	0.4%	53.3%	1.9%	0%		55.6%	0.7%	0%	5.2%	0%		5.9%	1.5%	35.9%	0.4%	0%		37.8%	-
PHF	0.25	0	0.25	0		0.25	0.25	0.77	0.42	0		0.75	0.5	0	0.5	0		0.57	0.33	0.61	0.25	0		0.58	-
Heavy	0	0	0	0		0		11	2	0		13	1	0	2	0		3	1	9	0	0		10	
Heavy %	0%	0%	0%	0%		0%	0%	7.6%	40%	0%		8.7%	50%	0%	14.3%	0%		18.8%	25%	9.3%	0%	0%		9.8%	-
Lights	1	0	1	0		2	1	133	3	0		137	1	0	12	0		13	3	88	1	0		92	
Lights %	100%	0%	100%	0%		100%	100%	92.4%	60%	0%		91.3%	50%	0%	85.7%	0%		81.3%	75%	90.7%	100%	0%		90.2%	-
Single-Unit Trucks	0	0	0	0		0	0	6	0	0		6	1	0	0	0		1	1	5	0	0		6	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	4.2%	0%	0%		4%	50%	0%	0%	0%		6.3%	25%	5.2%	0%	0%		5.9%	-
Buses	0	0	0	0		0	0	5	2	0		7	0	0	2	0		2	0	3	0	0		3	-
Buses %	0%	0%	0%	0%		0%	0%	3.5%	40%	0%		4.7%	0%	0%	14.3%	0%		12.5%	0%	3.1%	0%	0%		2.9%	-
Articulated Trucks	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	1%	0%	0%		1%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-		-	0%		-	-	-	-	0%		





										Sele	cted H	our: 04:30 PM -	05:30 P	M V	Veather	:									
Start Time				N Appro	oach LINE				WELLIN	E Approad	ch JNTY RD 1	9				S Approa	ach INE				WELLIN	W Approa	ch JNTY RD 19)	Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:30:00	0	0	0	0	0	0	0	43	0	0	0	43	0	0	0	0	1	0	3	44	0	0	0	47	90
16:45:00	0	0	0	0	0	0	0	27	1	0	0	28	0	0	2	0	0	2	3	54	2	0	0	59	89
17:00:00	2	0	0	0	0	2	0	30	1	0	0	31	1	0	1	0	0	2	2	40	0	0	0	42	77
17:15:00	0	0	0	0	0	0	0	26	0	0	0	26	0	0	0	0	0	0	5	53	0	0	0	58	84
Grand Total	2	0	0	0	0	2	0	126	2	0	0	128	1	0	3	0	1	4	13	191	2	0	0	206	340
Approach%	100%	0%	0%	0%		-	0%	98.4%	1.6%	0%		-	25%	0%	75%	0%		-	6.3%	92.7%	1%	0%		-	
Totals %	0.6%	0%	0%	0%		0.6%	0%	37.1%	0.6%	0%		37.6%	0.3%	0%	0.9%	0%		1.2%	3.8%	56.2%	0.6%	0%		60.6%	-
PHF	0.25	0	0	0		0.25	0	0.73	0.5	0		0.74	0.25	0	0.38	0		0.5	0.65	0.88	0.25	0		0.87	-
Heavy	0	0	0	0		0	0	4	0	0		4	0	0	0	0		0		6	0	0		6	
Heavy %	0%	0%	0%	0%		0%	0%	3.2%	0%	0%		3.1%	0%	0%	0%	0%		0%	0%	3.1%	0%	0%		2.9%	-
Lights	2	0	0	0		2	0	122	2	0		124	1	0	3	0		4	13	185	2	0		200	
Lights %	100%	0%	0%	0%		100%	0%	96.8%	100%	0%		96.9%	100%	0%	100%	0%		100%	100%	96.9%	100%	0%		97.1%	-
Single-Unit Trucks	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	0	1	0	0		1	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	0.8%	0%	0%		0.8%	0%	0%	0%	0%		0%	0%	0.5%	0%	0%		0.5%	-
Buses	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	-
Buses %	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	0	5	0	0		5	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	2.4%	0%	0%		2.3%	0%	0%	0%	0%		0%	0%	2.6%	0%	0%		2.4%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	÷	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	100%		-	-	-	-	0%		-





										Pe	ak Hou	ır: 03:15 PM - 04	1:15 PM	We	eather:										
Start Time				N Appro	oach LINE				WELLIN	E Approad	ch JNTY RD 1	9				S Appro THIRD L	ach INE				WELLIN	W Approa	ch INTY RD 19		Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
15:15:00	0	0	0	0	0	0	0	31	1	0	0	32	1	0	4	0	0	5	6	44	1	0	0	51	88
15:30:00	0	0	0	0	0	0	0	24	1	0	0	25	3	0	5	0	0	8	4	48	1	0	0	53	86
15:45:00	2	0	0	0	0	2	0	22	1	0	0	23	0	0	4	0	0	4	5	55	1	0	0	61	90
16:00:00	1	0	0	0	0	1	0	40	0	0	0	40	1	0	2	0	0	3	3	58	0	0	0	61	105
Grand Total	3	0	0	0	0	3	0	117	3	0	0	120	5	0	15	0	0	20	18	205	3	0	0	226	369
Approach%	100%	0%	0%	0%		-	0%	97.5%	2.5%	0%		-	25%	0%	75%	0%		-	8%	90.7%	1.3%	0%		-	-
Totals %	0.8%	0%	0%	0%		0.8%	0%	31.7%	0.8%	0%		32.5%	1.4%	0%	4.1%	0%		5.4%	4.9%	55.6%	0.8%	0%		61.2%	-
PHF	0.38	0	0	0		0.38	0	0.73	0.75	0		0.75	0.42	0	0.75	0		0.63	0.75	0.88	0.75	0		0.93	-
Heavy		0	0	0		0	0	9	0	0		9	2	0	0	0		2	2	11		0		13	
Heavy %	0%	0%	0%	0%		0%	0%	7.7%	0%	0%		7.5%	40%	0%	0%	0%		10%	11.1%	5.4%	0%	0%		5.8%	-
Lights	3	0	0	0		3	0	108	3	0		111	3	0	15	0		18	16	194	3	0		213	
Lights %	100%	0%	0%	0%		100%	0%	92.3%	100%	0%		92.5%	60%	0%	100%	0%		90%	88.9%	94.6%	100%	0%		94.2%	-
Single-Unit Trucks	0	0	0	0		0	0	4	0	0		4	0	0	0	0		0	0	2	0	0		2	-
Single-Unit Trucks %	0%	0%	0%	0%		0%	0%	3.4%	0%	0%		3.3%	0%	0%	0%	0%		0%	0%	1%	0%	0%		0.9%	-
Buses	0	0	0	0		0	0	1	0	0		1	2	0	0	0		2	2	7	0	0		9	-
Buses %	0%	0%	0%	0%		0%	0%	0.9%	0%	0%		0.8%	40%	0%	0%	0%		10%	11.1%	3.4%	0%	0%		4%	-
Articulated Trucks	0	0	0	0		0	0	4	0	0		4	0	0	0	0		0	0	2	0	0		2	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	3.4%	0%	0%		3.3%	0%	0%	0%	0%		0%	0%	1%	0%	0%		0.9%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-	-	-	-	0%		-





Appendix D Synchro Worksheets

HCM Unsignalized Intersection Capacity Analysis 4: 3 Line & Wellington Road 19

Existing (PM)

Y	H	2	2	H	9	2	FOR	2	ē	E	0
ומ	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	ن	r_ ;		4	•	9	÷	4	•	÷	•
۲ ک	700	5 7	۲ ک	135	0	9 9	0 0	0 0	0 0	0 0	0 0
c	Free	Ω	ດ	Fre 130	0	2	Ston	0	0	Ston	0
	%0			%0			%0			%0	
0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
2	217	16	2	147	0	=	0	0	0	0	0
	None			None							
147			233			384	384	217	384	400	147
147			233			384	384	217	384	400	147
4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
100			100			86	100	100	100	100	100
1435			1335			571	546	823	571	534	006
EB 1	EB2	WB1	NB 1	SB 1							
222	16	152	11	0							
5	0	2	=	0							
0	16	0	0	0							
1435	1700	1335	571	1700							
0.00	0.01	0.00	0.02	0.00							
0.1	0.0	0.1	0.5	0.0							
0.7	0.0	0.3	11.4	0.0							
A		V	В	⋖							
0.2		0.3	11.4	0.0							
			В	V							
		0.5									
ntersection Capacity Utilization		22.5%	2	U Level o	ICU Level of Service			⋖			
		15									

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HCM Unsignalized Intersection Capacity Analysis 4: 3 Line & Wellington Road 19

Existing (AM)

	4	†	1	\	ţ	4	•	+	*	۶	→	•
	i	Ė	- 6		H	9	-	- 5	- 5	č	- 6	Č
Movement	EBL	EBI	EBK	WBL	WBI	WBK	NBL	NBI	NBK	SBL	SBI	SBK
Lane Configurations		÷	*		4			4			4	
Traffic Volume (veh/h)	0	95	2	2	145	0	15	0	0	15	0	5
Future Volume (Veh/h)	0	95	2	2	145	0	15	0	0	15	0	
Sign Control		Free			Free			Stop			Stop	
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)	0	103	2	2	158	0	16	0	0	16	0	2
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	158			108			276	271	103	271	276	158
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	158			108			276	271	103	271	276	158
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
po dueue free %	90			100			86	100	100	86	100	66
cM capacity (veh/h)	1422			1483			671	633	952	089	629	887
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total	103	2	163	16	21							
Volume Left	0	0	2	16	16							
Volume Right	0	2	0	0	2							
SH	1422	1700	1483	671	720							
Volume to Capacity	0.00	0.00	0.00	0.02	0.03							
Queue Length 95th (m)	0.0	0.0	0.1	9.0	0.7							
Control Delay (s)	0.0	0.0	0.3	10.5	10.2							
Lane LOS			V	В	В							
Approach Delay (s)	0.0		0.3	10.5	10.2							
Approach LOS				В	В							
Intersection Summary												
Average Delay			1.4									
Intersection Capacity Utilization	tion		24.6%	2	U Level o	ICU Level of Service			⋖			
Analysis Period (min)			15									
, , , , , , , , , , , , , , , , , , , ,												

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HCM Unsignalized Intersection Capacity Analysis 2026 Future Background (PM) 4: 3 Line & Wellington Road 19

220 15 5 150 0 10 0 0 0 0 0 0 0 0 0 0 0 0
15 5 150 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0
092 092 092 092 092 092 092 092 092 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
None None 16 5 163 0 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
None 255 422 239 422 438 256 422 239 422 438 4.1 7.1 6.5 6.2 7.1 6.5 100 98 100 100 100 100 1310 539 1700 0.00 0.02 0.00 0.3 118 0.0 A B A 0.3 118 0.0 0.05 0.05 0.05 0.05 0.07 0.07 0.08 0.09 0.09 0.00 0
None 255 422 239 422 438 265 422 239 422 438 4.1 7.1 6.5 6.2 7.1 6.5 100 98 100 100 100 100 1310 539 1700 0.00 0.02 0.00 0.3 118 0.0 A B A 0.3 118 0.0 0.05 100 0.07 118 0.0 0.08 118 0.0 0.09 118 0.0 0.00 0.00 0.00 0.01 0.00 0.00 0.01 0.00 0.00
None 255 422 239 422 438 256 422 239 422 438 4.1 7.1 6.5 6.2 7.1 6.5 100 98 100 100 100 100 1310 539 1700 0.00 0.02 0.00 0.3 118 0.0 A B A 0.3 118 0.0 Cobstant of Service A CU Level of Service A COST CONTRACT OF A COST COST COST COST COST COST COST COST
None 255 422 239 422 438 256 422 239 422 438 4.1 7.1 6.5 6.2 7.1 6.5 100 98 100 100 100 100 1310 539 1700 0.00 0.02 0.00 0.3 118 0.0 A B A 0.3 118 0.0 0.3 118 0.0 0.5 6.2 7.1 6.5 1.0 6.5 6.2 7.1 6.5 1.0 7.1 6.5 6.2 7.1 6.5 1.0 89 100 100 100 100 1.0 98 100 100 100 1.0 100 10
None None A22 A22 A38 A23 A2
255 422 239 422 438 255 422 422 239 422 438 4.1 7.1 6.5 6.2 7.1 6.5 100 98 100 100 100 100 1310 539 519 800 539 509 NB 1 SB 1 0 0 0 539 1700 0.02 0.00 0.02 0.00 0.03 0.00 0.04 0.00 0.05 0.00 0.
255 422 239 422 438 255 422 422 239 422 438 4.1 7.1 6.5 6.2 7.1 6.5 100 98 100 100 100 1310 98 100 100 100 1311 0 100 0.0 0 539 1700 0.0 0 539 1700 0.1 0 0 539 1700 0.1 0 0 18 A 118 0.0 18 A 118 0.0 19 A 118 0.0
255 422 239 422 438 255 422 239 422 438 4.1 6.5 6.2 7.1 6.5 100 98 100 100 100 1310 539 519 800 539 509 NB1 SB1 11 0 0 539 1700 002 0.00 002 0.00 118 0.0 B A 118 0.0 ICU Level of Service A 122 438 422 438 422 438 423 422 438 426 422 438 427 428 428 422 438 428 422 438 429 422 438 400 100 100 10
255 422 239 422 438 256 4.1 4.2 422 239 422 438 4.1 6.5 6.2 7.1 6.5 100 98 100 100 100 100 131 0 0 0 839 519 800 839 509 NB1 SB1 11 0 0 839 100 100 100 539 1700 0.0 0 0 839 509 118 0.0 B A A 118 0.0 B A A 118 0.0 CUL Level of Service A
255 422 239 422 438 4.1 7.1 6.5 6.2 7.1 6.5 100 98 100 100 100 100 1310 539 519 800 539 509 NB1 SB1 63 710 00 111 0 0 0 539 519 800 539 509 112 0 0 0 539 1700 539 519 800 539 509 113 0 0 0 114 0 0 0 118 0 0 0
255 422 422 239 422 438 438 44.1
4.1 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 7.1 6.5 7.1 6.5 7.1 6.5 7.1
22 3.5 4.0 3.3 3.5 4.0 100 100 100 100 100 100 100 100 100 1
100 98 100 100 100 131 4.0 100 100 100 100 100 100 100 100 100 1
130
1310 539 519 800 539 509 1310 111 0
NB1 SB1 11 0 0 0 5.59 1700 0.02 0.00 0.5 0.00 11.8 0.0 B A 11.8 0.0 B A ICU Level of Service
11 0 0 0 0 0 0.2 0.00 0.5 0.00 11.8 0.0 B A 11.8 0.0 CL Level of Service
11 0 0 539 1700 0.02 0.00 0.5 0.00 11.8 0.0 B A 11.8 0.0 ICU Level of Service
539 1700 0.02 0.00 0.5 0.00 11.8 0.0 B A 11.8 0.0 ICU Level of Service
0.02 0.00 0.5 0.00 11.8 0.0 B A 11.8 0.0 B A
0.5 0.0 118 0.0 B A 11.8 0.0 B A ICU Level of Service
11.8 0.0 B A 11.8 0.0 B A (CU Level of Service)
B A 11.8 0.0 B A II.8 CU Level of Service
11.8 0.0 B A ICU Level of Service
B A ICU Level of Service
ICU Level of Service
ICU Level of Service
ICU Level of Service

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HCM Unsignalized Intersection Capacity Analysis 4: 3 Line & Wellington Road 19

2026 Future Background (AM)

		44 105 105 105 105 105 105 105 105 109 1114 1114	K v v	WBL 5	WBT	WBR	NBL	NBT ←	NBR	SBL	SBT	SBR
		105 105 0% 0% 1114	് വ ച	2	4			4	c		4	
		105 105 00% 1114	വ	2					C			
		105 17ee 0% 0.92 1114	ro.		160	0	15	0	>	15	0	5
		1114 1114 000 000 000		2	160	0	15	0	0	15	0	5
		0% 1114 One			Free			Stop			Stop	
		114 114 One			%0			%0			%0	
		114 One	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
	Z	e	2	2	174	0	16	0	0	16	0	
	Z	one										
	Z	one										
	Z	one										
	Z	one										
	Ż	one										
		2			None							
vC, conflicting volume 17	174			119			303	298	114	298	303	174
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	174			119			303	298	114	298	303	174
tC, single (s) 4	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
stage (s)												
	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			86	100	100	86	100	66
cM capacity (veh/h) 1403	03			1469			644	612	939	653	809	869
Direction, Lane # EB 1		EB 2	WB 1	NB 1	SB 1							
Volume Total 11	114	2	179	16	21							
Volume Left	0	0	2	16	16							
ne Right		2	0	0	2							
cSH 140	1403 1	1700	1469	644	694							
J		0.00	0.00	0.02	0.03							
ith (m)	0.0	0.0	0.1	9.0	0.7							
lay (s)	0.0	0.0	0.2	10.7	10.4							
			V	В	В							
y (s)	0.0		0.2	10.7	10.4							
Approach LOS				В	В							
Intersection Summary												
Average Delay			1.3	3		-			•			
Intersection Capacity Utilization		2	25.4%	<u>ವ</u>	ICU Level of Service	Service			×			
Analysis Period (min)			12									

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HCM Unsignalized Intersection Capacity Analysis 2026 Future Total (AM) 3: North Site Access/Golf Course Access & Wellington Road 19

Movement EBI EBI EBI MBI		1	†	~	>	ļ	4	•	←	•	۶	→	•
Onligurations 44-bit onlight 44-bit onligurations 44-bit onlight 44-bit	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Moune (verly) 10 115 5 185 15 15 0 10 5 0 0 Volume (verly) 10 115 5 185 15 15 0 10 5 0 0 Volume (verly) 11 125 5 185 15 15 0 10 5 0 0 Volume (verly) 11 125 5 201 16 16 0 11 5 0 0 Volume (verly) 11 125 5 201 16 16 0 11 5 0 Volume (verly) 11 125 5 201 16 16 0 11 5 0 Volume (verly) 11 125 5 201 16 16 0 11 5 0 Volume (verly) 11 125 5 201 16 16 0 11 5 0 Volume (verly) 11 125 5 201 16 16 0 11 5 0 Volume (verly) 11 125 5 5 201 16 17 128 380 371 Volume (verly) 1353 1455 130 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 380 371 Volume (verly) 1353 1455 100 374 376 128 376 128 376 128 Volume (verly) 1353 1455 100 374 376 128 376 128 376 128 Volume (verly) 1353 1455 100 374 376 128	-ane Configurations		4			4			4			4	
Volume (Veh/h) 10 115 5 18 15 16 0 10 5 0 Annual Free Free Free Stop 0.92	raffic Volume (veh/h)	10	115	2	2	185	15	15	0	10	2	0	2
Annich (m) Free (pk) Free (pk) Stop (0%) <	uture Volume (Veh/h)	10	115	2	2	185	15	15	0	10	2	0	2
our Factor 0% 0	Sign Control		Free			Free			Stop			Stop	
Hour Factor 0,92 0,92 0,92 0,92 0,92 0,92 0,92 0,92	Grade		%0			%0			%0			%0	
1 125 5 201 16 16 10 11 5 0 Interversion 11 125 5 201 16 16 10 11 5 0 Interversion 11 125 5 201 16 16 10 11 5 0 Interversion 11 125 12 130 134 376 128 380 371 Interversion 130 374 376 128 380 371 Interversion 130 374 376 128 380 371 Interversion 130 374 376 128 380 371 Interversion 217 218 218 380 371 Interversion 217 218 218 380 371 Interversion 218 218 218 218 Interversion 218 218 218 218 Interversion 218 218 Interve	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
Note (m.)	Hourly flow rate (vph)	11	125	2	വ	201	16	16	0	11	2	0	2
Width (m) Width (m) Ing Speed (ins) None None nun flackage veh) None None nun flackage veh) None None nun strage veh) 374 376 128 380 371 ale m Strage veh) 374 376 128 380 371 ale m Strage veh) 374 376 128 380 371 ale m Strage veh) 374 376 128 380 371 stage 1 conf vol 217 4.1 4.1 6.5 6.2 7.1 6.5 stage 2 conf vol 4.1 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage 2 conf vol 4.1 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage 2 conf vol 4.1 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0	Pedestrians												
ng Speed (m/s) Inflanckage Inflanckage Inflanckage Inminater (veh) Institution (min of the company of the com	Lane Width (m)												
nt Blockage turn flame (veh) In vige	Walking Speed (m/s)												
Lum flare (veh) None None na type None None am stgrage veh) Am stgrage veh) Am stgrage veh) eam signal (m) aloon unblocked Am stgrage veh Am stgrage veh am stgrage (m) aloon unblocked Am stgrage veh Am stgrage veh aloon unblocked vol 217 130 374 376 128 380 371 stage 1 conf vol Am stgrage (s) Am stgrage veh Am stg	Percent Blockage												
nn type ann storage verh) action Capacity (verbir) action Capacity action Capacity and Delay (s) and Capacity and Capacity and Delay (s) and Capacity and Delay (s) and Capacity and Delay (s) and Capacity action Capacity action Capacity action Capacity and Delay (s) and Capacity action	Right turn flare (veh)												
aem storage veh) appacity (verhy) are to Capacity and Delay (s) aem tength 95th (m) aem	Median type		None			None							
eam signal (m) adoon unblocked adoon unblocked by collection 217 aloon unblocked by collection 217 aloon unblocked aloon unblocked aloon ord aloon unblocked aloon ord aloon unblocked aloon ord alo	Median storage veh)												
attoon unblocked attoon unblocked annitoticked annitoticked void stage 2 cord void stage 3 cord void stage 4 cord void annitoticked void 2 17	Upstream signal (m)												
stage foot volume 217 130 374 376 128 380 371 stage foot vol 217 130 374 376 128 380 371 stage 2 conf vol 4.1 4.1 4.1 6.5 6.2 7.1 6.5 stage (s) 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (s) 2.2 2.2 4.1 6.5 6.2 7.1 6.5 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (s) 2.2 2.2 4.1 6.5 5.7 5.4 9.9 9.0 pacify (well/n) 1353 1455 5.7 5.4 9.2 5.0 5.2 tor Lot and L	oX, platoon unblocked												
Rigge (s) 217 130 374 376 128 380 371 Rigge (s) 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (s) 2.2 2.2 3.5 4.0 99 99 100 pacify (veh/h) 1353 MB1 NB1 SB1 7.1 6.5 52 7.1 6.5 pacify (veh/h) 1353 MB1 NB1 SB1 7.1 6.5 54 99 99 100 pacify (veh/h) 1353 MB1 SB1 5 54 99 100 pacify (veh/h) 1353 1455 679 67 10 99 99 100 pacify (veh/h) 1353 1455 679 674 67 54 55 548 923 566 552 re Edit 11 5 <	/C, conflicting volume	217			130			374	376	128	380	371	209
stage 2 conf vol 217 130 374 376 128 380 371 amblooked vol 217 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (s) 4.1 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (s) 99 100 97 100 99 99 100 stage (s) 2.2 2.7 10 97 100 99 99 100 stage (s) 99 10 100 99 99 100 99 99 100 stage (s) 1.1 5 1.0 99 99 100 99 99 100 stage (s) 1.1 5 1.0 9 9 9 100	/C1, stage 1 conf vol												
type (s) 4.1 130 374 376 128 380 371 type (s) 4.1 4.1 4.1 6.5 6.2 7.1 6.5 3.3 3.5 4.0 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 eue free % 99 100 97 100 99 99 100 ppacity (verbr) 1353 1455 5.75 5.46 9.2 7.0 99 100 ppacity (verbr) 1353 1451 5.8 7 100 99 99 100 ppacity (verbr) 1353 1451 5.7 5.75 5.48 99 100 ppacity (werbr) 135 16 5 7 10 99 99 100 pec Left 1 2 1 1 5 1 6 5 5 5 5 1 6 5 1 6 6	/C2, stage 2 conf vol												
type (s) 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 6.5 7.1 6.5 eue free % 99 100 97 100 99 99 100 pacify (ver/h) 1353 1455 575 548 923 566 552 40 pacify (ver/h) 1353 1455 81 8 8 99 100 pacify (ver/h) 1353 1455 575 548 923 566 552 7 ion, Lane # EB NB SB 8 9 9 9 9 9 <t< td=""><td>Cu, unblocked vol</td><td>217</td><td></td><td></td><td>130</td><td></td><td></td><td>374</td><td>376</td><td>128</td><td>380</td><td>371</td><td>209</td></t<>	Cu, unblocked vol	217			130			374	376	128	380	371	209
Stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 eue free % 99 100 97 100 99 99 100 pacify (vehth) 1353 1455 575 548 923 566 552 8 ion, Lane # EB1 WB1 NB1 SB1 AB1 AB2 AB2 <td>C, single (s)</td> <td>4.1</td> <td></td> <td></td> <td>4.1</td> <td></td> <td></td> <td>7.1</td> <td>6.5</td> <td>6.2</td> <td>7.1</td> <td>6.5</td> <td>6.2</td>	C, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
Section Capacity (self-ki) Section Capacity Section Section Capacity	C, 2 stage (s)												
spaceting (verlyr) 99 100 99 99 100 apacity (verlyr) 1353 1455 575 548 923 566 552 8 altity Lane # EB1 NB1 SB1 A	F (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
apacity (veh/h) 1353 1455 575 548 923 566 552 14ton Lane # EB1 WB1 NB1 SB1 575 548 923 566 552 14ton Lane # EB1 WB1 NB1 SB1 575 548 923 566 552 14ton Lane # EB1 WB1 NB1 SB1 581 581 581 581 581 581 581 581 581 58	on gue ue free %	66			100			4	100	66	66	100	66
and Total EB 1 WB 1 NB 1 SB 1 ne Total 141 222 27 10 ne Left 11 5 16 5 ne Legach 67 674 674 674 ne Length 95ih (m) 0.01 0.00 0.04 0.01 0.04 ne Length 95ih (m) 0.2 0.1 1.0 0.4 0.01 no Length 95ih (m) 0.2 0.1 1.0 0.4 0.01 no Lobely (s) 0.7 0.2 10.5 10.4 0.04 ach Los A A B B B ach Los B B B B action Callon Summary 1.3 I.3 I.2 I.2 action Callod Summary 1.3 I.3 I.2 I.2 action Callod (min) 1.5 I.2 I.2 I.2 action Callod (min) 1.5 I.2 I.2 I.2	tM capacity (veh/h)	1353			1455			575	248	923	266	552	831
ne Total 141 222 27 10 ne Left 1 5 16 5 ne Right 5 11 5 ne Right 1353 1455 679 674 ne to Capacity 0.01 0.00 0.04 0.01 ne Length 95th (m) 0.2 0.1 1.0 0.4 corl Delay (s) 0.7 0.2 10.5 10.4 and Delay (s) 0.7 0.2 10.5 10.4 and LOS B B section Summary 1.3 section Capacity Wilization 1.5 1.3 I.3 ICU Level of Service 1.5 section Capacity Wilization 1.5 1.5 ICU Level of Service 1.5 1.5 IC	Direction, Lane #	EB 1	WB1	NB 1	SB 1								
ne Left 11 5 16 5 ne Right 5 16 5 ne Right 135 145 679 674 ne to Capacity 0.01 0.00 0.04 0.01 ne Length 95th (m) 0.2 0.1 1.0 0.4 LOS 0.7 0.2 10.1 10.0 0.4 coch Delay (s) 0.7 0.2 10.5 10.4 and Delay (s) 0.7 0.2 10.5 10.4 and LOS B B section Summary 1.3 section Capacity Utilization 21.9% ICU Level of Service 15 section Capacity Wish Period (finit) 15 10.0 10.0 10.0 10.0 10.0 10.0 10.0 1	/olume Total	141	222	27	10								
ne Right 15 16 11 5	/olume Left	1	2	16	2								
1353 1455 679 674 me to Capacity 0.01 0.00 0.04 0.01 me Leught 95th (m) 0.2 0.1 1.0 0.4 LOS A A B B B and Delay (s) 0.7 0.2 10.5 10.4 and LOS B B B section Summary 1.3 1.3 CU Level of Service section Chin) 1.5 15 10.4 16 10.4 17 1.3 18 10.4 18 10.4 19 1.3 19 1.3 19 1.3 10 1.3 11 1.3 11 1.3 11 1.3 11 1.3	/olume Right	2	16	11	2								
0.01 0.00 0.04 0.01 0.2 0.1 1.0 0.4 0.7 0.2 10.5 10.4 A A B B B 0.7 0.2 10.5 10.4 B B B 1.3 ICU Level of Service	SH	1353	1455	619	674								
0.2 0.1 1.0 0.4 0.7 0.2 10.5 10.4 0.7 0.2 10.5 10.4 0.7 0.2 10.5 10.4 B B B 1.3 ICU Level of Service	/olume to Capacity	0.01	0.00	0.04	0.01								
0.7 0.2 10.5 10.4 A A B B B 0.7 0.2 10.5 10.4 B B B 1.3 ICU Level of Service	Queue Length 95th (m)	0.2	0.1	1.0	0.4								
A A B B 0.7 0.2 10.5 10.4 B B 1.3 21.9% ICU Level of Service	Control Delay (s)	0.7	0.2	10.5	10.4								
0.7 0.2 10.5 10.4 B B B 1.3 21.9% ICU Level of Service 15	ane LOS	A	V	В	В								
1.3 ICU Level of Service 15.9%	Approach Delay (s)	0.7	0.2	10.5	10.4								
1.3 21.9% ICU Level of Service 15	Approach LOS			В	В								
1.3 21.9% ICU Level of Service 15	ntersection Summary												
21.9% ICU Level of Service 15	Werade Delay	l	l	1 2	l	l	l	l	l	l	l	l	
15	ntersection Capacity Utilization	Ę		21.9%	⊇	U Level o	f Service			⋖			
	Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis 2: South Site Access & Wellington Road 19

2026 Future Total (AM)

																																								ď	
•	NBR		2	5			0.92	2										138			138	6.2		3.3	66	910														Service	
•	NBL	>	25	25	Stop	%0	0.92	27										366			366	6.4		3.5	96	632														ICU Level of Service	
ţ	WBT	₩	200	200	Free		0.92							None																											
-	WBL		2	2			0.92	2										141			141	4.1		2.2	100	1442	NB 1	32	27				1.2	10.7	В	10.7	В		1.0	24.5%	15
1	EBR		2	5			0.92	2																			WB 1	222	5	0	1442	0.00	0.1	0.2	V	0.2					
†	EBT	÷£	125	125	Free	%0	0.92	136						None													EB 1	141	0	2	1700	0.08	0.0	0.0		0.0				lization	
	Movement	Lane Configurations	Traffic Volume (veh/h)	Future Volume (Veh/h)	Sign Control	Grade	Peak Hour Factor	Hourly flow rate (vph)	Pedestrians	Lane Width (m)	Walking Speed (m/s)	Percent Blockage	Right turn flare (veh)	Median type	Median storage veh)	Upstream signal (m)	pX, platoon unblocked	vC, conflicting volume	vC1, stage 1 conf vol	vC2, stage 2 conf vol	vCu, unblocked vol	tC, single (s)	tC, 2 stage (s)	tF (s)	bo dnene tree %	cM capacity (veh/h)	Direction, Lane #	Volume Total	Volume Left	Volume Right	- SH	Volume to Capacity	Queue Length 95th (m)	Control Delay (s)	Lane LOS	Approach Delay (s)	Approach LOS	Intersection Summary	Average Delay	Intersection Capacity Utilization	Analysis Period (min)

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HCM Unsignalized Intersection Capacity Analysis 5: 3 Line & West Site Access

2026 Future Total (AM)

	•	*	•	←	→	•
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	>			€	¢\$	
Traffic Volume (veh/h)	2	0	0	20	10	വ
Future Volume (Veh/h)	2	0	0	70	10	D
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)	2	0	0	22	=	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	36	14	16			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	36	14	16			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	100	100			
cM capacity (veh/h)	116	1067	1602			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	2	22	16			
Volume Left	2	0	0			
Volume Right	0	0	2			
cSH	716	1602	1700			
Volume to Capacity	0.01	0.00	0.01			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	8.7	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			13.3%	⊇	ICU Level of Service	f Service A
Analysis Period (min)			15			

Synchro 11 Report 02-04-2022 BA Group

HCM Unsignalized Intersection Capacity Analysis 4: 3 Line & Wellington Road 19

2026 Future Total (AM)

	1	†	<i>></i>	>	ţ	4	•	←	•	۶	→	*
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		₩	*		4			4			4	
Traffic Volume (veh/h)	0	125	വ	10	185	0	15	0	10	15	0	2
Future Volume (Veh/h)	0	125	2	10	185	0	15	0	10	15	0	2
Sign Control		Free			Free			Stop			Stop	
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)	0	136	2	1	201	0	16	0	Ξ	16	0	2
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	201			141			364	326	136	370	364	201
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			141			364	326	136	370	364	201
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
po dueue free %	100			66			67	100	66	4	100	66
cM capacity (veh/h)	1371			1442			282	263	913	929	290	840
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total	136	2	212	27	21							
Volume Left	0	0	1	16	16							
Volume Right	0	2	0	11	2							
CSH	1371	1700	1442	982	623							
Volume to Capacity	0.00	0.00	0.01	0.04	0.03							
Queue Length 95th (m)	0:0	0.0	0.2	1.0	8.0							
Control Delay (s)	0.0	0.0	0.5	10.5	11.0							
Lane LOS			V	В	В							
Approach Delay (s)	0.0		0.5	10.5	11.0							
Approach LOS				В	В							
Intersection Summary												
			-									
Average Delay			C. I. 5	-					•			
Intersection Capacity Utilization	noi		27.9%	2	U Level o	ICU Level of Service			⋖			
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis 2: South Site Access & Wellington Road 19

2026 Future Total (PM)

	Ť	>	\	Ļ	•	•	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	æ			₩	>		ı
Traffic Volume (veh/h)	270	22	2	180	10	5	
Future Volume (Veh/h)	270	22	2	180	10	2	
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)	293	27	2	1%	11	5	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
	None			None			
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume			320		512	306	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			320		512	306	
tC, single (s)			4.1		6.4	6.2	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			100		86	66	
cM capacity (veh/h)			1240		519	733	
Direction, Lane #	EB 1	WB1	NB 1				
Volume Total	320	201	16				
Volume Left	0	2	Ξ				
Volume Right	27	0	2				
CSH	1700	1240	572				
Volume to Capacity	0.19	0.00	0.03				
Queue Length 95th (m)	0.0	0.1	0.7				
Control Delay (s)	0.0	0.2	11.5				
Lane LOS		V	æ				
Approach Delay (s)	0.0	0.2	11.5				
Approach LOS			В				
Intersection Summary							
Average Delay			0.4				1
Intersection Capacity Utilization			25.7%	JO	ICU Level of Service	Service A	
Analysis Period (min)			15				

Synchro 11 Report 02-04-2022 BA Group

2026 Future Total (AM)	
HCM Unsignalized Intersection Capacity Analysis	6: 3 Line & East Site Access

																																								A	:
*	SBR		0	0			0.92	0																																ICU Level of Service	
→	SBT	æ	10	10	Free	%0	0.92	Ξ						None																										U Level o	
—	NBT	4	15	15	Free	%0	0.92	16						None																										2	
€	NBL		0	0			0.92	0										Ξ			=======================================	4.1		2.2	100	1608	SB 1	1	0	0	1700	0.01	0.0	0.0		0.0			1.4	13.3%	15
>	EBR		0	0			0.92	0										=			=======================================	6.2		3.3	100	1070	NB 1	16	0	0	1608	0.00	0.0	0.0		0.0					
1	EBL	>-	വ	2	Stop	%0	0.92	2										27			27	6.4		3.5	66	886	EB 1	2	വ	0	886	0.01	0.1	8.7	A	8.7	V			zation	
	Movement	Lane Configurations	Traffic Volume (veh/h)	Future Volume (Veh/h)	Sign Control	Grade	Peak Hour Factor	Hourly flow rate (vph)	Pedestrians	Lane Width (m)	Walking Speed (m/s)	Percent Blockage	Right turn flare (veh)	Median type	Median storage veh)	Upstream signal (m)	pX, platoon unblocked	vC, conflicting volume	vC1, stage 1 conf vol	vC2, stage 2 conf vol	vCu, unblocked vol	tC, single (s)	tC, 2 stage (s)	tF (s)	% eauf enenb 0d	cM capacity (veh/h)	Direction, Lane #	Volume Total	Volume Left	Volume Right	CSH	Volume to Capacity	Queue Length 95th (m)	Control Delay (s)	Lane LOS	Approach Delay (s)	Approach LOS	Intersection Summary	Average Delay	Intersection Capacity Utilization	Analysis Period (min)

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HCM Unsignalized Intersection Capacity Analysis 2026 Future Total (PM) 4: 3 Line & Wellington Road 19

Movement EBI EBI EBI WBI		4	†	<i>></i>	\	ļ	4	•	←	•	۶	→	•
ordigurations	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (Verly) 5 250 15 15 185 0 10 0 0 0 0 0 0 0	Lane Configurations		₩	¥L		4			4			4	
our Factor 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92	Traffic Volume (veh/h)	2	250	15	15	185	0	9	0	10	0	0	0
Orget Factor Free Orget O	Future Volume (Veh/h)	2	250	15	15	185	0	10	0	10	0	0	0
our Factor 0.9% 0.0%	Sign Control		Free			Free			Stop			Stop	
Hour Factor 092 092 092 092 092 092 092 092 092 092	Grade		%0			%0			%0			%0	
y flow rate (riph) 5 272 16 16 201 0 11 0 11 0 0 1 strains which (m) ag Speed (m/s) that seed (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
Note (m.)	Hourly flow rate (vph)	2	272	16	16	201	0	=	0	11	0	0	0
Width (m) Width (m) Mydth (m) More None None nun flaged (eds) None None None nun flaged (eds) 1 288 515 572 526 531 ann Strage veh) 201 288 515 572 526 531 <	Pedestrians												
ng Speed (m/s) In Blockage In Blockage an storage veh) ean signal (m) and storage veh) ean storage	Lane Width (m)												
Int Blockage Lum Itare (veh) In vige In storage veh) In vige In v	Walking Speed (m/s)												
Lum flare (veh) None None nn type None None sam stgrage veh) Sam stgrage veh) Sam stgrage veh) seam signal (m) attorn undiocked 201 228 515 515 522 531 331 stage L cord vol multiocked vol 201 228 515 515 515 526 531 31 stage L cord vol multiocked vol 201 4.1 4.1 7.1 6.5 6.2 7.1 6.5 531 31 stage L cord vol 201 4.1 4.1 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1 6.5 6.2 7.1	Percent Blockage												
In Stocked well) None None an styped ewell) 1	Right turn flare (veh)												
am signage weh) aem signage weh) aem signage weh) aem signal (m) aem signage weh) aem signal (m) aem signal (m) aem signal (m) asignal (m) aem signal	Median type		None			None							
eam signal (m) allocatible decided (m) allocatible dec	Median storage veh)												
attorn unblocked attorn unblocked attorn unblocked attorn vol	Jpstream signal (m)												
stage from' vol mene 201 288 515 515 572 526 531 3 1 1 1 1 1 1 1 2 1 1 2 1 2 1 2 1 2 1	X, platoon unblocked												
lage 1 conf vol stage 2 conf vol stage 3 d. 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (\$) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (\$) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (\$) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (\$) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (\$) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 stage (\$) 2.2 3.5 1.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3	vC, conflicting volume	201			288			515	515	272	526	531	201
stage 2 conf vol annotation of	vC1, stage 1 conf vol												
rublocked vol 201 288 515 515 572 526 531 rublocked vol 4.1 4.1 6.5 515 515 572 526 531 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 eue free % 100 99 98 100 99 700 700 ppacity (verbr) 1371 1274 464 456 767 450 447 6 floor, Lane # EB 1 EB 2 WB 1 NB 1 SB 1 760 76	C2, stage 2 conf vol												
type (s) 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 5.9 4.0 1.0 <t< td=""><td>vCu, unblocked vol</td><td>201</td><td></td><td></td><td>288</td><td></td><td></td><td>515</td><td>515</td><td>272</td><td>526</td><td>531</td><td>201</td></t<>	vCu, unblocked vol	201			288			515	515	272	526	531	201
stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 eue free % pacity (veh/h) 100 99 98 100 99 100 100 pacity (veh/h) 1371 1274 464 456 767 450 447 6 ion, Lane # EB 1 EB 2 WB 1 NB 1 SB 1 464 456 767 450 447 6 447 6 100	C, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
Lear (ree % Lot) 22 3.5 4.0 3.3 3.5 4.0 Beach (ree % Lot) 100 99 98 100 99 100 <td>C, 2 stage (s)</td> <td></td>	C, 2 stage (s)												
specifiee % 100 99 98 100 99 100 apacity (ve/h/1) 1371 1274 464 456 767 447 apacity (ve/h/1) 1371 124 0 81 81 81 ne Total 277 16 217 22 0 81 81 ne Right 0 16 17 22 0 8 8 8 ne Right 0 16 17 0 11 0 8 <t< td=""><td>F (s)</td><td>2.2</td><td></td><td></td><td>2.2</td><td></td><td></td><td>3.5</td><td>4.0</td><td>3.3</td><td>3.5</td><td>4.0</td><td>3.3</td></t<>	F (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
apacity (veh/h) 1371 1274 464 456 767 450 447 410 Lane # EB1 EB2 WB1 NB1 SB1 464 456 767 450 447 410 Lane # EB1 EB2 WB1 NB1 SB1 464 456 767 450 447 410 Lane left 5 16 217 22 0	no queue free %	100			66			86	100	66	100	100	100
stion, Lane # EB 1 EB 2 WB 1 SB 1 ne Total 277 16 217 22 0 ne Left 5 0 11 0 1 0 ne Right 1371 1700 1274 579 1700 1 0	:M capacity (veh/h)	1371			1274			464	426	191	420	447	840
ne Total 277 16 217 22 0 ne Left 5 0 16 11 0 ne Right 0 17 10 0 11 0 ne Right 1371 1700 1274 579 1700 ne to Capacity 0.00 0.01 0.01 0.04 0.00 ne to Capacity 0.00 0.01 0.01 0.04 0.00 ne to Capacity 516 (m) 0.1 0.0 0.0 1.15 0.0 LLOS A A B A A B A A B A A B A A B A A B A A B A A B A A B A A B A A B A B A A B A B A B A B A B A B A B A B A B A B A B A B B A B B A B B A B B A B B A B B A B B A B	Direction, Lane #	EB 1	EB2	WB1	NB 1	SB1							
ne Left 5 0 16 11 0	Volume Total	277	16	217	22	0							
ne Right 10 16 0 11 0 1 10 1 10 1 11 10 1 11 11 11 11	Volume Left	2	0	16	Ξ	0							
1371 1700 1274 579 1700	/olume Right	0	16	0	11	0							
0.00 0.01 0.01 0.04 0.00 0.1 0.0 0.3 0.9 0.0 0.0 0.7 11.5 0.0 0.2 0.0 11.5 0.0 0.2 0.0 0.1 0.0 0.1 0.0 0.1 0.0 0.0 0.0 0.0	TS:	1371	1700	1274	579	1700							
0.1 0.0 0.3 0.9 0.0 0.2 0.0 0.7 11.5 0.0 0.2 0.7 11.5 0.0 0.2 0.7 11.5 0.0 0.8 A 0.7 11.5 0.0 0.8 A 0.8 A 0.9 0.0 0.8 A 0.9 0.0 0.8 A 0.0 B 0.0	folume to Capacity	0.00	0.01	0.01	0.04	0.00							
0.2 0.0 0.7 11.5 0.0 A B A B A A O O O O O O O O O O O O O O	Queue Length 95th (m)	0.1	0.0	0.3	6.0	0.0							
0.2 0.7 11.5 0.0 0.2 0.7 11.5 0.0 0.8 A 32.1% ICU Level of Service	Control Delay (s)	0.2	0.0	0.7	11.5	0.0							
0.2 0.7 11.5 0.0 B A 0.8 12.1% ICU Level of Service 15 15 15	ane LOS	A		A	В	A							
B A 0.8 32.1% ICU Level of Service 15	Approach Delay (s)	0.2		0.7	11.5	0.0							
0.8 32.1% ICU Level of Service 15	Approach LOS				В	A							
0.8 32.1% ICU Level of Service 15	ntersection Summary												
32.7% ICU Level of Service 15	Werade Delay			o c									
55	werage beary ntersection Capacity Utilization	_		32.1%	2	U level o	f Service			⋖			
	Analysis Period (min)			15	2								

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HCM Unsignalized Intersection Capacity Analysis 3: North Site Access/Golf Course Access & Wellington Road 19

2026 Future Total (PM)

	1	†	1	-	ţ	4	•	•	4	۶	→	*
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (veh/h)	15	245	15	15	165	15	10	0	10	15	0	10
Future Volume (Veh/h)	15	245	15	15	165	15	10	0	10	15	0	10
Sign Control		Free			Free			Stop			Stop	
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)	16	266	16	16	179	16	Ξ	0	1	16	0	=
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	195			282			536	533	274	536	533	187
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	195			282			536	533	274	536	533	187
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
bo dnene free %	66			66			86	100	66	%	100	66
cM capacity (veh/h)	1378			1280			441	442	765	441	442	822
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	298	211	22	27								
Volume Left	16	16	1	16								
Volume Right	16	16	11	=								
CSH	1378	1280	260	549								
Volume to Capacity	0.01	0.01	0.04	0.05								
Queue Length 95th (m)	0.3	0.3	1.0	1.2								
Control Delay (s)	0.5	0.7	11.7	11.9								
Lane LOS	A	A	Ω	Ω								
Approach Delay (s)	0.5	0.7	11.7	11.9								
Approach LOS			В	В								
Intersection Summary												
Average Delay			1.6									
Intersection Capacity Utilization	ntion		27.7%	2	U Level o	ICU Level of Service			A			
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis 6: 3 Line & East Site Access

2026 Future Total (PM)

	4	-	•	←	→	`
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	>-			₩;	4	L
Figure Volume (Veh/h)	n n	0	n u	2 (2	8 %	o r
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)	2	0	2	Ξ	22	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	46	24	27			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	46	24	27			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	100	100			
cM capacity (veh/h)	396	1052	1587			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	2	16	27			
Volume Left	2	2	0			
Volume Right	0	0	D.			
cSH	396	1587	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.1	0.1	0.0			
Control Delay (s)	8.8	2.3	0.0			
Lane LOS	V	⋖				
Approach Delay (s)	8.8	2.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			15.0%	<u></u>	l level o	ICIT level of Service
Analysis Period (min)			15			

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HCM Unsignalized Intersection Capacity Analysis 5: 3 Line & West Site Access

2026 Future Total (PM)

0.92 25 25 25 0% 0.92 None 15 15 16 0% 0.92 None 0.92 2.2 100 1580 0.02 32 0.92 3.3 0.00 30 30 Stop 0% 0.92 5 46 3.5 46 Direction, Lane #
Volume Total
Volume Left
CSH
Volume Right
CSH
Volume In Post (CSH
Control Delay (S)
Lane LOS Lane Configurations Traffic Volume (veh/h) Future Volume (Veh/h) Grade
Peak Hour Factor
Peak Hour Factor
Peak Hour Factor
Peak Hour Factor
Lane Width (m)
Walking Speed (ms)
Walking Speed (ms)
Percent Blockage
Right turn flare (veh)
Median ype
Median ype
Right turn flare (veh)
Wedian storage veh)
Upstream signal (m)
Pex, Baltoon unblocked
vc, conflicting volume
vc1, stage 1 cont vol
vc2, stage 2 cont vol
vc3, stage 2 cont vol
vc2, stage 2 cont vol
vc2, stage 2 cont vol
vc2, stage 5 cont vol
vc2, stage 6 S
FC, Stage (s)
FC, FC, Stage (s)
FC, FC, Stage (Sign Control

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ICU Level of Service

0.8 13.3% 15

Intersection Summary
Average Delay
Intersection Capacity Utilization
Analysis Period (min)

0.0

0.0

Approach Delay (s) Approach LOS

2031 Future Background (PM) HCM Unsignalized Intersection Capacity Analysis 4: 3 Line & Wellington Road 19

165 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	↑ E
10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	F _12
Slop Slop Slop Slop O'8 0'8 0'8 0'8 0'8 0'8 0'8 0'8 0'8 0'8 0	245 15 5
0.92 0.92 0.92 0.92 11 0 0 0 0 465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 35 40 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	Free 0%
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	0.92 0.92 0.92
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	266 16 5
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	
465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	None
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	
465 465 266 465 481 465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 505 491 773 505 481	
465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	282
465 465 266 465 481 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481	
7.1 6.5 6.2 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.5 8.5 7.1 6.	787
3.5 4.0 3.3 3.5 4.0 98 100 100 100 505 491 773 505 481	4.1
35 4.0 3.3 3.5 4.0 98 100 100 100 100 505 491 773 505 481 A	
505 491 773 505 481	2.2
505 491 773 505 481	100
	1280
	EB2 WB1 NB1
	184
	0 5 11
	0 000
	1/00 1/280 505
	0.00
Ш	0.2
Ш	×
Ш	12
	В
	30

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2031 Future Background (AM) HCM Unsignalized Intersection Capacity Analysis 4: 3 Line & Wellington Road 19

Modernerian EBI EBI WBI WBI WBI NBI NBI NBI SBI FIGURATION TIS 5 175 0 15 0 15 0 5 15 0 15 0 0 15 0 5 15 0 0 15 0 <th< th=""><th></th><th>1</th><th>†</th><th>×</th><th>-</th><th>Ļ</th><th>4</th><th>€</th><th>—</th><th>•</th><th>۶</th><th>→</th><th>*</th></th<>		1	†	×	-	Ļ	4	€	—	•	۶	→	*
h) 0 115 5 5 175 0 15 0 0 15 0 0 15 0 0 10 0 1	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
None	Lane Configurations		₩	*		4			4			4	
Vrb) 0 115 5 175 0 15 0 0 15 0 Orgential organization Free Free Free 0 0 15 0 15 0 0 15 0 0 15 0 <td>Traffic Volume (veh/h)</td> <td>0</td> <td>115</td> <td>വ</td> <td>2</td> <td>175</td> <td>0</td> <td>15</td> <td>0</td> <td>0</td> <td>15</td> <td>0</td> <td>2</td>	Traffic Volume (veh/h)	0	115	വ	2	175	0	15	0	0	15	0	2
Free Free Slop O% O% O% O% O% O% O% O	Future Volume (Veh/h)	0	115	2	2	175	0	15	0	0	15	0	2
None	Sign Control		Free			Free			Stop			Stop	
0,92 0,92 0,92 0,92 0,92 0,92 0,92 0,92	Grade		%0			%0			%0			%0	
h) 0 125 5 190 0 16 0 16 0 16 0 16 0 16 0 16 0 16	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
None	Hourly flow rate (vph)	0	125	2	2	190	0	16	0	0	16	0	2
None None None None None	Pedestrians												
None None None None Sign Sign Sign Sign Sign Sign Sign Sign	Lane Width (m)												
None	Walking Speed (m/s)												
None None None None	Percent Blockage												
None None None None	Right turn flare (veh)												
190	Median type		None			None							
ed 190	Median storage veh)												
ed 190	Upstream signal (m)												
Pee 190 130 330 325 125 325 330 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	pX, platoon unblocked												
190	vC, conflicting volume	190			130			330	325	125	325	330	190
190 130 330 325 125 325 330 330 325 125 325 330 330 325 125 325 330 330 325 125 325 330 325 325 330 325 325 325 330 325	vC1, stage 1 conf vol												
190	vC2, stage 2 conf vol												
4.1 4.1 7.1 6.5 6.2 7.1 6.5 6.2 1.1 6.5 6.2 1.1 6.5 6.2 7.1 6.2 7.1 6.	vCu, unblocked vol	190			130			330	325	125	325	330	190
2.2 2.2 3.5 4.0 3.3 3.5 4.0 100 100 1384 1455 618 591 926 626 587 6 688 1384 1455 618 591 926 626 587 6 688 1384 1384 1881 NB1 SB1	tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
22 22 35 40 33 35 40 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97 100 100 97	tC, 2 stage (s)												
100	fF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
1384 1455 618 591 926 626 587 1884 1455 618 591 926 626 587 618 618 618 618 626	po dueue free %	100			100			46	100	100	46	100	66
EB1 EB2 WB1 NB1 SB1 125 5 195 16 21 0 5 10 5 16 16 1384 1700 1455 618 669 0.00 0.00 0.03 0.03 n) 0.0 0.0 0.1 10.6 0.0 0.2 11.0 10.6 A B B 0.0 0.2 11.0 10.6 I 12 12 Utilization 26.2% ICU Level of Service 15	cM capacity (veh/h)	1384			1455			618	591	926	979	287	852
125 5 195 16 21 0 0 5 16 16 0 5 0 0 5 16 1384 1700 1455 618 669 0.00 0.00 0.01 0.03 0.03 0.0 0.0 0.1 10.6 0.0 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.1 1.2 0.1 1.2 0.1 1.2 0.1 1.2 0.1 1.2 0.1 1.2 0.1 1.2 0.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3	Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
0 0 0 5 16 16 0 1384 1700 1455 618 669 0.00 0.00 0.00 0.03 0.03 0.0 0.0 0.1 0.6 0.8 0.0 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.1 1.2 0.1 1.2 0.1 1.2 0.1 1.2 0.1 1.2	Volume Total	125	2	195	16	21							
1384 1700 1455 618 669 0.00 0.00 0.00 0.03 0.03 0.0 0.0 0.1 0.6 0.8 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 1.2 11.0 10.6 0.0 2.2 11.0 10.6 0.0 2.2 11.0 10.6 0.1 1.2 Evel of Service 15	Volume Left	0	0	2	16	16							
1384 1700 1455 618 669 000 000 003 003 00 0.0 0.1 0.6 8 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 0.2 11.0 10.6 0.0 1.2 11.0 10.6 0.0 2.2 11.0 10.6 0.0 2.2 11.0 10.6 0.0 1.2 12.0 Evel of Service 15	Volume Right	0	2	0	0	2							
m) 0.00 0.00 0.03 0.03 0.03 0.00 0.0 0.0 0	CSH	1384	1700	1455	618	699							
n) 0.0 0.0 0.1 0.6 0.8 0.0 0.0 0.2 11.0 10.6 A B B B 0.0 0.2 11.0 10.6 B B V 1.2 Utilization 26.2% ICU Level of Service	Volume to Capacity	0.00	0.00	0.00	0.03	0.03							
0.0 0.0 1.0 10.6 A B B B 0.0 0.2 11.0 10.6 B B I B I I I I I I I I I I I I I I I I	Queue Length 95th (m)	0.0	0.0	0.1	9.0	0.8							
0.0 0.2 11.0 10.6 1.0 1.2 Utilization 26.2% ICU Level of Service	Control Delay (s)	0.0	0.0	0.2	11.0	10.6							
0.0 0.2 11.0 10.6 1	Lane LOS			A	В	В							
B B 1 1.2 Utilization 26.2% ICU Level of Service 15 15	Approach Delay (s)	0.0		0.2	11.0	10.6							
y 1.2 Utilization 26.2% ICU Level of Service 15	Approach LOS				В	В							
1.2 Utilization 26.2% ICU Level of Service 15	Intersection Summary												
Ullization 26.2% ICU LEVEL Of SETVICE 15	Average Delay	1		1.2	2					٥			
	Intersection Capacity Utiliza	IION		26.2%	2	U Level o	or Service			⋖			
	Analysis Period (min)			2									

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HCM Unsignalized Intersection Capacity Analysis
3: North Site Access/Golf Course Access & Wellington Road 19

	1	Ť	<u> </u>	-	Ļ	4	•	←	•	۶	→	*
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (veh/h)	10	125	വ	2	200	15	15	0	10	2	0	2
Future Volume (Veh/h)	10	125	2	2	200	15	15	0	10	2	0	2
Sign Control		Free			Free			Stop			Stop	
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)	=	136	2	2	217	16	16	0	=	22	0	2
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	233			141			400	404	138	406	398	225
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	233			141			400	404	138	406	398	225
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	66			100			46	100	66	66	100	66
cM capacity (veh/h)	1335			1442			222	530	910	543	533	814
Direction, Lane #	EB 1	WB1	NB 1	SB1								
Volume Total	152	238	27	10								
Volume Left	=	2	16	2								
Volume Right	2	16	11	2								
CSH	1335	1442	657	652								
Volume to Capacity	0.01	0.00	0.04	0.02								
Queue Length 95th (m)	0.2	0.1	1.0	0.4								
Control Delay (s)	9.0	0.2	10.7	10.6								
Lane LOS	⋖	⋖	В	В								
Approach Delay (s)	9.0	0.7	10.7	10.6								
Approach LOS			В	В								
Intersection Summary												
Average Delay			1.3									
Intersection Capacity Utilization	lion		22.8%	2	U Level o	ICU Level of Service			⋖			
Analysis Period (min)			15									

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HCM Unsignalized Intersection Capacity Analysis 2: South Site Access & Wellington Road 19

2031 Future Total (AM)

																																								A	
•	NBR		വ	5			0.92	2										150			150	6.2		3.3	66	897														of Service	
√	3T NBL	≱	215 25		0,		0	234 27						Je				394			394	6.4		3.5	96	609														ICU Level of Service	
+	WBL WBT		5 21		Fre		_	5 23						None				152			152	4.1		2.2	100	1429	NB 1	32	27	2	641	0.05	1.3	10.9	В	10.9	В		60	25.3%	15
*	EBR		2	2			0.92	2																			WB 1	239	2	0	1429	0.00	0.1	0.2	A	0.2					
†	EBT	€Œ.	135	135	Free	%0	0.92	147						None													EB 1	152	0	2	1700	0.00	0.0	0.0		0.0				zation	
	Movement	Lane Configurations	Traffic Volume (veh/h)	Future Volume (Veh/h)	Sign Control	Grade	Peak Hour Factor	Hourly flow rate (vph)	Pedestrians	Lane Width (m)	Walking Speed (m/s)	Percent Blockage	Right turn flare (veh)	Median type	Median storage veh)	Upstream signal (m)	pX, platoon unblocked	vC, conflicting volume	vC1, stage 1 conf vol	vC2, stage 2 conf vol	vCu, unblocked vol	tC, single (s)	tC, 2 stage (s)	1F (S)	bo dnene tree %	cM capacity (veh/h)	Direction, Lane #	Volume Total	Volume Left	Volume Right	cSH	Volume to Capacity	Queue Length 95th (m)	Control Delay (s)	Lane LOS	Approach Delay (s)	Approach LOS	Intersection Summary	Average Delay	Intersection Capacity Utilization	Analysis Period (min)

HCM Unsignalized Intersection Capacity Analysis 5: 3 Line & West Site Access

2031 Future Total (AM)

	•	~	•	←	→	*	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	>			₩	\$		
Traffic Volume (veh/h)	2	0	0	70	10	വ	
Future Volume (Veh/h)	2	0	0	70	10	5	
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)	2	0	0	22	=	5	
Pedestrians							
Lane Width (m)							
Walking Speed (m/s)							
Percent Blockage							
Right turn flare (veh)							
Median type				None	None		
Median storage veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume	36	14	16				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	36	14	16				
tC, single (s)	6.4	6.2	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	66	100	100				
cM capacity (veh/h)	677	1067	1602				
Direction, Lane #	EB 1	NB 1	SB1				
Volume Total	2	22	16				
Volume Left	2	0	0				
Volume Right	0	0	2				
cSH	77.6	1602	1700				
Volume to Capacity	0.01	0.00	0.01				
Queue Length 95th (m)	0.1	0.0	0.0				
Control Delay (s)	8.7	0.0	0.0				
Lane LOS	⋖						
Approach Delay (s)	8.7	0.0	0.0				
Approach LOS	V						
Intersection Summary							
Average Delay			1.0				
Intersection Capacity Utilization		,-	13.3%	J)	ICU Level of Service	Service A	
Analysis Period (min)			15				

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HCM Unsignalized Intersection Capacity Analysis 4: 3 Line & Wellington Road 19

2031 Future Total (AM)

			•				-	-	-			
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		÷	¥C.		4			4			4	
Traffic Volume (veh/h)	0	135	വ	10	200	0	15	0	10	15	0	
Future Volume (Veh/h)	0	135	2	10	200	0	15	0	10	15	0	
Sign Control		Free			Free			Stop			Stop	
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)	0	147	2	11	217	0	16	0	11	16	0	
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	217			152			391	386	147	397	391	217
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	217			152			391	386	147	397	391	217
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			66			67	100	66	4	100	66
cM capacity (veh/h)	1353			1429			261	544	006	553	540	823
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1							
Volume Total	147	2	228	27	21							
Volume Left	0	0	1	16	16							
Volume Right	0	2	0	11	2							
CSH	1353	1700	1429	663	009							
Volume to Capacity	0.00	0.00	0.01	0.04	0.04							
Oueue Length 95th (m)	0.0	0.0	0.2	1.0	6.0							
Control Delay (s)	0.0	0.0	0.4	10.7	11.2							
Lane LOS			A	В	В							
Approach Delay (s)	0.0		0.4	10.7	11.2							
Approach LOS				В	В							
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization	tion		28.7%	2	U Level o	ICU Level of Service			V			

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HCM Unsignalized Intersection Capacity Analysis 2: South Site Access & Wellington Road 19

2031 Future Total (PM)

																																								А	
•	NBR		2	2			0.92	5										334			334	6.2		3.3	66	707														ICU Level of Service	
√	WBT NBL	ľ	195 10		Free Stop		0	212 11						None				226			226	6.4		3.5	86	490														ICU Level	
,	WBL		വ	2				2						_				348			348	4.1		2.2	100	1211	NB 1	16	11	2	542	0.03	0.7	11.8	В	11.8	മ		0.4	27.0%	15
<u> </u>	EBR		22	25			0.92	27																			WB1	217	2	0	1211	0.00	0.1	0.2	A	0.2					
†	EBT	43	295	295	Free	%0	0.92	321						None													EB 1	348	0	27	1700	0.20	0.0	0.0		0.0				ion	
	Movement	Lane Configurations	Traffic Volume (veh/h)	Future Volume (Veh/h)	Sign Control	Grade	Peak Hour Factor	Hourly flow rate (vph)	Pedestrians	Lane Width (m)	Walking Speed (m/s)	Percent Blockage	Right turn flare (veh)	Median type	Median storage veh)	Upstream signal (m)	pX, platoon unblocked	vC, conflicting volume	vC1, stage 1 conf vol	vC2, stage 2 conf vol	vCu, unblocked vol	tC, single (s)	tC, 2 stage (s)	tF (s)	p0 queue free %	cM capacity (veh/h)	Direction, Lane #	Volume Total	Volume Left	Volume Right	cSH	Volume to Capacity	Queue Length 95th (m)	Control Delay (s)	Lane LOS	Approach Delay (s)	Approach LOS	Intersection Summary	Average Delay	Intersection Capacity Utilization	Analysis Period (min)

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HCM Unsignalized Intersection Capacity Analysis 6: 3 Line & East Site Access

2031 Future Total (AM)

																																								A	
`	SBR		0	0			0.92	0																																f Service	
→	SBT	2	_	10	_		O	=						None																										ICU Level of Service	
←	NBL NBT	4	0 15	0 15	Free		0	0 16						None				11			7	4.1		2.2	100	1608	SB 1	11	0	0	1700	0.01	0.0	0.0		0.0			1.4	13.3%	
* *	EBR		0	0				0										11			11	6.2				1070 1	NB1 S	16	0				0.0	0:0		0.0				13	
1	EBL	>	വ	2	Stop	%0	0.92	2										27			27	6.4		3.5	66	886	EB 1	2	2	0	988	0.01	0.1	8.7	A	8.7 A	C			ation	
	Movement	Lane Configurations	Traffic Volume (veh/h)	Future Volume (Veh/h)	Sign Control	Grade	Peak Hour Factor	Hourly flow rate (vph)	Pedestrians	Lane Width (m)	Walking Speed (m/s)	Percent Blockage	Right turn flare (veh)	Median type	Median storage veh)	Upstream signal (m)	pX, platoon unblocked	vC, conflicting volume	vC1, stage 1 conf vol	vC2, stage 2 conf vol	vCu, unblocked vol	tC, single (s)	tC, 2 stage (s)	fF (s)	bo dnene tree %	cM capacity (veh/h)	Direction, Lane #	Volume Total	Volume Left	Volume Right	HS3	volume to Capacity	Queue Length 95th (m)	Control Delay (s)	Lane LOS	Approach Delay (s)	Apploacii EO3	Intersection Summary	Average Delay	Intersection Capacity Utilization	Analysis Period (min)

HCM Unsignalized Intersection Capacity Analysis 2031 Future Total (PM) 4: 3 Line & Wellington Road 19

15 200 0 10 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0	EBL EBT
None None SER 558 558 299 569 574 7.1 6.5 6.2 7.1 6.5 0 0 0 1700 0 0 A A CU Level of Service A 11 0 0 11 0 0 120 0 0 A 4 5 4.0 3.3 3.5 4.0 A 6 6 7 7 4.0 A 7 10 6.5 6.2 7.1 6.5 0 0 0 0 0 0 0 A 8 0 0 A 9	275 Free 0%
None 558 558 299 569 574 568 558 299 569 574 7.1 6.5 6.2 7.1 6.5 0 97 100 99 100 100 435 431 741 421 422 SB1 00 00 00 00 00 00 A A A O A A A A A A A	0.92 0.92 0.92 5 299 16
None 558 558 299 569 574 558 558 299 569 574 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 97 100 99 100 100 435 431 741 421 422 SB1 0 0 0 0 1700 0.00 0.00 0.00 A A 0.0 A A 0.0 A A O.0 A A A O.0 A A A O.0 A A A O.0 A A A A O.0 A A A A O.0 A A A A A O.0 A A A A A A A A A A A A A A A A A A A	
SER 558 299 569 574 558 558 299 569 574 7.1 6.5 6.2 7.1 6.5 0 77 100 99 100 100 435 431 741 421 422 SB1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	M
558 558 299 569 574 558 558 299 569 574 7.1 6.5 6.2 7.1 6.5 0 97 100 99 100 100 435 431 741 421 422 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	None
558 558 299 569 574 558 558 299 569 574 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 0 97 100 99 100 100 435 431 741 421 422 0 0 0 1700 0.00 0.00 A A CU Level of Service A	
SBB 558 299 569 574 7.1 6.5 6.2 7.1 6.5 3.5 4.0 3.3 3.5 4.0 97 100 99 100 100 435 431 741 421 422 0 0 0 0 0.00 0.00 0.00 A A A O A A O A A A O A A A A A A A A	217
SB 288 249 859 854 7.1 6.5 6.2 7.1 6.5 8.4 0 3.3 3.5 4.0 97 100 99 100 100 435 431 741 421 422 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
3.5 4.0 3.3 3.5 4.0 100 97 100 99 100 100 435 431 741 421 422 881 421 422 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4.1
SB1	c
SB1 435 431 741 421 422 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
SB 1 0 0 0 0.0 0.0 0.0 0.0 A 0.0 A 0.0 A 0.0 A 0.0 A	
0 0 0 0.00 0.0 0.0 A A CU Level of Service	EB2 WB1
1700 0.00 0.0 0.0 0.0 A A CU Level of Service	304 16 233 5 0 16
1700 0.00 0.0 0.0 A A CU Level of Service	
0.00 0.0 0.0 A A CU Level of Service	1700 1245
0.0 0.0 A A CU Level of Service	0.01 0.01
A A A CU Level of Service	0.0 0.0 0.3
0.0 A CU Level of Service	A
A ICU Level of Service	0.7
П	
	0.8
	32.9% 15

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HCM Unsignalized Intersection Capacity Analysis 3: North Site Access/Golf Course Access & Wellington Road 19

2031 Future Total (PM)

Movement EBI EBI WBI		1	†	1	>	ţ	4	•	←	•	۶	→	*
Configurations 44	Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (verlyt) 15 270 15 18 180 15 10 0 10 15 0 0 10 0 10 0	Lane Configurations		4			4			4			4	
Processory (Verlyth) 15 270 15 15 180 15 10 0 10 15 0 0 0 0 0 0 0 0 0 0 0 0	Traffic Volume (veh/h)	15	270	15	15	180	15	10	0	10	15	0	10
Property	Future Volume (Veh/h)	15	270	15	15	180	15	10	0	10	15	0	19
Hour Factor (pt) 16 293 16 16 196 197 098 098 099 099 099 099 099 099 099 099	Sign Control		Free			Free			Stop			Stop	
Mode (ph) 16 292 092 092 092 092 092 092 092 092 092 092 092 092 092 092 093 14 16 19 11 16 0 11 16 11 11 16 0 <td>Grade</td> <td></td> <td>%0</td> <td></td> <td></td> <td>%0</td> <td></td> <td></td> <td>%0</td> <td></td> <td></td> <td>%0</td> <td></td>	Grade		%0			%0			%0			%0	
March Marc	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
width (m) None	Hourly flow rate (vph)	16	293	16	16	196	16	1	0	1	16	0	Ξ
Width (m) Width (m) ng Speed (m/s) None None tun flackage None None tun flackage (eth) 80 577 301 580 577 301 300 577 301 580 577 </td <td>Pedestrians</td> <td></td>	Pedestrians												
ng Speed (m/s) In Blockage In Blockage In Intrinder (veh) None	Lane Width (m)												
turn flaer (verb) None In storage veh) In storage veh In storage veh) In storage veh In storage veh) In storage veh) In storage veh In stora	Walking Speed (m/s)												
Lurn flare (veh) None None In type None None nn type None None sam stgrage veh) Sem Strage veh) Sem Strage veh aem stgrad (m) Sem Strage veh Sem Strage veh aem stgrad (mink) ordered 212 309 580 577 301 580 577 37	Percent Blockage												
In type in the proper of the property of the p	Right turn flare (veh)												
na storage veh) am storage (m) an storage (m) an storage (m) attage 2 conf vol attage 3 conf vol attage 6 conf vol attage 6 conf vol attage 6 conf vol attage 7 conf vol attage 7 conf vol attage 8 conf vol attage 9 conf vol attage 8 conf vol attage 9 conf vol attage 9 conf vol attage 8 conf vol attage 9 con attage	Median type		None			None							
sam signal (m) agon riboded ago	Median storage veh)												
alton unblocked 212 309 580 577 301 580 577 31 212 328 22 77 301 580 577 31 213 329 577 301 580 577 31 213 329 577 301 580 577 31 213 32 57 301 580 577 31 22 2.2 2.2 3.5 4.0 3.3 3.5 4.0 23 32 22 2.2 3.5 4.0 3.3 3.5 4.0 24 41 1 152 31 12.3 25 228 2.2 27 27 41 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Upstream signal (m)												
Atage 2 conf vol at age and belief to Capacity Certificity Celture	pX, platoon unblocked												
stage 1 cont vol stage 1 cont vol stage 1 cont vol stage 1 cont vol stage 2 cont vol stage 5 cont vol stage 6 cont vol<	vC, conflicting volume	212			309			280	217	301	280	277	204
stage 2 conf vol Annocked vol 212 309 580 577 301 580 577 3 annocked vol 212 309 580 577 301 580 577 3 annocked vol 212 309 580 577 301 585 577 3 annocked vol 22 2 2 3.5 4.0 3.3 3.5 4.0 set free % 99 99 97 7100 99 96 7100 8 40 8 40 8 40 8 40 8 40 8 40 8 40 8	vC1, stage 1 conf vol												
ratio cked vol 212 309 580 577 301 580 577 301 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 577 310 580 570 570 570 570 570 570 570 570 570 57	vC2, stage 2 conf vol												
type (s) 4.1 4.1 7.1 6.5 6.2 7.1 6.5 stage (s) 2.2 2.2 3.5 4.0 3.3 3.5 4.0 eue free % 99 99 97 100 99 96 100 pacify (veh/h) 1358 1252 2.2 412 417 739 412 417 81 per Left 16 16 16 11 16 81 17 17 17 18 11 16 16 17 17 18	vCu, unblocked vol	212			309			280	277	301	280	277	204
stage (s) 2.2 3.5 4.0 3.3 3.5 4.0 eue free % 99 97 100 99 96 100 pacify (vehrh) 1358 1252 412 417 739 412 417 6 100 pacify (vehrh) 1358 1252 27 412 417 739 412 417 6 100 99 96 100 99 96 100 99 96 100 99 96 100 99 96 100 99 96 100 417	tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
eue free % 99 92 35 40 33 35 40 99 94 99 94 90 90 90 90 90 90 90 90 90 90 90 90 90	tC, 2 stage (s)												
99 99 96 100 1358 1252 412 417 739 412 417 1368 1282 22 27 16 16 11 16 1388 1252 529 519 0.01 0.01 0.01 0.05 0.03 0.3 1.0 1.3 0.5 0.7 12.1 12.3 A A B B C C C C C C C C C C C C C C C C C C	IF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
135B	po dueue free %	66			66			4	100	66	%	100	66
EB1 WB1 NB1 SB1 325 228 22 27 16 16 11 11 1358 1252 529 519 0.01 0.01 0.04 0.05 (m) 0.3 0.3 1.0 1.3 A A B B B 0.5 0.7 12.1 12.3 A A B B B 0.5 0.7 12.1 12.3 Py 1.5 ICU Level of Service 1.5 IS	cM capacity (veh/h)	1358			1252			412	417	739	412	417	837
325 228 22 27 16 16 11 16 16 16 11 11 1858 1252 529 519 0.01 0.01 0.04 0.05 0.01 0.01 0.04 0.05 0.07 12.1 12.3 A A B B 0.5 0.7 12.1 12.3 B B 0.5 0.7 12.1 12.3 Py 1Uilization 29.2% ICU Level of Service 15	Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
16 16 11 16 16 16 11 16 18 16 16 11 11 18 18 18 18 2 529 519 0.01 0.01 0.04 0.05 0.5 0.7 12.1 12.3 A A B B B 0.5 0.7 12.1 12.3 B B 0.5 0.7 12.1 12.3 Py 1 Utilization 29.2% ICU Level of Service 1 15 15 15 15 15 15 15 15 15 15 15 15 15	Volume Total	325	228	22	27								
(m) 0.3 0.3 1.0 1.3 1.5 1.0 1.3 1.0 1.3 1.0 1.3 1.0 1.3 1.0 1.3 1.0 1.3 1.0 1.3 1.3 1.5 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	Volume Left	16	16	Ξ	16								
1358 1252 529 519 001 0.01 0.04 0.05 (m) 0.3 0.3 1.0 1.3 A A B B B 0.5 0.7 12.1 12.3 Py 1.5 1.5 ICU Level of Service 1 1.5 1.5 1.5 1.5 1.5 1.5 1.5	Volume Right	16	16	7	7								
(m) 0.01 0.01 0.04 0.05 (m) 0.3 0.3 1.0 1.3 0.5 0.7 12.1 12.3 A A B B B 0.5 0.7 12.1 12.3 B B B 1.9 1.5 ICU Level of Service 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	cSH	1358	1252	529	519								
(m) 0.3 0.3 1.0 1.3 0.5 0.7 12.1 12.3 A A B B B 0.5 0.7 12.1 12.3 B B B 1.5 I.9 I.9 I.9 I.5 ICU Level of Service	Volume to Capacity	0.01	0.01	0.04	0.02								
0.5 0.7 12.1 12.3 A A B B B B B B B B Iny Ity Utilization 29.2% ICU Level of Service	Queue Length 95th (m)	0.3	0.3	1.0	1.3								
A A B B B 0.5 0.7 12.1 12.3 B B B B B B B B B B B B B B B B B B B	Control Delay (s)	0.5	0.7	12.1	12.3								
0.5 0.7 12.1 12.3 INY 1.5 1.5 1.5 1.0 Level of Service 1.5 1.5	Lane LOS	A	⋖	В	В								
B B mmary 1.5 pacity Utilization 29.2% ICU Level of Service (min) 15	Approach Delay (s)	0.5	0.7	12.1	12.3								
nmary 1.5 1.5 1.0 Level of Service (min) 15	Approach LOS			В	В								
1.5 pacity Utilization 29.2% ICU Level of Service (min) 15	Intersection Summary												
pacity Utilization 29.2% ICU Level of Service (min) 15	Average Delay			1.5									
15	Intersection Capacity Utiliza	rtion		29.2%	2	U Level o	of Service			⋖			
	Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 6: 3 Line & East Site Access

2031 Future Total (PM)

	4	>	•	←	→	*
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	>			÷	£,	
Traffic Volume (veh/h)	2	0	2	10	50	5
Future Volume (Veh/h)	2	0	2	10	70	5
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)	2	0	2	Ξ	22	വ
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	46	24	27			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	46	24	27			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	66	100	100			
cM capacity (veh/h)	396	1052	1587			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	2	16	27			
Volume Left	2	2	0			
Volume Right	0	0	2			
CSH	396	1587	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (m)	0.1	0.1	0.0			
Control Delay (s)	8.8	2.3	0.0			
Lane LOS	∢	⋖				
Approach Delay (s)	8.8	2.3	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization	_		15.0%	⊇	J Level o	ICU Level of Service A
Analysis Period (min)			15			

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HCM Unsignalized Intersection Capacity Analysis 5: 3 Line & West Site Access

2031 Future Total (PM)

	•	1	*	+	_	7	
	١	/		-	+	•	
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations	>			4	£		
Traffic Volume (veh/h)	വ	0	0	15	25	2	
Future Volume (Veh/h)	2	0	0	12	25	2	
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)	2	0	0	16	27	2	
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	46	30	32				
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	46	30	32				
tC, single (s)	6.4	6.2	4.1				
tC, 2 stage (s)							
tF (s)	3.5	3.3	2.2				
p0 queue free %	66	100	100				
cM capacity (veh/h)	996	1045	1580				
Direction, Lane #	EB 1	NB 1	SB 1				
Volume Total	2	16	32				
Volume Left	2	0	0				
Volume Right	0	0	2				
CSH	965	1580	1700				
Volume to Capacity	0.01	0.00	0.02				
Queue Length 95th (m)	0.1	0.0	0.0				
Control Delay (s)	8.8	0.0	0.0				
Lane LOS	A						
Approach Delay (s)	89.	0.0	0.0				
Approach LOS	V						
Intersection Summary							
Average Delay			0.8				
Intersection Capacity Utilization	ion		13.3%	⊴	ICU Level of Service	Service	Α
Analysis Period (min)			15				

Appendix E Signal Warrant Excerpts and Analysis

4.4 Justification 1 – Minimum Vehicle Volume

Purpose

The Minimum Vehicle Volume Justification is intended for applications where the principal reason for installing a traffic signal is the cumulative delay produced by a large volume of intersecting traffic at an unsignalized intersection.

Justification 1A reflects the lowest total traffic on all approaches, and Justification 1B reflects the lowest volume on the minor road for which the average delay is similar for both signalized and unsignalized conditions. Therefore, this justification is intended to address the minimum volume conditions for which signalization can be used to minimize total average vehicle delay at the intersection.

As volumes increase beyond threshold criteria, delay to traffic on the minor road will increase, and the overall delay for the intersection will be greater than would be the case if minor delays were distributed between both main and minor roadways.

Standard

The need for a traffic signal must be considered if both Justification 1A and Justification 1B are 100% fulfilled.

If Justifications 1A and 1B do not reach or exceed 100%, but are at least 80% fulfilled, the lesser fulfilled of the Justifications 1A or 1B can be used in the assessment of Justification 3, the Combination Justification.

In applying Justification 1 (Minimum Vehicle Volume) for "T" intersections, the justification values for the minor street are increased by 50%. This approach reflects the reduction in traffic volumes due to the lack of one of the approaches.

Table 12 may be used for Justification 1: Minimum Vehicle Volume. Restricted Flow is applicable to Urban Conditions, while Free Flow is applicable to Rural conditions (see Section 4.2 for definitions).

Guidelines

Justification 1 evaluates total intersection volume and total minor road volume. The hours selected should represent the eight highest hours of the 24-hour traffic volume, and they do not have to be consecutive hours. Each one of the highest eight hours of the entering volumes is compared to the justification value. The justification should be met for each of the eight hours. "Sectional Percent" is calculated in Table 12 for reference purposes, and may indicate how close an intersection is to achieving full justification. "Total Across" is calculated by adding all 8-hour compliance percentages. The Compliance % figures used in Table 12 must not exceed 100%.

Table 12 - Justification 1 - Minimum Vehicle Volume

100% SATISFIED –	YES 🗖	NO \square
80% SATISFIED -	YES 🗖	NO 🗆

			JIREMENT BRACKE	S)		F	PERCENTAC		NT				
APPROACH LANES	1	1	2 or N	IORE			HOUR	ENDING					
FLOW CONDITION	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW								TOTAL ACROSS	
A. ALL APPROACH	480 (385)	720 (575)	600 (480)	900 (720)									
LANES		100% FU	ILFILLED										SECTIONAL
LANES			ILFILLED										PERCENT
	ACTUA	AL % IF BE	LOW 80%	VALUE									-
											Т	OTAL DOW	V / 8 =
B. MINOR STREET	120* (95)*	170* (135)*	120* (95)*	170* (135)*								TOTAL ACROSS	
BOTH APPROACHES		100% FU	LFILLED	•									SECTIONAL
BOTTAFFROACTIES		80% FU	ILFILLED										PERCENT
	ACTUA	AL % IF BE	LOW 80%	VALUE									PERCENT
						•		•		•	1 т	OTAL DOW	1/8=

^{*} For "T" intersections, these values should be increased by 50%.

4.5 Justification 2 – Delay to Cross Traffic

Purpose

The Delay to Cross Traffic Justification is intended for applications where the traffic volume on the main road is so heavy that traffic on the minor road suffers excessive delay or hazard in entering or crossing the main road.

Standard

The need for a traffic signal must be considered if both Justification 2A and Justification 2B are 100% fulfilled. If Justifications 2A or 2B do not meet or exceed 100%, but both are at least 80% fulfilled, the lesser fulfilled of the justifications 2A or 2B can be used in the assessment of Justification 3, the Combination Justification.

Table 13 may be used for Justification 2: Delay to Cross Traffic. Restricted Flow is applicable to Urban Conditions, while Free Flow is applicable to Rural Conditions (see Section 4.2 for definitions).

Table 13 – Justification 2 – Delay to Cross Traffic

										SFIED – SFIED –		YES YES	
			IREMENT BRACKE			ı	PERCENTA	GE WARRA	NT				
APPROACH LANES	1		2 or I	MORE			HOUF	RENDING					
FLOW CONDITION		RESTR. FLOW	FREE FLOW	RESTR. FLOW								TOTAL ACROSS	
A. MAJOR STREET	480 (385)	720 (575)	600 (480)	900 (720)									
BOTH APPROACHES			LFILLED LFILLED LOW 80%	VALUE									SECTIONAL PERCENT
	ACTUAL	. 70 IF DE	LUVV 60%	VALUE							Т	OTAL DOW	N / 8 =
										L		O I AL DOWN	170
B. TRAFFIC	50 (40)	75 (60)	50 (40)	75 (60)								TOTAL ACROSS	
CROSSING MAJOR	1	100% FU											SECTIONAL
STREET			LFILLED										PERCENT
	ACTUAL	. % IF BE	LOW 80%	VALUE								OTAL DOW!	
												OTAL DOW	N / δ =

Guidelines

Justification 2 evaluates major road volume and minor road movements that cross the intersection. The hours selected should represent the eight highest hours of the 24-hour traffic volume, and they do not have to be consecutive hours. The entering volumes of each of the highest eight hours are compared to the justification value. The justification is met if the justification value is 100% and fulfilled by each of the eight hours.

"Sectional Percent" is calculated in Table 13 for reference purposes, and may indicate how close an intersection is to achieving full justification. "Total Across" is calculated by adding all 8-hour compliance percentages. The Compliance % figures used in Table 13 must not exceed 100%.

As right turns are not considered as traffic crossing a road, they should be deleted from the combined pedestrian and vehicle volume in the Delay to Cross Traffic Justification. In one-way street systems, left turns from a one-way street into another one-way street should be treated in a similar manner to right turns, and be deleted from the justification.

When applying Justification 2B, the crossing volume consists of the sum of:

- The number of pedestrians crossing the main road
- 2. Total left turns from both the side road approaches
- 3. The highest through volume from one of the side road approaches
- 4. Fifty percent of the heavier left-turn traffic movement from the main road when both of the following criteria are met:
 - a) The left-turn volume is greater than 120 vehicles per hour
 - b) The total of the heavier left-turn volume plus its opposing volume is greater than 720 vehicles per hour

- e) Pedestrian Grade Separations In cases of very heavy pedestrian and traffic volumes, it may be economically viable to construct pedestrian bridges or tunnels.
- 4. The priority placed on implementing a new pedestrian crossing device should reflect the proximity and convenience of existing crossings; a higher priority should be placed on crossings where no reasonable alternatives exist within walking distance.

4.10 Justification 7 – Projected Volumes

In some cases, it is desired to determine the future need for traffic signals at an existing or planned intersection. There are two basic scenarios. The first is that the intersection may exist and all that is changing is the addition of one or more developments which will add traffic to the intersection. The second is a development which will require, or be associated with, the construction of one or more new legs at an existing intersection or a completely new intersection or roadway.

The prediction of future traffic demands is based on knowledge of growth in roadway usage, growth of local traffic generators and predicted traffic volumes, obtained from a traffic impact study, transportation planning study, environmental assessment or other similar evaluation. The preferred approach is that eighthour volume projections are estimated as part of the engineering study and evaluated against Justifications 1, 2 or 3. It is incumbent upon the road authority to ensure that the calculation methodology is sound and is based on good data, so that there is a high level of confidence in the predicted traffic volumes.

For future development, especially where the intersection or road may not exist, eight-hour volumes may be difficult to obtain or predict with the necessary accuracy. If eight-hour volumes are unavailable or not considered to be of sufficient accuracy, Peak Hour Volumes (PHV) may be estimated as part of the transportation studies and reduced to Average Hourly Volumes (AHV) for comparison with traffic signal justifications for projected volumes.

Table 21 – Justification 7 – Projected Volumes

		Minimum	Requirement	Minimum E	Requirement 2	Compliance			
Justification	Description	1	Highways	1	ore lanes	Sect	Entire %		
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900				
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170				
Delay to cross traffic	A. Vehicle volume, major street (average hour)	480	720	600	900				
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	120	170	_ _			

^{*}Note: For "T" intersections, these values should be increased by 50%.

The Average Hourly Volume for a typical day can be estimated from the Peak Hour Volumes using the following relationships:

$$AHV = \frac{PHV}{2}$$
 or $AHV = \frac{amPHV + pmPHV}{4}$

Alternately, the Average Hourly Volume for the eight highest hours of an average day can be estimated from Annual Average Daily Traffic (AADT) volume using the following relationship:

$$AHV = \frac{AADT}{16}$$

Where:

AHV = Average hourly volume

AADT = Annual average daily traffic

Analysis Using Eight-hour Volumes

If eight-hour projections are available, Justifications 1, 2 or 3 should be used. For the situation of an existing intersection with new development, Justifications 1 or 2 need to be met to 100%, or Justification 3 needs to be met to 80%.

For developments where new intersections or roadways are to be built, there is more uncertainty in the volume projections as the estimate requires projections of background traffic as well as development traffic. For this reason, where new intersection or roadway construction is required, Justifications 1 or 2 must be met to 120%.

Analysis Using Average Hour Volume

In the case that the volume estimates are based on the expansion of peak hour volumes or average daily traffic, the effect on Justifications 1 or 2 of the requirement to meet the warrant for each of eight hours would be lessened by averaging. As well, increased uncertainty is introduced by estimating from as little as one hour of traffic volume. For this reason, the thresholds are raised and, for traffic signals to be considered, Justification 7 as per Table 21 is used but with a 20% increase over the required volumes for an existing intersection and a 50% increase for a future intersection or roadway. For example, under restricted flow and two lanes, the AHV for Part 1A of Justification 7 must be met to 900 x 1.20 = 1080 vph.

Note that future volumes may include side street traffic attracted to the new traffic signal since the signal may provide a significant reduction in delay.

Table 22 – Future Development: Volume Expansion Required to Meet Justifications

Deadurer Condition	Full Eight-hour Count	Estimate Available	AHV Only Available		
Roadway Condition	Justification 1 or 2	Justification 3	Justification 7		
Both Intersecting Roads Exist; Development is Future	100%	80%	120%		
One Road, Both Roads and/or Intersection are Future; Development is Future	120%	N/A	150%		

Project No. 6860-39

Intersection Wellington Road 19 / 3 Line

Intersection Wellin	ngton Road 19/3 L	ine												
ITE 210 - Single-Family Detached	Housing Tempora	al Variati	on											
Time Ending	% of daily total	% of	daily peak	hour										
8:00	6.7	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	100%											
9:00	6.2		93%											
12:00	5.2		78%											
13:00	5.5		61%											
14:00	6		67%											
16:00	7.2		80%											
17:00	9		100%											
18:00	8.8		98%											
Temporal Variation														
Time Ending	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
8:00		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	AM Peak	
9:00													AIVI FEAK	
	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%		
12:00	78%	78%	78%	78%	78%	78%	78%	78%	78%	78%	78%	78%		
13:00	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%	61%		
14:00	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%		
16:00	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%		
17:00	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	PM Peak	
18:00	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%		
Existing Volumes														
Time Ending	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
8:00	5	0	0	0	0	1	0	61	2	0	136	0		
9:00	12	0	1	1	0	1	1	88	3	3	133	1	AM Peak	
			•										AWIFCAN	
12:00	5	0	2	0	0	3	2	102	5	4	87	0		
13:00	9	0	2	0	0	2	5	103	10	0	99	2		
14:00	17	0	0	0	0	0	0	101	12	3	139	0		
16:00	17	0	3	0	0	2	3	174	13	3	96	0		
17:00	8	0	2	0	0	1	3	197	13	3	129	0	PM Peak	
18:00	7	0	2	0	0	2	0	164	10	1	100	1	_	
2031 Corridor Growth Volumes														
	NDI	NBT	NBR	SBL	CDT	CDD	EDI	EDT	EBR	WBL	WPT	WDD		
Time Ending	NBL				SBT	SBR	EBL	EBT			WBT	WBR		
8:00	0	0	0	0	0	0	0	22	0	0	32	0		
9:00	0	0	0	0	0	0	0	20	0	0	30	0	AM Peak	
12:00	0	0	0	0	0	0	0	17	0	0	25	0		
13:00	0	0	0	0	0	0	0	28	0	0	18	0		
14:00	0	0	0	0	0	0	0	30	0	0	20	0		
16:00	0	0	0	0	0	0	0	36	0	0	24	0		
17:00	0	0	0	0	0	0	0	45	0	0	30	0	PM Peak	
								45					FIVI FEAK	
18:00	0	0	0	0	0	0	0	44	0	0	29	0		
Site Traffic														
Time Ending	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
8:00	0	0	11	0	0	0	0	22	0	5	27	0		
9:00	0	0	10	0	0	0	0	20	0	5	25	0	AM Peak	
12:00	0	0	8	0	0	0	0	17	0	4	21	0		
13:00	0	0	6	0	0	0	0	18	0	6	21	0		
14:00	0	0	7	0	0	0	0	20	0	7	23	0		
16:00	0	0	8	0	0	0	0	24	0	8	28	0		
	-												DM Dook	
17:00	0	0	10	0	0	0	0	30	0	10	35	0	PM Peak	
18:00	0	0	10	0	0	0	0	29	0	10	34	0		
2031 Future Total													All M	linor Ma
Time Ending	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR		
8:00	5	0	11	0	0	1	0	104	2	5	195	0	324	25
9:00	12	0	11	1	0	1	1	128	3	8	188	1	354	25
				-		-						-	302	18
12:00	5	0	10	0	0	3	2	136	5	8	133	0		
13:00	9	0	8	0	0	2	5	149	10	6	139	2	330	19
14:00	17	0	7	0	0	0	0	151	12	10	182	0	379	24
16:00	17	0	11	0	0	2	3	234	13	11	148	0	439	30
17:00	8	0	12	0	0	1	3	272	13	13	10/	0	516	21

8-Hour Volume

17:00

18:00

\sim					
	Future To	tal (2031)			
	Time Endi	ng	Major	Minor	
	8:00		307	17	
	9:00		329	25	
	12:00		284	18	
	13:00		311	19	
	14:00		355	24	
	16:00		409	30	
	17:00		495	21	
	18:00		423	21	
	Total		2912	175	

TRAFFIC SIGNAL WARRANTS - OTM Book 12, Justifications 1 & 2 **FUTURE** Justification Requirement 1 lane Hour Ending Free Flow Averaçonal Percent 8:00 9:00 12:00 13:00 14:00 16:00 17:00 18:00 1. Min Vehicle Volumes A. Vehicle volumes all approaches 324 354 302 330 379 439 516 443 **Score** 67% 74% 63% 69% 79% 91% 108% 92% **67 74 63 69 79 80 100 80 77** B. Vehicle volumes, minor streets **Score** 21% 21% 15% 16% 20% 25% 18% 17% 2. Delay to Cross Traffic A. Vehicle volumes, major street 329 329 284 311 355 409 495 423 **Score** 69% 69% 59% 65% 74% 85% 103% 88% **69 69 59 65 74 80 100 80** 75 B. Combined vehicle+ped minor street 10 18 10 14 22 22 13 12 score 20% 36% 20% 28% 44% 44% 26% 24% **20 36 20 28 44 44 26 24** 30

OVERALL WARRANT FOR TRAFFIC SIGNAL IS 30%

Minor

Major

21

21

329

329

284

311

355

409

495

423

Veh+ped

18

10

14

22

22

13

12

OTM BOOK 12 - JUSTIFICATION 7 - Wellington Road 19 / South Site Access

STEP 1

All Approaches Minor Streets Major Street

Major Street

Combined Vehicle
and Pedestrian
Crossing Artery from
Minor Streets

 amPHV
 390
 30
 360
 30
 (25+5)
 Lefts + peds

 pmPHV
 535
 15
 520
 15
 (10+5)
 Lefts + peds

 AHV
 231
 11
 220
 11
 AHV = (amPHV+pmPHV)/4

 1B
 2A
 2B

STEP 2

JUSTIFICATION 7

		Minimur		Minimum Requ	iirement 1 Lane	Compliance			
Justification	Description			Highways		Sectional		ENTIRE	
		Free Flow	Restr. Flow	Restr. Flow	Free Flow	Numerical	%	%	
1. Minimum	A. Vehicle volume, all approaches (average hour)				480	231	48%	6%	
Vehicular Volume	B. Vehicle volume, along minor streets (average hour)				180	11	6%	0 /6	
Delay to cross traffic	A. Vehicle volume, major street (average hour)		Does not apply.		480	220	46%		
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)				50	11	23%	23%	

^{*}Note: For "T" intersections, 1B values should be increased by 50%. (The intersection is a "T" configuration thus values are increased in the above table.)

Analysis Using Average Hour Volume

For traffic signals to be considered, Justification 7 as per Table 21 is used but with a 20% increase over the required volumes for an existing intersection and a 50% increase for a future intersection or roadway.

Result: Required: 23% 150% NOT

WARRANTED

OTM BOOK 12 - JUSTIFICATION 7 - Wellington Road 19 / North Site Access

STEP 1

All Approaches Minor Streets Major Street Combined Vehicle and Pedestrian Crossing Artery from Minor Streets

 amPHV
 385
 35
 350
 20
 (15+5)
 Lefts + peds

 pmPHV
 555
 45
 510
 15
 (10+5)
 Lefts + peds

 AHV
 235
 20
 215
 9
 AHV = (amPHV+pmPHV)/4

 1B
 2A
 2B

STEP 2

JUSTIFICATION 7

				Minimum Requ	irement 1 Lane				
Justification	Description			Highways		Sectional		ENTIRE	
		Free Flow	Restr. Flow	Restr. Flow	Free Flow	Numerical	%	%	
1. Minimum	A. Vehicle volume, all approaches (average hour)				480	235	49%	17%	
Vehicular Volume	B. Vehicle volume, along minor streets (average hour)				120	20	17%	1770	
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)		Does not apply.		480	215	45%		
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)				50	9	18%	18%	

^{*}Note: For "T" intersections, 1B values should be increased by 50%. (The intersection is a "T" configuration thus values are increased in the above table.)

Analysis Using Average Hour Volume

For traffic signals to be considered, Justification 7 as per Table 21 is used but with a 20% increase over the required volumes for an existing intersection and a 50% increase for a future intersection or roadway.

Result: Required: 18% 150%

NOT WARRANTED **Appendix F Left-Turn Lane Analysis**

Left-Turn Lane Warrant Analysis

Speed Limit (unposted) = 80 km/h

Design Speed = 100 km/h

AM Peak Period

South Access:

Existing Thru Traffic Volume: $V_T = 210$

Opposing Traffic Volume: $V_O = 130$

Left Turn Traffic Volume: $V_L = 5$

Advancing Traffic Volume $V_A = V_T + V_L$

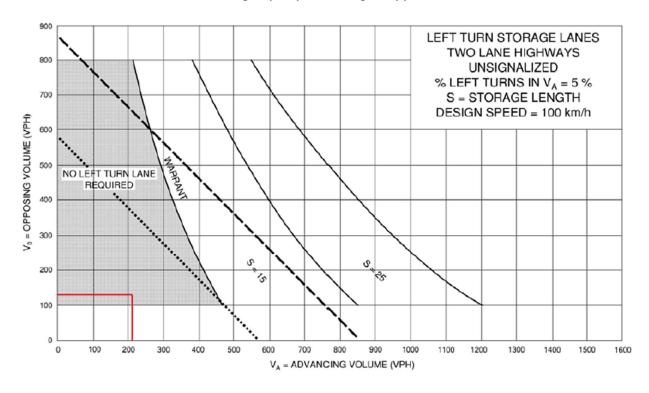
Advancing Traffic Volume $V_A = 210 + 5$

Advancing Traffic Volume $V_A = 215$

Percentage of Left Turning Traffic = $\frac{V_L}{V_A} \times 100$

Percentage of Left Turning Traffic = $\frac{5}{215} \times 100$

Percentage of Left Turning Traffic = 2.3%



North Access:

Northbound Left

Existing Thru Traffic Volume: $V_T = 125$

Opposing Traffic Volume: $V_O = 205$

Left Turn Traffic Volume: $V_L = 10$

Advancing Traffic Volume $V_A = V_T + V_L$

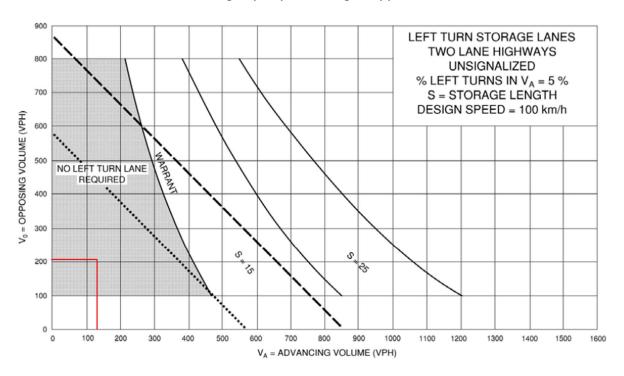
Advancing Traffic Volume $V_A = 125 + 10$

Advancing Traffic Volume $V_A = 135$

Percentage of Left Turning Traffic $= \frac{V_L}{V_A} \times 100$

Percentage of Left Turning Traffic = $\frac{10}{135} \times 100$

Percentage of Left Turning Traffic = 7.4%



Southbound Left

Existing Thru Traffic Volume: $V_T = 200$

Opposing Traffic Volume: $V_O=140$

Left Turn Traffic Volume: $V_L = 5$

Advancing Traffic Volume $V_A = V_T + V_L$

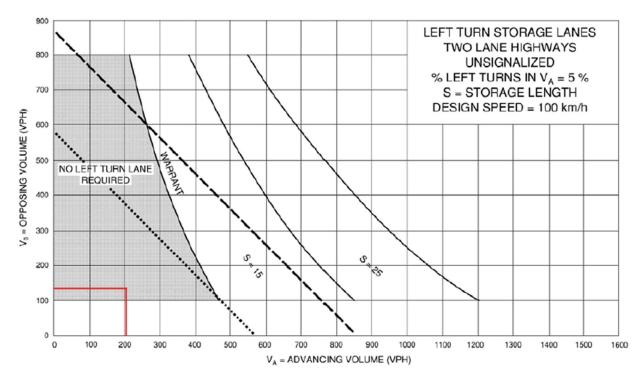
Advancing Traffic Volume $V_A = 200 + 5$

Advancing Traffic Volume $V_A = 205$

Percentage of Left Turning Traffic = $\frac{V_L}{V_A} \times 100$

Percentage of Left Turning Traffic = $\frac{5}{205} \times 100$

Percentage of Left Turning Traffic = 2.4%



PM Peak Period

South Access:

Existing Thru Traffic Volume: $V_T = 185$

Opposing Traffic Volume: $V_O = 310$

Left Turn Traffic Volume: $V_L = 5$

Advancing Traffic Volume $V_A = V_T + V_L$

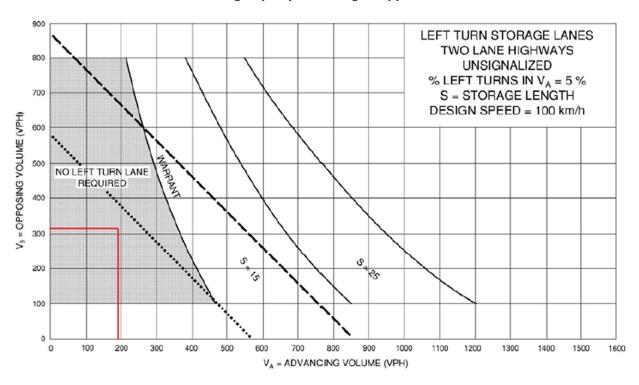
Advancing Traffic Volume $V_A = 185 + 5$

Advancing Traffic Volume $V_A = 190$

Percentage of Left Turning Traffic = $\frac{V_L}{V_A} \times 100$

Percentage of Left Turning Traffic = $\frac{5}{190} \times 100$

Percentage of Left Turning Traffic = 2.6%



North Access

Northbound Left

Existing Thru Traffic Volume: $V_T = 270$

Opposing Traffic Volume: $V_0 = 195$

Left Turn Traffic Volume: $V_L = 15$

Advancing Traffic Volume $V_A = V_T + V_L$

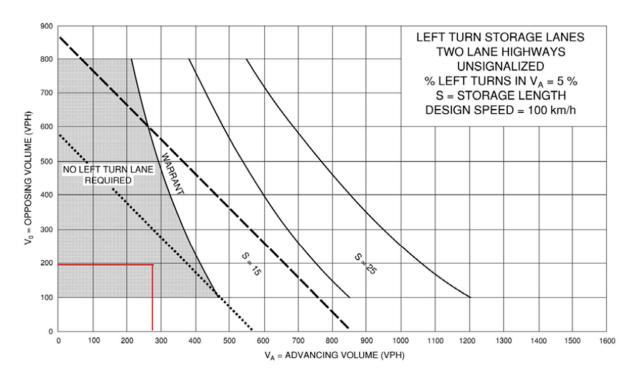
Advancing Traffic Volume $V_A = 270 + 15$

Advancing Traffic Volume $V_A = 285$

Percentage of Left Turning Traffic = $\frac{V_L}{V_A} \times 100$

Percentage of Left Turning Traffic = $\frac{15}{285} \times 100$

Percentage of Left Turning Traffic = 5.3%



Southbound Left

Existing Thru Traffic Volume: $V_T = 180$

Opposing Traffic Volume: $V_O = 300$

Left Turn Traffic Volume: $V_L = 15$

Advancing Traffic Volume $V_A = V_T + V_L$

Advancing Traffic Volume $V_A = 180 + 15$

Advancing Traffic Volume $V_A = 195$

Percentage of Left Turning Traffic = $\frac{V_L}{V_A} \times 100$

Percentage of Left Turning Traffic = $\frac{15}{195} \times 100$

Percentage of Left Turning Traffic = 7.7%

