



February 20th, 2024

JDE Project 21156

Dunlop Ferndale Inc.

c/o Baldwin Planning and Development Consultants
3 Barrie Terrace
Barrie, ON L4M 1E8

**RE: Traffic Brief Addendum
440 Dunlop & 125 Ferndale, City of Barrie**

This letter was prepared by **JD Northcote Engineering Inc.** [JD Engineering] for the account of **Dunlop Ferndale Inc.** [The Developer].

1.0 BACKGROUND

JD Engineering prepared a Traffic Impact Study for the proposed mixed-use development located on a site municipally known as 440 Dunlop Street & 125 Ferndale Drive, in the City of Barrie [City], dated March 30th, 2022 [TIS]. The TIS assessed the impact of following development statistics:

- Six-storey hotel – 120 rooms;
- Coffee shop with drive-thru – 196 m² (2,110 ft²) & commercial tenant – 605 m² (6,512 ft²);
- Existing single-storey commercial building – 780 m² (8,396 ft²); and
- A single-storey commercial building – 401 m² (4,316 ft²).

An additional Addendum Letter was prepared by JD Engineering dated June 14th, 2022 [Addendum Letter] to consider the updated development plan which included a revised unit count of 101 hotel rooms and an additional entrance onto Lennox Drive [Northeast Access]

Based on our discussion with the development team, it is our understanding that the proposed Hotel Block is going to proceed ahead of the other buildings.

The Hotel will include three full-movement access driveways; two onto Lennox Drive [North Access] and [Northeast Access], and one onto Ferndale Drive [Northwest Access].

The existing single-storey building (125 Ferndale Drive) will remain as a wholesale/supplier with access via the three accesses noted above, in addition to the right-in-right-out [RIRO] driveway onto Ferndale Drive [Southwest Access]. The revised Site Plan is provided in the **Appendix**.

This letter is intended as an update to the TIS, to assess the impact of the revised Site Plan.



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2.0 IMPACT OF THE REVISED SITE PLAN - TRAFFIC GENERATION

Data provided in the Institute of Transportation Engineers [ITE] *Trip Generation* (11th Edition) was used in the TIS to calculate the traffic generated from the proposed development. The revised estimated trip generation of the hotel block and the existing single-storey building is shown below in **Table 1**. The previous traffic generation for the hotel has also been included, for comparative purposes.

Table 1 – Estimated Traffic Generation of Proposed Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Previous Development Plan							
Hotel Coffee Donut Shop Strip Retail Plaza (<40k)	120 rooms 2,110 ft² 19,227 ft²	63	46	109	60	62	122
Revised Development Plan							
Hotel ITE Land Use: 310	101 units	24	19	43	24	23	47
Existing Building ITE Land Use: 180*	8,396 ft²	10	4	14	5	11	16
Total Trips		34	23	57	29	34	63
Net Trips		-29	-23	-52	-31	-28	-59

* Based on our review of applicable ITE trip generation data, ITE Land Use Code 180 (Specialty Trade Contractor) has been applied to estimate the existing building traffic. This land use code reflects a more conservative estimate than the ITE 110 (General Light Industrial).

As indicated, the revised Site Plan will result in a net trip reduction of the of 52 AM and 59 PM peak hour trips.

The revised total traffic assignment of the proposed development is illustrated in **Figure 1** through **3**.

The resulting total (2025) horizon year traffic volumes for the AM and PM peak hour is illustrated in **Figure 4**.

Figure 2 – Site Traffic Assignment - Hotel

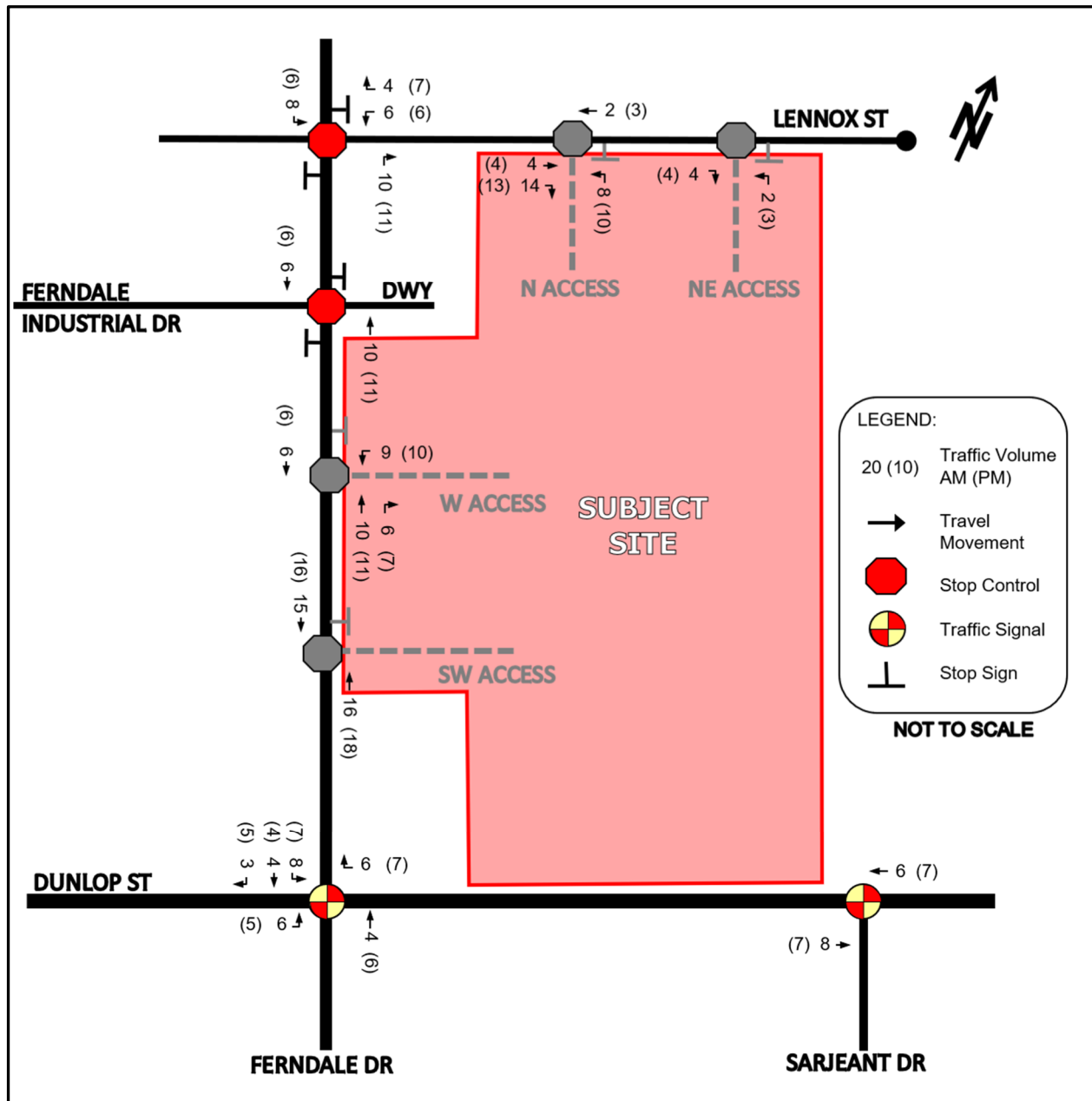


Figure 2 – Site Traffic Assignment - Existing Building

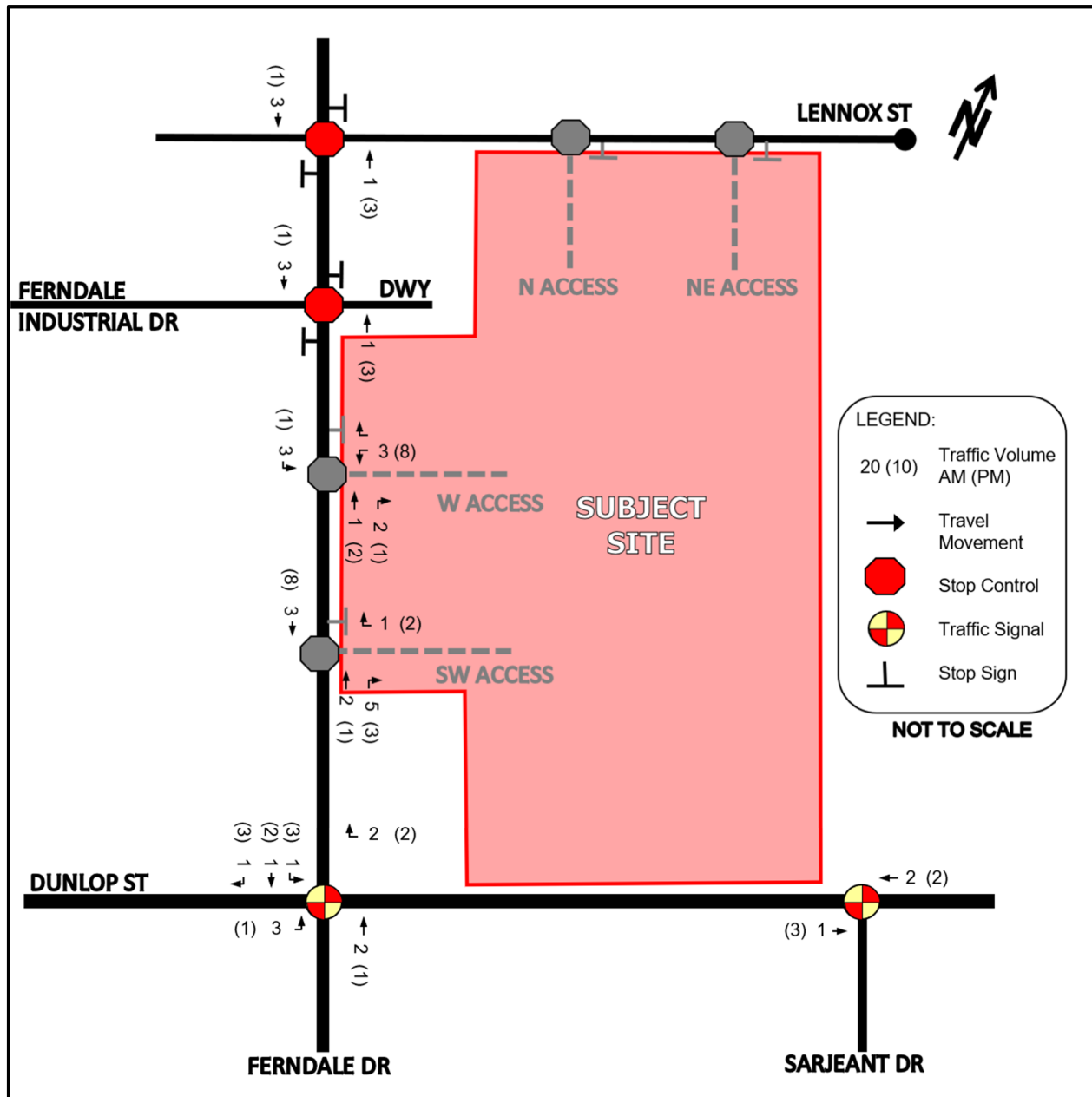


Figure 3 – Site Traffic Assignment - Total

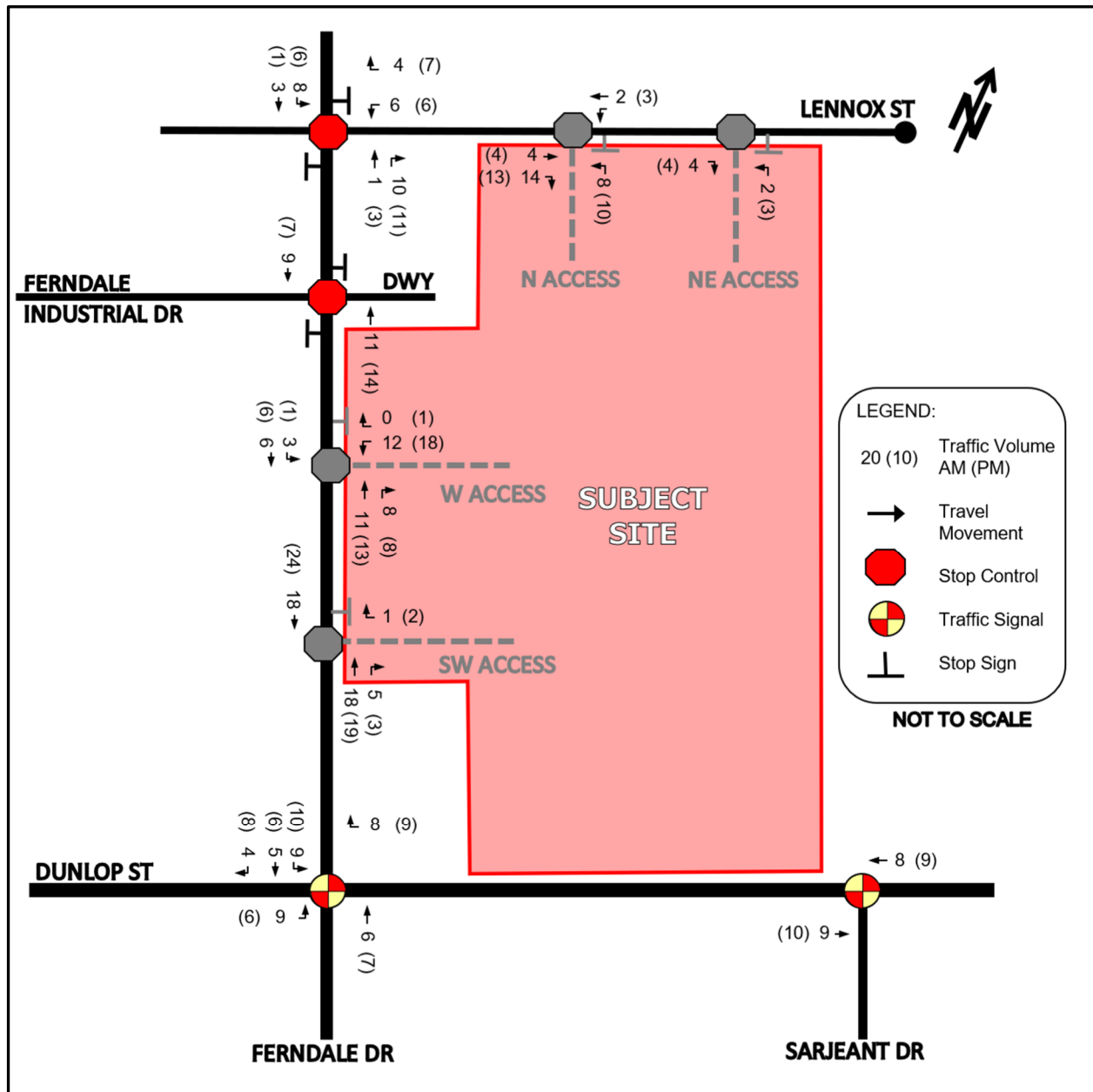
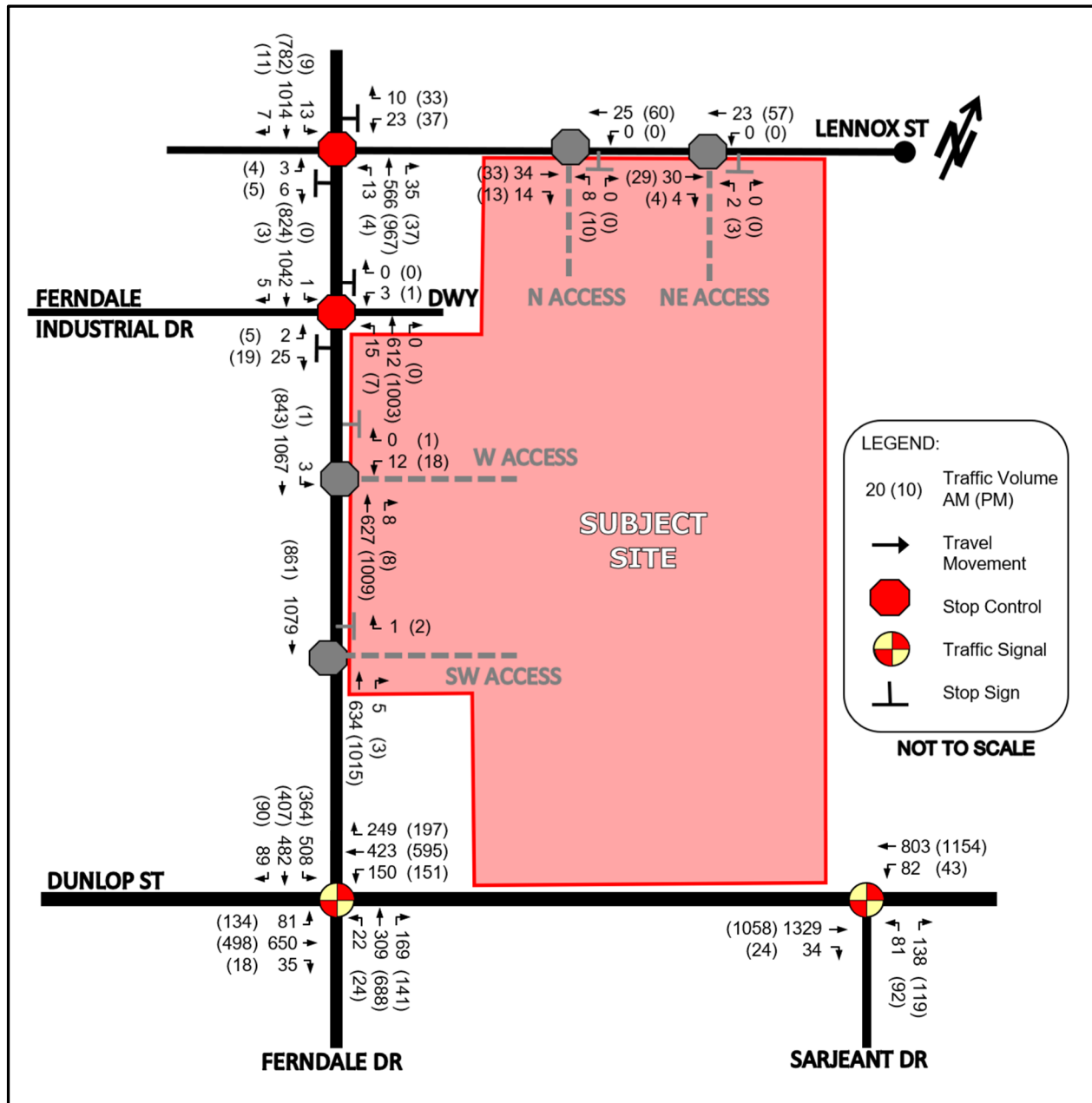


Figure 4 – Total (2025) Traffic Volumes



3.0 TOTAL (2025) INTERSECTION OPERATION

The following analysis was completed to determine the critical total (2025) intersection operation to assess if the revisions noted in section 2.0 will change the recommendations or conclusions in the TIS. For the purpose of this analysis, we have used the Synchro parameters and assumptions used in Section 5.1 for the TIS.

The results of the LOS analysis under total (2025) traffic volumes during the AM and PM peak hours can be found below in Table 10. The infrastructure improvements noted in Section 2.2 and 3.3 of the TIS have been utilized for this scenario. Stop control has been assumed for the Site Access driveways. Detailed output of the Synchro analysis can be found in the **Appendix**.

Table 2 - Total (2025) LOS

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Ferndale Dr N / Dunlop St W (signalized)	0.66	35.8	D	-	-	0.60	34.9	C	-	-
EBL	0.25	26.8	C	100	23	0.46	27.0	C	100	36
EBTR	0.54	36.1	D	-	-	0.39	34.0	C	-	-
WBL	0.60	30.1	C	90	38	0.45	26.9	C	90	37
WBT	0.30	32.1	C	-	-	0.42	34.3	C	-	-
WBR	0.16	15.6	B	100	11	0.20	20.0	C	100	25
NBL	0.09	28.7	C	90	7	0.08	25.0	C	90	8
NBT	0.37	37.7	D	-	-	0.70	40.7	D	-	-
NBR	0.24	29.3	C	90	30	0.16	24.5	C	90	21
SBL	0.87	59.1	E	55	84	0.73	56.5	E	55	63
SBTR	0.50	27.9	C	-	-	0.38	26.3	C	-	-
Sarjeant Dr / Dunlop St W (signalized)	0.48	16.3	B	-	-	0.45	15.0	B	-	-
EBTR	0.68	20.2	C	-	-	0.57	18.7	B	-	-
WBL	0.33	10.7	B	60	11	0.18	8.9	A	60	6
WBT	0.31	8.5	A	-	-	0.41	9.3	A	-	-
NB	0.22	25.4	C	-	-	0.26	25.0	C	-	-
Ferndale Dr N / Ferndale Industrial Dr (unsignalized)	-	0.5	A	-	-	-	0.3	A	-	-
EB	0.09	15.2	C	-	-	0.07	13.9	B	-	-
WB	0.02	16.4	C	-	-	0.01	17.2	C	-	-
NBL	0.03	11.7	B	TWLTL	1	0.01	10.3	B	TWLTL	0
NB	0.25	0.0	-	-	-	0.41	0.0	-	-	-
SBL	0.00	8.5	A	TWLTL	0	0.00	0.0	-	TWLTL	0
SB	0.44	0.0	-	-	-	0.35	0.0	-	-	-
Ferndale Dr N / Lennox Dr (unsignalized)	-	0.6	A	-	-	-	0.8	A	-	-
EB	0.06	16.5	C	-	-	0.06	14.9	B	-	-
WB	0.08	14.6	B	-	2	0.20	16.3	C	-	6
NBL	0.02	11.2	B	TWLTL	1	0.01	9.7	A	TWLTL	0
NB	0.24	0.0	-	-	-	0.43	0.0	-	-	-
SBL	0.02	9.1	A	TWLTL	-	0.01	10.1	B	TWLTL	0
SB	0.42	0.0	-	-	-	0.34	0.0	-	-	-
Ferndale Dr N / NW Access (unsignalized)	-	0.1	A	-	-	-	0.2	A	-	-
WB	0.03	14.3	B	-	-	0.06	16.3	C	-	-

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Ferndale Dr N / SW Access (unsignalized)	-	0.0	A	-	-	-	0.0	A	-	-
WB	0.00	9.3	A	-	-	0.00	9.1	A	-	-
N Access / Lennox Dr (unsignalized)	-	0.9	A	-	-	-	0.8	A	-	-
NB	0.01	8.9	A	-	-	0.01	9.1	A	-	-
NE Access / Lennox Dr (unsignalized)	-	0.3	A	-	-	-	0.3	A	-	-
NB	0.00	8.8	A	-	-	0.00	9.0	A	-	-

The results of the LOS analysis indicate that the study area intersections will operate within the typical design limits. The analysis indicates that the study intersections will operate with similar or better operations to those shown in the TIS. Consequently, the conclusions and recommendation made in the TIS remain valid.

The location of the North Access, Northeast Access, Northwest Access and Southwest Access are consistent with the locations reviewed in the TIS and Addendum Letter; consequently, the recommendations and conclusions from the sight distance analysis and the intersection spacing analysis remains as outlined in those reports.

4.0 PARKING REVIEW

Table 3 summarizes the parking requirement for the revised Site Plan, in context with the City's *Zoning By-law #2009-141* [City's ZBL].

Table 3 – Parking Requirement Summary

Category	Parking Standard	Size	Parking (spaces)		
			Required	Provided	Net
Hotel + Meeting Room	1 space / room + 1 space / 40m ² GFA	101 rooms + 70m ²	103	103	-
Accessible Parking	1 + 3% of required parking		5 spaces	5 spaces	-

The proposed development will provide 103 total parking spaces, which meets the City's ZBL requirement.

5.0 CONCLUSION

This chapter summarizes the conclusions and recommendations from the additional analysis.

- 1) There is no change to the recommendations and conclusions presented in the TIS, as a result of the change in traffic generation by the revised Site Plan.

We trust you will find this submission acceptable. Should you have any questions or concerns or require any additional information in this regard, please contact our office.

Yours truly,
JD Northcote Engineering Inc.



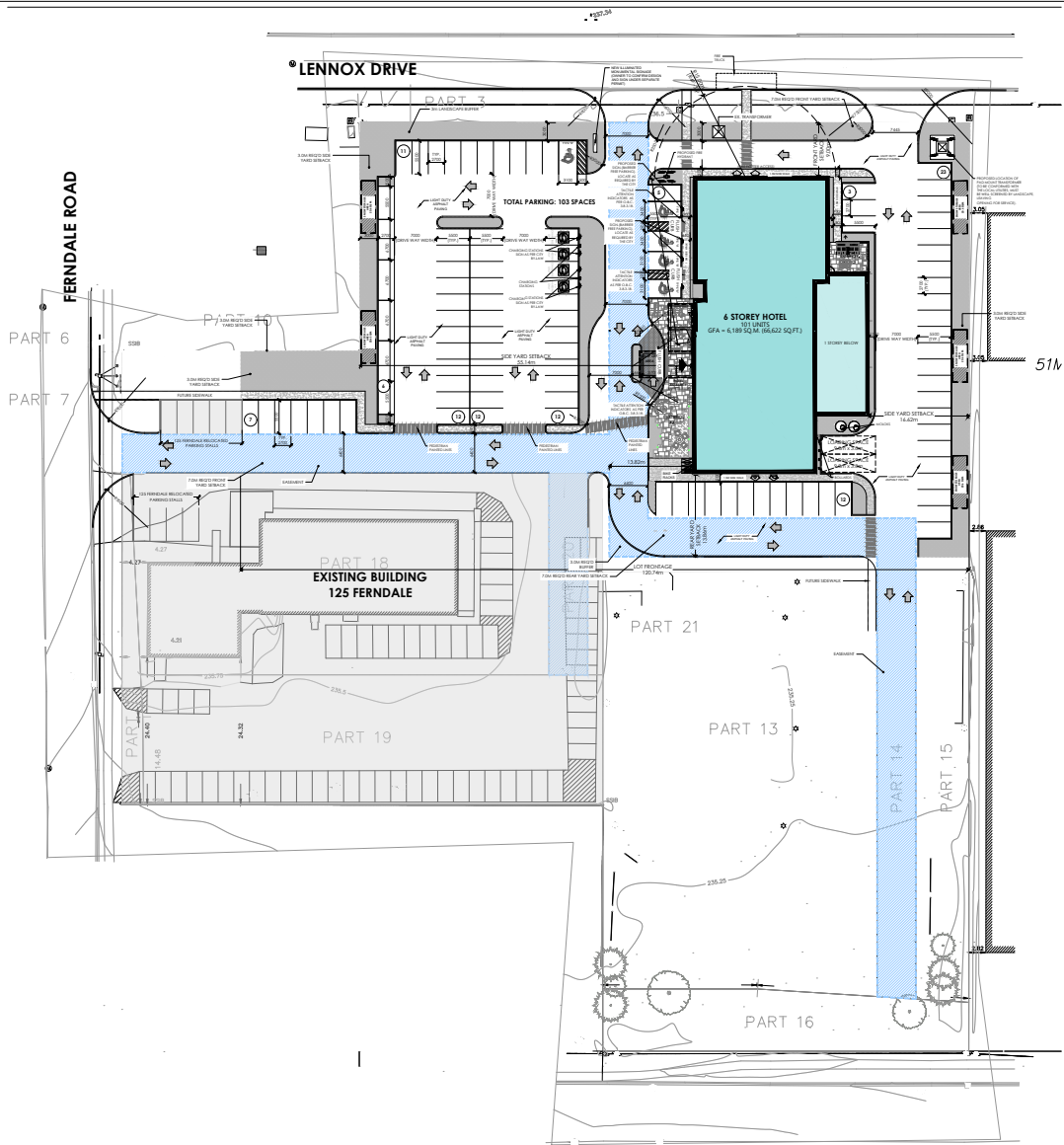
John Northcote, P.Eng.
President



Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. JD Engineering accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Appendix

BARRIE HOTEL DEVELOPMENT - SITE STATISTICS			
ZONING INFORMATION		440 Dunlop Street West, Barrie, ON L4N 1C2	
Chvic Address		Barrie (City of Barrie, County of Simcoe)	
Municipality		U1 - Industrial - Light Industrial Zone	
Zone Description		City of Barrie Comprehensive Zoning Bylaw 2009-141	
Zoning Bylaw Description			
SITE CALCULATIONS			
Site Area (acres)	SM	7,054.0	74,252
Building Area (acres)		1,195.0	12,863
SITE PROVISIONS (Bylaw section 7.3)			
Minimum Lot Area	Min. REQ.	700 m ²	7,054.0
Minimum Lot Frontage		18 m	126.74 m
Minimum Lot Coverage		80%	16.76%
SITE SETBACKS (Bylaw section 7.3)			
Minimum Front Yard Setback	Min. REQ. (m)	7.0	9.00
Minimum Rear Yard Setback		7.0	13.86
Minimum Side Yard Setback		3.0	14.62
Minimum Side Yard Setback		3.0	55.14
HEIGHT OF BUILDING (Minor Variance Approval CoA 7/02)			
Building Height (Hotel)	Max. allowed (m)	PROVIDED (m)	
	19.0	19.05	
PARKING (required size = 2.0m x 5.5m, Bylaw section 4.4.2.5)			
Hotel - 1 parking space per room or suite	Min. REQ.	103	103
Meeting Room - 1 parking space per 40m ² of GFA		2	2
Total Parking		103	103
ACC. PARKING (required size = 4.0m x 5.5m, Bylaw section 4.4.4.1)			
Over 100 parking spaces = 1 space + 3% of required parking spaces	Min. REQ.	5	5
(1) TYPE A (min. width: 3.4m - min length: 5.5m + 1.5m access aisle)		2	2
(2) TYPE B (min. width: 3.1m - min length: 3.5m + 1.5m access aisle)		3	3
Total Acc. Parking		5	5
LOADING SPACES (required size = 3.0m x 9.0m, Bylaw section 4.1.7.2)			
Between 1,000 - 7,499 sqm of GFA = 2 spaces	Min. REQ.	2	2
Driveways & Aisle Requirements (Bylaw section 4.4.3.5)			
Min. REQ.	PROVIDED	6.4m	6.4m, 6.7m & 7.0m
GROSS FLOOR AREA CALCULATIONS			
BUILDING (Hotel + Meeting Room)			
Ground Floor	1,195.0	12,863	
1 Hotel (including Pool & Fitness Room)	1,125.4	12,116	
1 Meeting Room	69.4	747	
2nd Floor	998.9	10,762	
3rd Floor	998.9	10,762	
4th Floor	998.9	10,762	
5th Floor	998.9	10,762	
6th Floor	998.9	10,762	
TOTAL AREA - HOTEL	4,187.4	46,422	



Project North:

True North:

Key Plan:

HOME2
SUITES BY HILTON

1	23-03-03	Issued for Brand response	MA
No.	Date:	Issue/Revision	By:
Drawing Issues/Revisions:			

NOTE:
ALL DIMENSIONS AND INFORMATION SHOWN ON THESE DRAWINGS MUST BE CHECKED AND VERIFIED ON THE ACTUAL SITE. ANY DISCREPANCIES REPORTED TO THE ARCHITECT PRIOR TO CONSTRUCTION AND FABRICATION OF ITS COMPONENTS. SHOULD BEING CORRECTED OR REVISED BEFORE THE ARCHITECT MUST BE NOTIFIED IMMEDIATELY.

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MATAJ
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Architect's Stamp

MATAJ ARCHITECTS
INCORPORATED

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Oakville, ON L6M 4K5
1-800-261-6444

Project:
BARRIE HOTEL DEVELOPMENT
440 DUNLOP STREET WEST, BARRIE
ON L4N 1C2

Sheet Title:
OVERALL SITE PLAN

Design By: A.M.	Drawn By: S.F.	Approved By: A.M.
Scale: 1:400	Date: 22.12.21	Project No.: 22-013

Drawing No:
A.101a

Drawing Series:

Queues

1: Ferndale Dr & Dunlop St

440 Dunlop St & 125 Ferndale Dr

Total (2025) - AM

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	81	650	150	423	249	22	309	169	508	482
Future Volume (vph)	81	650	150	423	249	22	309	169	508	482
Lane Group Flow (vph)	92	779	155	436	257	24	340	186	627	705
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA
Protected Phases	7	4	3	8	1	5	2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	7	4	3	8	1	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	7.0	35.0	7.0	35.0	7.0	7.0	10.0	7.0	7.0	10.0
Minimum Split (s)	11.5	41.0	11.5	41.0	12.0	11.5	36.0	11.5	12.0	36.0
Total Split (s)	11.5	41.0	13.0	42.5	29.0	11.5	37.0	13.0	29.0	54.5
Total Split (%)	9.6%	34.2%	10.8%	35.4%	24.2%	9.6%	30.8%	10.8%	24.2%	45.4%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	4.0	6.0	4.0	4.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	None	Max	Max
v/c Ratio	0.24	0.54	0.59	0.30	0.27	0.08	0.37	0.32	0.87	0.50
Control Delay	23.4	37.0	32.6	32.7	2.2	17.0	38.0	13.5	59.4	27.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	37.0	32.6	32.7	2.2	17.0	38.0	13.5	59.4	27.3
Queue Length 50th (m)	13.1	56.0	23.0	28.7	0.0	2.7	34.7	13.1	74.1	62.4
Queue Length 95th (m)	23.3	67.3	37.7	38.2	10.9	7.0	48.2	29.8	83.6	69.4
Internal Link Dist (m)		185.4		119.4			166.3			41.1
Turn Bay Length (m)	100.0		90.0		100.0	90.0		90.0	55.0	
Base Capacity (vph)	386	1441	266	1439	951	287	907	582	724	1407
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.54	0.58	0.30	0.27	0.08	0.37	0.32	0.87	0.50

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 119.9

Natural Cycle: 105

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Ferndale Dr & Dunlop St

			
29 s	37 s	13 s	41 s
			
11.5 s	54.5 s	11.5 s	42.5 s

HCM Signalized Intersection Capacity Analysis

440 Dunlop St & 125 Ferndale Dr

1: Ferndale Dr & Dunlop St

Total (2025) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	81	650	35	150	423	249	22	309	169	508	482	89
Future Volume (vph)	81	650	35	150	423	249	22	309	169	508	482	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	4.0	4.0	6.0	4.0	4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	4918		1721	4725	1569	1658	3510	1477	3471	3445	
Flt Permitted	0.48	1.00		0.24	1.00	1.00	0.38	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	896	4918		428	4725	1569	669	3510	1477	3471	3445	
Peak-hour factor, PHF	0.88	0.88	0.88	0.97	0.97	0.97	0.91	0.91	0.91	0.81	0.81	0.81
Adj. Flow (vph)	92	739	40	155	436	257	24	340	186	627	595	110
RTOR Reduction (vph)	0	5	0	0	0	125	0	0	67	0	13	0
Lane Group Flow (vph)	92	774	0	155	436	132	24	340	119	627	692	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		
Heavy Vehicles (%)	3%	5%	19%	6%	11%	3%	10%	4%	9%	2%	3%	6%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	42.4	35.0		45.4	36.5	61.5	38.5	31.0	39.9	25.0	48.5	
Effective Green, g (s)	42.4	35.0		45.4	36.5	61.5	38.5	31.0	39.9	25.0	48.5	
Actuated g/C Ratio	0.35	0.29		0.38	0.30	0.51	0.32	0.26	0.33	0.21	0.40	
Clearance Time (s)	4.0	6.0		4.0	6.0	4.0	4.0	6.0	4.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	370	1435		258	1438	804	276	907	491	723	1393	
v/s Ratio Prot	0.02	0.16		c0.04	0.09	0.03	0.01	0.10	0.02	c0.18	c0.20	
v/s Ratio Perm	0.07			c0.18		0.05	0.02		0.06			
v/c Ratio	0.25	0.54		0.60	0.30	0.16	0.09	0.37	0.24	0.87	0.50	
Uniform Delay, d1	26.4	35.7		26.2	32.0	15.5	28.0	36.5	29.0	45.8	26.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.4		3.9	0.1	0.1	0.6	1.2	0.3	13.3	1.3	
Delay (s)	26.8	36.1		30.1	32.1	15.6	28.7	37.7	29.3	59.1	27.9	
Level of Service	C	D		C	C	B	C	D	C	E	C	
Approach Delay (s)		35.1			26.7			34.5			42.6	
Approach LOS		D			C			C			D	
Intersection Summary												
HCM 2000 Control Delay		35.8			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.66										
Actuated Cycle Length (s)		119.9			Sum of lost time (s)			20.0				
Intersection Capacity Utilization		93.6%			ICU Level of Service			F				
Analysis Period (min)		15										
c Critical Lane Group												

Queues
2: Sarjeant Dr & Dunlop St

440 Dunlop St & 125 Ferndale Dr

Total (2025) - AM

	→	↖	←	↗	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↖
Traffic Volume (vph)	1328	82	801	81	138
Future Volume (vph)	1328	82	801	81	138
Lane Group Flow (vph)	1449	93	910	93	150
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	4	3	8	2	
Permitted Phases		8			2
Detector Phase	4	3	8	2	2
Switch Phase					
Minimum Initial (s)	34.0	7.0	34.0	10.0	10.0
Minimum Split (s)	40.0	11.5	40.0	26.0	26.0
Total Split (s)	48.0	14.0	62.0	28.0	28.0
Total Split (%)	53.3%	15.6%	68.9%	31.1%	31.1%
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	Max	None	Max	Max
v/c Ratio	0.68	0.33	0.31	0.22	0.31
Control Delay	21.1	9.5	8.8	26.7	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	21.1	9.5	8.8	26.7	6.7
Queue Length 50th (m)	65.9	5.4	24.2	11.3	0.0
Queue Length 95th (m)	80.4	10.5	29.8	24.6	14.0
Internal Link Dist (m)	159.0		217.5	119.8	
Turn Bay Length (m)		60.0		20.0	
Base Capacity (vph)	2517	286	3278	420	484
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.58	0.33	0.28	0.22	0.31

Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 83.8

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Sarjeant Dr & Dunlop St

↖ Ø2	↖ Ø3	→ Ø4
28 s	14 s	48 s
	↖ Ø8	
	62 s	

HCM Signalized Intersection Capacity Analysis

2: Sarjeant Dr & Dunlop St

440 Dunlop St & 125 Ferndale Dr
Total (2025) - AM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	↗
Traffic Volume (vph)	1328	34	82	801	81	138
Future Volume (vph)	1328	34	82	801	81	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		4.0	6.0	6.0	6.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5015		1659	4902	1601	1423
Flt Permitted	1.00		0.10	1.00	0.95	1.00
Satd. Flow (perm)	5015		176	4902	1601	1423
Peak-hour factor, PHF	0.94	0.94	0.88	0.88	0.87	0.92
Adj. Flow (vph)	1413	36	93	910	93	150
RTOR Reduction (vph)	3	0	0	0	0	111
Lane Group Flow (vph)	1446	0	93	910	93	39
Confl. Peds. (#/hr)		5	5		5	10
Heavy Vehicles (%)	4%	9%	10%	7%	14%	12%
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	35.8		49.8	49.8	22.0	22.0
Effective Green, g (s)	35.8		49.8	49.8	22.0	22.0
Actuated g/C Ratio	0.43		0.59	0.59	0.26	0.26
Clearance Time (s)	6.0		4.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2142		281	2913	420	373
v/s Ratio Prot	c0.29		0.04	c0.19	c0.06	
v/s Ratio Perm			0.16			0.03
v/c Ratio	0.68		0.33	0.31	0.22	0.11
Uniform Delay, d1	19.3		10.0	8.5	24.2	23.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9		0.7	0.1	1.2	0.6
Delay (s)	20.2		10.7	8.5	25.4	24.0
Level of Service	C		B	A	C	C
Approach Delay (s)	20.2			8.7	24.5	
Approach LOS	C			A	C	
Intersection Summary						
HCM 2000 Control Delay			16.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.48			
Actuated Cycle Length (s)			83.8		Sum of lost time (s)	16.0
Intersection Capacity Utilization			64.2%		ICU Level of Service	C
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis 3: Ferndale Dr & Ferndale Ind. Dr./Dwy

440 Dunlop St & 125 Ferndale Dr
Total (2025) - AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	0	25	3	0	0	15	612	0	1	1042	5
Future Volume (Veh/h)	2	0	25	3	0	0	15	612	0	1	1042	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.75	0.75	0.75	0.38	0.38	0.38	0.95	0.95	0.95	0.93	0.93	0.93
Hourly flow rate (vph)	3	0	33	8	0	0	16	644	0	1	1120	5
Pedestrians		5			5							
Lane Width (m)		3.7			3.7							
Walking Speed (m/s)		1.1			1.1							
Percent Blockage		0			0							
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage (veh)								2			2	
Upstream signal (m)								134				
pX, platoon unblocked	0.93	0.93		0.93	0.93	0.93				0.93		
vC, conflicting volume	1484	1810	568	1276	1813	327	1130			649		
vC1, stage 1 conf vol	1130	1130		681	681							
vC2, stage 2 conf vol	354	681		595	1132							
vCu, unblocked vol	1372	1723	568	1150	1726	131	1130			477		
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.4			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	99	100	92	98	100	100	97			100		
cM capacity (veh/h)	211	246	421	325	235	835	552			1016		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	36	8	16	429	215	1	747	378				
Volume Left	3	8	16	0	0	1	0	0				
Volume Right	33	0	0	0	0	0	0	5				
cSH	389	325	552	1700	1700	1016	1700	1700				
Volume to Capacity	0.09	0.02	0.03	0.25	0.13	0.00	0.44	0.22				
Queue Length 95th (m)	2.3	0.6	0.7	0.0	0.0	0.0	0.0	0.0				
Control Delay (s)	15.2	16.4	11.7	0.0	0.0	8.5	0.0	0.0				
Lane LOS	C	C	B			A						
Approach Delay (s)	15.2	16.4	0.3			0.0						
Approach LOS	C	C										
Intersection Summary												
Average Delay			0.5									
Intersection Capacity Utilization			42.2%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 4: Ferndale Dr & Dwy/Lennox Dr

440 Dunlop St & 125 Ferndale Dr

Total (2025) - AM

																				
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR								
Lane Configurations																				
Traffic Volume (veh/h)	3	0	6	23	0	10	13	566	35	13	1014	7								
Future Volume (Veh/h)	3	0	6	23	0	10	13	566	35	13	1014	7								
Sign Control	Stop			Stop			Free			Free										
Grade	0%			0%			0%			0%										
Peak Hour Factor	0.45	0.45	0.45	0.96	0.96	0.96	0.93	0.93	0.93	0.94	0.94	0.94								
Hourly flow rate (vph)	7	0	13	24	0	10	14	609	38	14	1079	7								
Pedestrians	5			5																
Lane Width (m)	3.7			3.7																
Walking Speed (m/s)	1.1			1.1																
Percent Blockage	0			0																
Right turn flare (veh)																				
Median type							TWLTL			TWLTL										
Median storage (veh)							2			2										
Upstream signal (m)							183													
pX, platoon unblocked	0.94	0.94		0.94	0.94	0.94				0.94										
vC, conflicting volume	1458	1796	548	1242	1780	328	1091				652									
vC1, stage 1 conf vol	1116	1116		661	661															
vC2, stage 2 conf vol	342	680		580	1119															
vCu, unblocked vol	1358	1717	548	1127	1700	154	1091				499									
tC, single (s)	7.5	6.5	6.9	7.5	6.5	7.2	4.3				4.5									
tC, 2 stage (s)	6.5	5.5		6.5	5.5															
tF (s)	3.5	4.0	3.3	3.5	4.0	3.5	2.3				2.4									
p0 queue free %	97	100	97	93	100	99	98				98									
cM capacity (veh/h)	211	245	483	342	237	765	598				883									
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3												
Volume Total	20	34	14	406	241	14	719	367												
Volume Left	7	24	14	0	0	14	0	0												
Volume Right	13	10	0	0	38	0	0	7												
cSH	333	409	598	1700	1700	883	1700	1700												
Volume to Capacity	0.06	0.08	0.02	0.24	0.14	0.02	0.42	0.22												
Queue Length 95th (m)	1.4	2.1	0.5	0.0	0.0	0.4	0.0	0.0												
Control Delay (s)	16.5	14.6	11.2	0.0	0.0	9.1	0.0	0.0												
Lane LOS	C	B	B					A												
Approach Delay (s)	16.5	14.6	0.2					0.1												
Approach LOS	C	B																		
Intersection Summary																				
Average Delay				0.6																
Intersection Capacity Utilization				42.1%	ICU Level of Service					A										
Analysis Period (min)				15																

HCM Unsignalized Intersection Capacity Analysis 5: Ferndale Dr & W Access

440 Dunlop St & 125 Ferndale Dr
Total (2025) - AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	12	0	627	8	3	1067
Future Volume (Veh/h)	12	0	627	8	3	1067
Sign Control	Stop		Free		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)	13	0	682	9	3	1160
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLT		TWLT	
Median storage (veh)			2		2	
Upstream signal (m)			101			
pX, platoon unblocked	0.93	0.93			0.93	
vC, conflicting volume	1272	346			691	
vC1, stage 1 conf vol	686					
vC2, stage 2 conf vol	586					
vCu, unblocked vol	1133	131			504	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	400	828			978	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	13	455	236	3	580	580
Volume Left	13	0	0	3	0	0
Volume Right	0	0	9	0	0	0
cSH	400	1700	1700	978	1700	1700
Volume to Capacity	0.03	0.27	0.14	0.00	0.34	0.34
Queue Length 95th (m)	0.8	0.0	0.0	0.1	0.0	0.0
Control Delay (s)	14.3	0.0	0.0	8.7	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	14.3	0.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization			42.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 6: Ferndale Dr & SW Access

440 Dunlop St & 125 Ferndale Dr
Total (2025) - AM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	1	634	5	0	1079
Future Volume (Veh/h)	0	1	634	5	0	1079
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	689	5	0	1173
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLT		TWLT	
Median storage (veh)			2		2	
Upstream signal (m)			65			
pX, platoon unblocked	0.92	0.92			0.92	
vC, conflicting volume	1278	347			694	
vC1, stage 1 conf vol	692					
vC2, stage 2 conf vol	586					
vCu, unblocked vol	1135	126			502	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	400	831			977	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	1	459	235	586	586	
Volume Left	0	0	0	0	0	
Volume Right	1	0	5	0	0	
cSH	831	1700	1700	1700	1700	
Volume to Capacity	0.00	0.27	0.14	0.34	0.34	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	9.3	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	9.3	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		33.2%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 8: N Access & Lennox Dr

440 Dunlop St & 125 Ferndale Dr
Total (2025) - AM

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	34	14	0	25	8	0
Future Volume (Veh/h)	34	14	0	25	8	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	15	0	27	9	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			52		72	44
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			52		72	44
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		99	100
cM capacity (veh/h)			1554		933	1025
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	52	27	9			
Volume Left	0	0	9			
Volume Right	15	0	0			
cSH	1700	1554	933			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.0	0.0	0.2			
Control Delay (s)	0.0	0.0	8.9			
Lane LOS			A			
Approach Delay (s)	0.0	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			0.9			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 9: NE Access & Lennox Dr

440 Dunlop St & 125 Ferndale Dr

Total (2025) - AM

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	30	4	0	23	2	0
Future Volume (Veh/h)	30	4	0	23	2	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	4	0	25	2	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			37		60	35
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			37		60	35
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		100	100
cM capacity (veh/h)			1574		947	1038
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	37	25	2			
Volume Left	0	0	2			
Volume Right	4	0	0			
cSH	1700	1574	947			
Volume to Capacity	0.02	0.00	0.00			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	0.0	0.0	8.8			
Lane LOS						
Approach Delay (s)	0.0	0.0	8.8			
Approach LOS						
Intersection Summary						
Average Delay						
			0.3			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

Queues

1: Ferndale Dr & Dunlop St

440 Dunlop St & 125 Ferndale Dr

Total (2025) - PM

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	134	498	151	595	197	24	688	141	364	407
Future Volume (vph)	134	498	151	595	197	24	688	141	364	407
Lane Group Flow (vph)	151	580	156	613	203	27	764	157	396	540
Turn Type	pm+pt	NA	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA
Protected Phases	7	4	3	8	1	5	2	3	1	6
Permitted Phases	4		8		8	2		2		
Detector Phase	7	4	3	8	1	5	2	3	1	6
Switch Phase										
Minimum Initial (s)	7.0	35.0	7.0	35.0	7.0	7.0	10.0	7.0	7.0	10.0
Minimum Split (s)	11.5	41.0	11.5	41.0	12.0	11.5	36.0	11.5	12.0	36.0
Total Split (s)	13.8	41.0	13.8	41.0	23.0	11.5	42.2	13.8	23.0	53.7
Total Split (%)	11.5%	34.2%	11.5%	34.2%	19.2%	9.6%	35.2%	11.5%	19.2%	44.8%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	4.0	6.0	4.0	4.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	Max	Max	Max	None	Max	Max
v/c Ratio	0.45	0.39	0.44	0.42	0.26	0.08	0.70	0.23	0.73	0.38
Control Delay	26.6	34.6	26.3	35.2	8.7	16.3	41.0	9.2	57.0	25.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	34.6	26.3	35.2	8.7	16.3	41.0	9.2	57.0	25.3
Queue Length 50th (m)	22.0	39.7	22.8	42.6	11.4	3.1	83.7	7.7	46.2	44.6
Queue Length 95th (m)	35.8	50.0	37.3	53.9	24.9	7.8	105.4	20.6	63.1	59.0
Internal Link Dist (m)		185.4		119.4			166.3			41.1
Turn Bay Length (m)	100.0		90.0		100.0	90.0		90.0	55.0	
Base Capacity (vph)	342	1482	361	1474	784	354	1093	684	540	1404
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.39	0.43	0.42	0.26	0.08	0.70	0.23	0.73	0.38

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 119.7

Natural Cycle: 105

Control Type: Semi Act-Uncoord

Splits and Phases: 1: Ferndale Dr & Dunlop St

			
Ø1	Ø2	Ø3	Ø4
23 s	42.2 s	13.8 s	41 s
			
Ø5	Ø6	Ø7	Ø8
11.5 s	53.7 s	13.8 s	41 s

HCM Signalized Intersection Capacity Analysis

1: Ferndale Dr & Dunlop St

440 Dunlop St & 125 Ferndale Dr

Total (2025) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		  			  			 		 	 	
Traffic Volume (vph)	134	498	18	151	595	197	24	688	141	364	407	90
Future Volume (vph)	134	498	18	151	595	197	24	688	141	364	407	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0	4.0	4.0	6.0	4.0	4.0	6.0	
Lane Util. Factor	1.00	0.91		1.00	0.91	1.00	1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1788	5057		1824	5043	1553	1657	3614	1556	3404	3482	
Flt Permitted	0.34	1.00		0.36	1.00	1.00	0.45	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	636	5057		688	5043	1553	786	3614	1556	3404	3482	
Peak-hour factor, PHF	0.89	0.89	0.89	0.97	0.97	0.97	0.90	0.90	0.90	0.92	0.92	0.92
Adj. Flow (vph)	151	560	20	156	613	203	27	764	157	396	442	98
RTOR Reduction (vph)	0	3	0	0	0	60	0	0	62	0	16	0
Lane Group Flow (vph)	151	577	0	156	613	143	27	764	95	396	524	0
Confl. Peds. (#/hr)	5		5	5		5	5		10	10		5
Heavy Vehicles (%)	2%	3%	6%	0%	4%	4%	10%	1%	3%	4%	2%	0%
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	
Protected Phases	7	4		3	8	1	5	2	3	1	6	
Permitted Phases	4			8		8	2		2			
Actuated Green, G (s)	44.5	35.0		44.5	35.0	54.0	43.7	36.2	45.7	19.0	47.7	
Effective Green, g (s)	44.5	35.0		44.5	35.0	54.0	43.7	36.2	45.7	19.0	47.7	
Actuated g/C Ratio	0.37	0.29		0.37	0.29	0.45	0.37	0.30	0.38	0.16	0.40	
Clearance Time (s)	4.0	6.0		4.0	6.0	4.0	4.0	6.0	4.0	4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	327	1478		345	1474	700	341	1092	594	540	1387	
v/s Ratio Prot	c0.04	0.11		0.04	0.12	0.03	0.00	c0.21	0.01	c0.12	0.15	
v/s Ratio Perm	c0.13			0.13		0.06	0.02		0.05			
v/c Ratio	0.46	0.39		0.45	0.42	0.20	0.08	0.70	0.16	0.73	0.38	
Uniform Delay, d1	26.0	33.8		26.0	34.1	19.9	24.5	36.9	24.4	47.9	25.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.2		0.9	0.2	0.1	0.5	3.7	0.1	8.6	0.8	
Delay (s)	27.0	34.0		26.9	34.3	20.0	25.0	40.7	24.5	56.5	26.3	
Level of Service	C	C		C	C	C	C	D	C	E	C	
Approach Delay (s)		32.6			30.1			37.5			39.1	
Approach LOS		C			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			34.9			HCM 2000 Level of Service			C			
HCM 2000 Volume to Capacity ratio			0.60									
Actuated Cycle Length (s)			119.7			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			89.6%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Queues
2: Sarjeant Dr & Dunlop St

440 Dunlop St & 125 Ferndale Dr

Total (2025) - PM

	→	↖	←	↗	↘
Lane Group	EBT	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑	↖	↑↑↑	↖	↖
Traffic Volume (vph)	1055	43	1152	92	119
Future Volume (vph)	1055	43	1152	92	119
Lane Group Flow (vph)	1185	45	1213	126	163
Turn Type	NA	pm+pt	NA	Prot	Perm
Protected Phases	4	3	8	2	
Permitted Phases		8			2
Detector Phase	4	3	8	2	2
Switch Phase					
Minimum Initial (s)	34.0	7.0	34.0	10.0	10.0
Minimum Split (s)	40.0	11.5	40.0	26.0	26.0
Total Split (s)	48.0	14.0	62.0	28.0	28.0
Total Split (%)	53.3%	15.6%	68.9%	31.1%	31.1%
Yellow Time (s)	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	4.0	6.0	6.0	6.0
Lead/Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes			
Recall Mode	None	Max	None	Max	Max
v/c Ratio	0.57	0.17	0.41	0.26	0.32
Control Delay	19.6	8.0	9.8	25.4	6.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.6	8.0	9.8	25.4	6.0
Queue Length 50th (m)	50.1	2.6	34.4	15.5	0.0
Queue Length 95th (m)	63.0	6.3	43.2	23.0	6.8
Internal Link Dist (m)	159.0		217.5	119.8	
Turn Bay Length (m)		60.0		20.0	
Base Capacity (vph)	2576	262	3477	479	517
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.46	0.17	0.35	0.26	0.32

Intersection Summary

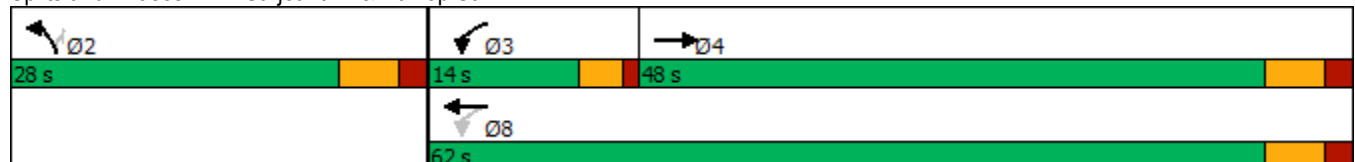
Cycle Length: 90

Actuated Cycle Length: 82

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Splits and Phases: 2: Sarjeant Dr & Dunlop St



HCM Signalized Intersection Capacity Analysis

2: Sarjeant Dr & Dunlop St

440 Dunlop St & 125 Ferndale Dr
Total (2025) - PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	↗
Traffic Volume (vph)	1055	24	43	1152	92	119
Future Volume (vph)	1055	24	43	1152	92	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0		4.0	6.0	6.0	6.0
Lane Util. Factor	0.91		1.00	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5023		1332	5092	1789	1485
Flt Permitted	1.00		0.15	1.00	0.95	1.00
Satd. Flow (perm)	5023		206	5092	1789	1485
Peak-hour factor, PHF	0.91	0.91	0.95	0.95	0.73	0.73
Adj. Flow (vph)	1159	26	45	1213	126	163
RTOR Reduction (vph)	3	0	0	0	0	119
Lane Group Flow (vph)	1182	0	45	1213	126	44
Confl. Peds. (#/hr)		5	5		5	5
Heavy Vehicles (%)	4%	4%	37%	3%	2%	8%
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	34.0		48.0	48.0	22.0	22.0
Effective Green, g (s)	34.0		48.0	48.0	22.0	22.0
Actuated g/C Ratio	0.41		0.59	0.59	0.27	0.27
Clearance Time (s)	6.0		4.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	2082		257	2980	479	398
v/s Ratio Prot	c0.24		0.02	c0.24	c0.07	
v/s Ratio Perm			0.08			0.03
v/c Ratio	0.57		0.18	0.41	0.26	0.11
Uniform Delay, d1	18.4		8.5	9.3	23.6	22.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4		0.3	0.1	1.3	0.6
Delay (s)	18.7		8.9	9.3	25.0	23.2
Level of Service	B		A	A	C	C
Approach Delay (s)	18.7			9.3	24.0	
Approach LOS	B			A	C	
Intersection Summary						
HCM 2000 Control Delay			15.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			82.0		Sum of lost time (s)	16.0
Intersection Capacity Utilization			62.4%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

3: Ferndale Dr & Ferndale Ind. Dr./Dwy

440 Dunlop St & 125 Ferndale Dr

Total (2025) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	0	19	1	0	0	7	1003	0	0	824	3
Future Volume (Veh/h)	5	0	19	1	0	0	7	1003	0	0	824	3
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.75	0.75	0.75	0.38	0.38	0.38	0.95	0.95	0.95	0.93	0.93	0.93
Hourly flow rate (vph)	7	0	25	3	0	0	7	1056	0	0	886	3
Pedestrians	5			5								
Lane Width (m)	3.7			3.7								
Walking Speed (m/s)	1.1			1.1								
Percent Blockage	0			0								
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage (veh)							2			2		
Upstream signal (m)							134					
pX, platoon unblocked	0.82	0.82		0.82	0.82	0.82				0.82		
vC, conflicting volume	1434	1968	450	1543	1969	533	894				1061	
vC1, stage 1 conf vol	892	892		1075	1075							
vC2, stage 2 conf vol	542	1075		468	894							
vCu, unblocked vol	1083	1736	450	1216	1738	0	894				626	
tC, single (s)	7.5	6.5	7.3	7.5	6.5	6.9	4.4				4.1	
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.5	3.5	4.0	3.3	2.3				2.2	
p0 queue free %	98	100	95	99	100	100	99				100	
cM capacity (veh/h)	291	264	508	298	261	887	686				785	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	32	3	7	704	352	0	591	298				
Volume Left	7	3	7	0	0	0	0	0				
Volume Right	25	0	0	0	0	0	0	3				
cSH	437	298	686	1700	1700	1700	1700	1700				
Volume to Capacity	0.07	0.01	0.01	0.41	0.21	0.00	0.35	0.18				
Queue Length 95th (m)	1.8	0.2	0.2	0.0	0.0	0.0	0.0	0.0				
Control Delay (s)	13.9	17.2	10.3	0.0	0.0	0.0	0.0	0.0				
Lane LOS	B	C	B									
Approach Delay (s)	13.9	17.2	0.1	0.0								
Approach LOS	B	C										
Intersection Summary												
Average Delay	0.3											
Intersection Capacity Utilization	40.8%			ICU Level of Service					A			
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 4: Ferndale Dr & Dwy/Lennox Dr

440 Dunlop St & 125 Ferndale Dr
Total (2025) - PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	5	37	0	33	4	967	37	9	782	11
Future Volume (Veh/h)	4	0	5	37	0	33	4	967	37	9	782	11
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.38	0.38	0.38	0.89	0.89	0.89	0.88	0.88	0.88	0.91	0.91	0.91
Hourly flow rate (vph)	11	0	13	42	0	37	5	1099	42	10	859	12
Pedestrians	5			5								
Lane Width (m)	3.7			3.7								
Walking Speed (m/s)	1.1			1.1								
Percent Blockage	0			0								
Right turn flare (veh)												
Median type							TWLTL			TWLTL		
Median storage (veh)							2			2		
Upstream signal (m)							183					
pX, platoon unblocked	0.82	0.82		0.82	0.82	0.82				0.82		
vC, conflicting volume	1486	2046	440	1598	2031	576	876				1146	
vC1, stage 1 conf vol	890	890		1135	1135							
vC2, stage 2 conf vol	596	1156		462	896							
vCu, unblocked vol	1150	1834	440	1286	1816	37	876				734	
tC, single (s)	7.5	6.5	6.9	7.6	6.5	7.0	4.1				4.1	
tC, 2 stage (s)	6.5	5.5		6.6	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	96	100	98	85	100	96	99				99	
cM capacity (veh/h)	283	244	567	272	249	831	775				717	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	24	79	5	733	408	10	573	298				
Volume Left	11	42	5	0	0	10	0	0				
Volume Right	13	37	0	0	42	0	0	12				
cSH	389	397	775	1700	1700	717	1700	1700				
Volume to Capacity	0.06	0.20	0.01	0.43	0.24	0.01	0.34	0.18				
Queue Length 95th (m)	1.5	5.6	0.1	0.0	0.0	0.3	0.0	0.0				
Control Delay (s)	14.9	16.3	9.7	0.0	0.0	10.1	0.0	0.0				
Lane LOS	B	C	A				B					
Approach Delay (s)	14.9	16.3	0.0				0.1					
Approach LOS	B	C										
Intersection Summary												
Average Delay	0.8											
Intersection Capacity Utilization	43.9%			ICU Level of Service				A				
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 5: Ferndale Dr & W Access

440 Dunlop St & 125 Ferndale Dr
Total (2025) - PM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	18	0	1009	8	1	843
Future Volume (Veh/h)	18	0	1009	8	1	843
Sign Control	Stop		Free		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)	20	0	1097	9	1	916
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLT		TWLT	
Median storage (veh)			2		2	
Upstream signal (m)			101			
pX, platoon unblocked	0.81	0.81			0.81	
vC, conflicting volume	1562	553			1106	
vC1, stage 1 conf vol	1102					
vC2, stage 2 conf vol	460					
vCu, unblocked vol	1231	0			671	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			100	
cM capacity (veh/h)	338	882			744	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	20	731	375	1	458	458
Volume Left	20	0	0	1	0	0
Volume Right	0	0	9	0	0	0
cSH	338	1700	1700	744	1700	1700
Volume to Capacity	0.06	0.43	0.22	0.00	0.27	0.27
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.0	0.0
Control Delay (s)	16.3	0.0	0.0	9.8	0.0	0.0
Lane LOS	C			A		
Approach Delay (s)	16.3	0.0		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			41.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 6: Ferndale Dr & SW Access

440 Dunlop St & 125 Ferndale Dr
Total (2025) - PM

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	2	1015	3	0	861
Future Volume (Veh/h)	0	2	1015	3	0	861
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2	1103	3	0	936
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLT		TWLT	
Median storage (veh)			2		2	
Upstream signal (m)			65			
pX, platoon unblocked	0.81	0.81			0.81	
vC, conflicting volume	1572	553			1106	
vC1, stage 1 conf vol	1104					
vC2, stage 2 conf vol	468					
vCu, unblocked vol	1244	0			670	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	336	882			745	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	2	735	371	468	468	
Volume Left	0	0	0	0	0	
Volume Right	2	0	3	0	0	
cSH	882	1700	1700	1700	1700	
Volume to Capacity	0.00	0.43	0.22	0.28	0.28	
Queue Length 95th (m)	0.1	0.0	0.0	0.0	0.0	
Control Delay (s)	9.1	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	9.1	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay		0.0				
Intersection Capacity Utilization		38.2%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 8: N Access & Lennox Dr

440 Dunlop St & 125 Ferndale Dr
Total (2025) - PM

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↶			↷	↶↷	
Traffic Volume (veh/h)	33	13	0	60	10	0
Future Volume (Veh/h)	33	13	0	60	10	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	14	0	65	11	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			50		108	43
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			50		108	43
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		99	100
cM capacity (veh/h)			1557		889	1027
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	50	65	11			
Volume Left	0	0	11			
Volume Right	14	0	0			
cSH	1700	1557	889			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.0	0.0	0.3			
Control Delay (s)	0.0	0.0	9.1			
Lane LOS						
Approach Delay (s)	0.0	0.0	9.1			
Approach LOS						
Intersection Summary						
Average Delay						
			0.8			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			