



Tribal Partners Canada Inc.

TRANSPORTATION IMPACT STUDY

12035 Dixie Road, Town of Caledon
Proposed Industrial/Employment
Development

March 2021
21185

**TOWN OF CALEDON
PLANNING
RECEIVED**

March, 17, 2021



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March 12, 2021

Reference Number: 21185

Tribal Partners Canada Inc.
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Dear Tribal Partners Canada Inc.,

RE: Transportation Impact Study
Proposed Industrial/Employment Development
12035 Dixie Road (Lot 2 and 3 Caledon Lands), Town of Caledon

LEA Consulting Ltd. (LEA) is pleased to present the findings of our Transportation Impact Study (TIS) for the proposed industrial/employment development located at 12035 Dixie Road in the Town of Caledon. This study has been prepared on behalf of Tribal Partners Canada Inc. in support of their Official Plan Amendment, Zoning By-law amendment, and Site Plan Approval applications. This report concludes that the traffic associated with the proposed development will have an acceptable impact on the surrounding road network.

Should you have any questions regarding this Transportation Impact Study, please do not hesitate to contact the undersigned at (905) 470-0015 x301 (schan@lea.ca).

Yours truly,
LEA CONSULTING LTD.

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Encl. Transportation Impact Study – 12035 Dixie Road, Town of Caledon, Proposed Industrial/Employment Development

Disclaimer

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1 INTRODUCTION

LEA Consulting Ltd. (LEA) has been retained by Tribal Partners Canada Inc. to conduct a Transportation Impact Study (TIS) for a proposed warehouse/employment development located at 12035 Dixie Road in the Town of Caledon (herein referred to as the “subject site”). The subject site is currently agricultural land at the northeast quadrant of Dixie Road & Mayfield Road, as illustrated in Figure 1-1.

Figure 1-1: Subject Site Location



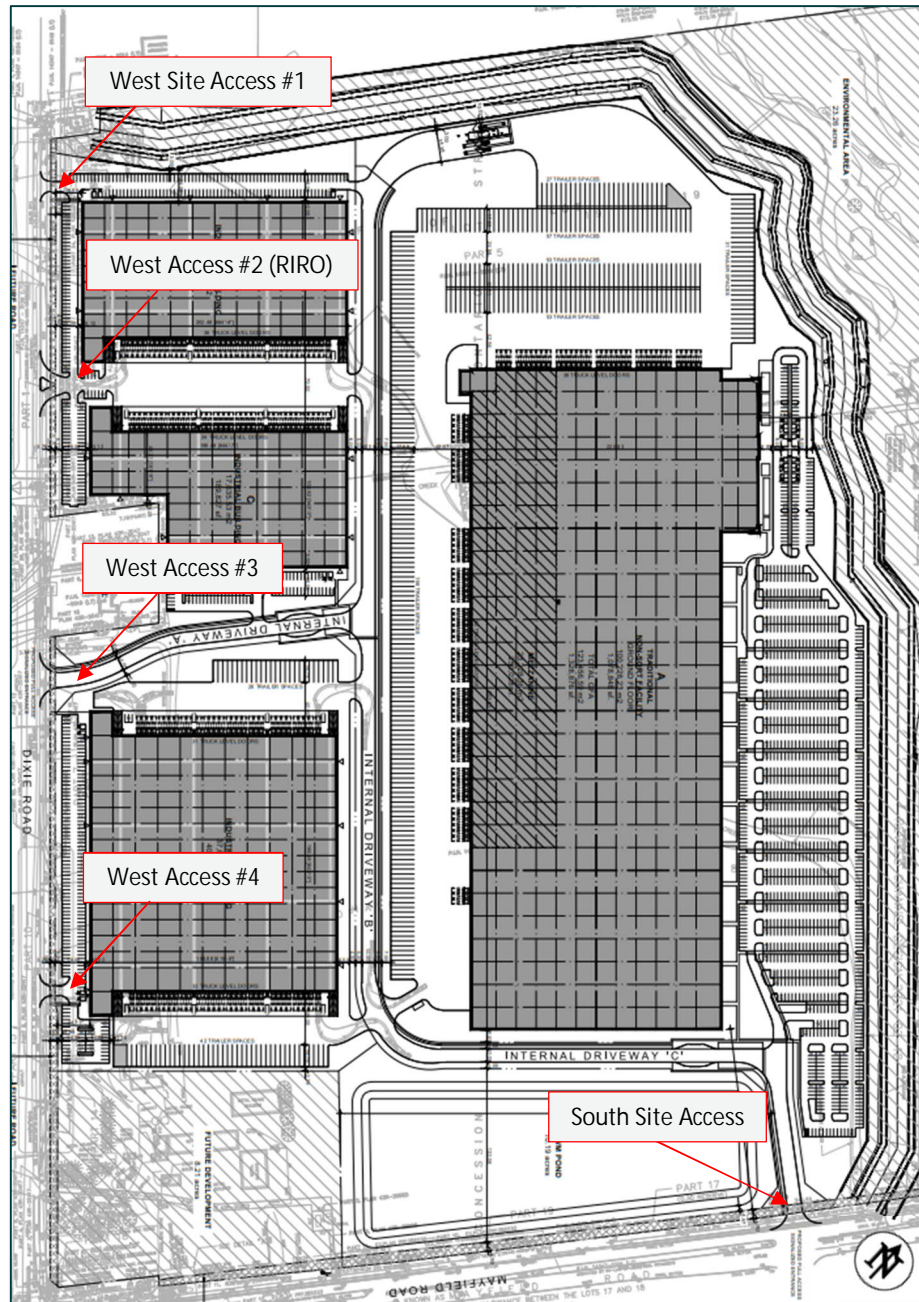
1.1 PROPOSED DEVELOPMENT

The development proposal will introduce four (4) warehouse/distribution buildings with a combined ground floor area (GFA) of approximately 200,292m². A total of 2,111 surface parking spaces are proposed for the subject site. The proposed site statistics are presented in Table 1-1, and the proposed site plan is shown in Figure 1-2.

Table 1-1: Proposed Site Statistics

Land Use	Building	GFA (m ²)	GFA (ft ²)
Warehouse/ Distribution Centre	A	123,457	1,328,874
	B	37,691	405,705
	C	17,636	189,827
	D	21,509	231,519
Total		200,292	2,155,926

Figure 1-2: Proposed Site Plan



Source: Baldassarra Architects Inc. (March 8th, 2021)

1.2 ACCESS ARRANGEMENT

The proposed development will be accessible via three (3) all-moves accesses and one (1) right-in/right-out (RIRO) access along Dixie Road, as well as one (1) all-moves access along Mayfield Road. The Mayfield Road

access, as well as the West Access #3 along Dixie Road access is proposed to be signalized. Additionally, the proposed internal driveways will allow the four buildings to be connected within the subject site.

The minimum spacing between intersections along Dixie Road are subject to the guidelines listed within Region of Peel's Road Characterization Study (May 2013). In the study, Dixie Road is characterized as a "Suburban Connector", where the minimum distance required between full intersections, and full to right-in/right-out intersections is 300m, and 150m, respectively. The distance between the intersections of Dixie Road & Merchant Road/West Access #3 and Dixie Road & West Access #2 (RIRO), meets the Region's criteria, at approximately 200m. However, the distance between the remaining accesses is short of 22-91m. Even so, given that the roadway is relatively flat with no horizontal or vertical obstructions, the spacing distance between accesses is considered acceptable.

Table 1-2 and below summarizes the design and usage of the proposed accesses along Dixie Road and Mayfield Road.

Table 1-2: Access Arrangement Summary

	West Access #1	West Access #2	West Access #3	West Access #4	South Access
Configuration	Full-moves (NBTR, SBLT, WBLR)	RIRO (NBTR, WBR)	Full-moves (NBTR, SBL, WBLTR, EBLTR)	Full-moves (NBTR, SBLT, WBLR)	Full-moves (NBLTR, SBLTR, WBL, EBTR,)
Traffic Control	Stop Controlled	Stop Controlled	Signalized	Stop Controlled	Signalized
Vehicle Type Permitted	Vehicles	Vehicles & Trucks	Vehicles & Trucks	Vehicles	Vehicles & Trucks
Building Access	Building C, D	Building C, D	Building A, B, C, D	Building B	Building A, B, C, D

2 EXISTING TRANSPORTATION CONDITIONS

This section will identify and assess the existing transportation conditions present in the study area, including the road, transit, cyclist, and pedestrian networks. The study area was determined based on the size of the development, its anticipated transportation impact, as well as through discussions with Town and Region staff. The study area will include the following intersections:

- ▶ Dixie Road & Mayfield Road (signalized);
- ▶ Dixie Road & Merchant Road/West Access #3 (proposed signalization); and
- ▶ Bramalea Road & Mayfield Road (signalized).

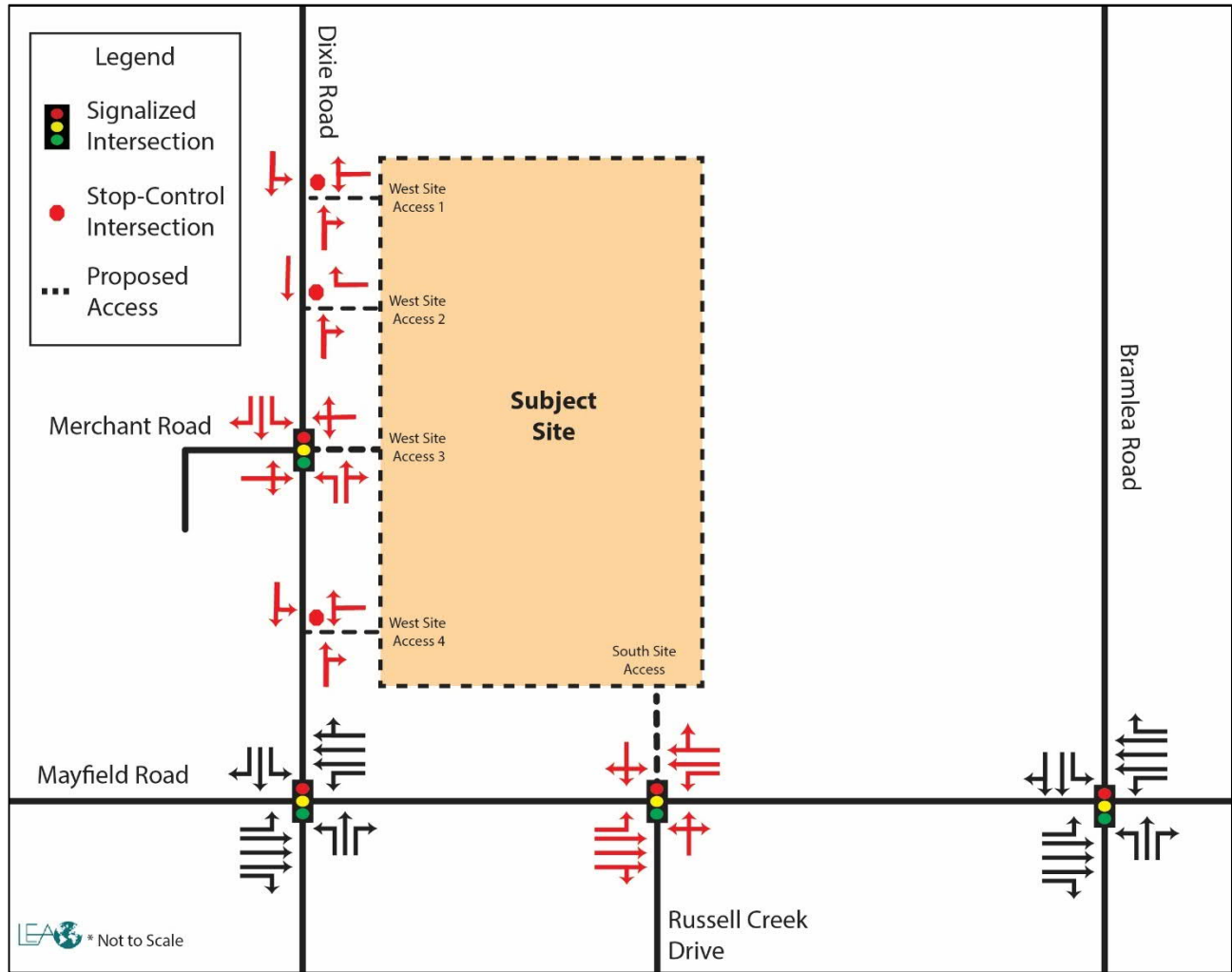
In addition to the West Access #3 at Dixie & Merchant, the following site accesses are also proposed:

- ▶ Dixie Road & West Site Access #1 (unsignalized);
- ▶ Dixie Road & West Site Access #2 RIRO (unsignalized);
- ▶ Dixie Road & West Access #4 (unsignalized); and
- ▶ South Access & Mayfield road (proposed signalization).

2.1 ROAD NETWORK

The following section provides a description and classification of the roadways within the study area, with Figure 2-1 illustrating the existing lane configuration.

Figure 2-1: Existing Lane Configuration and Traffic Control

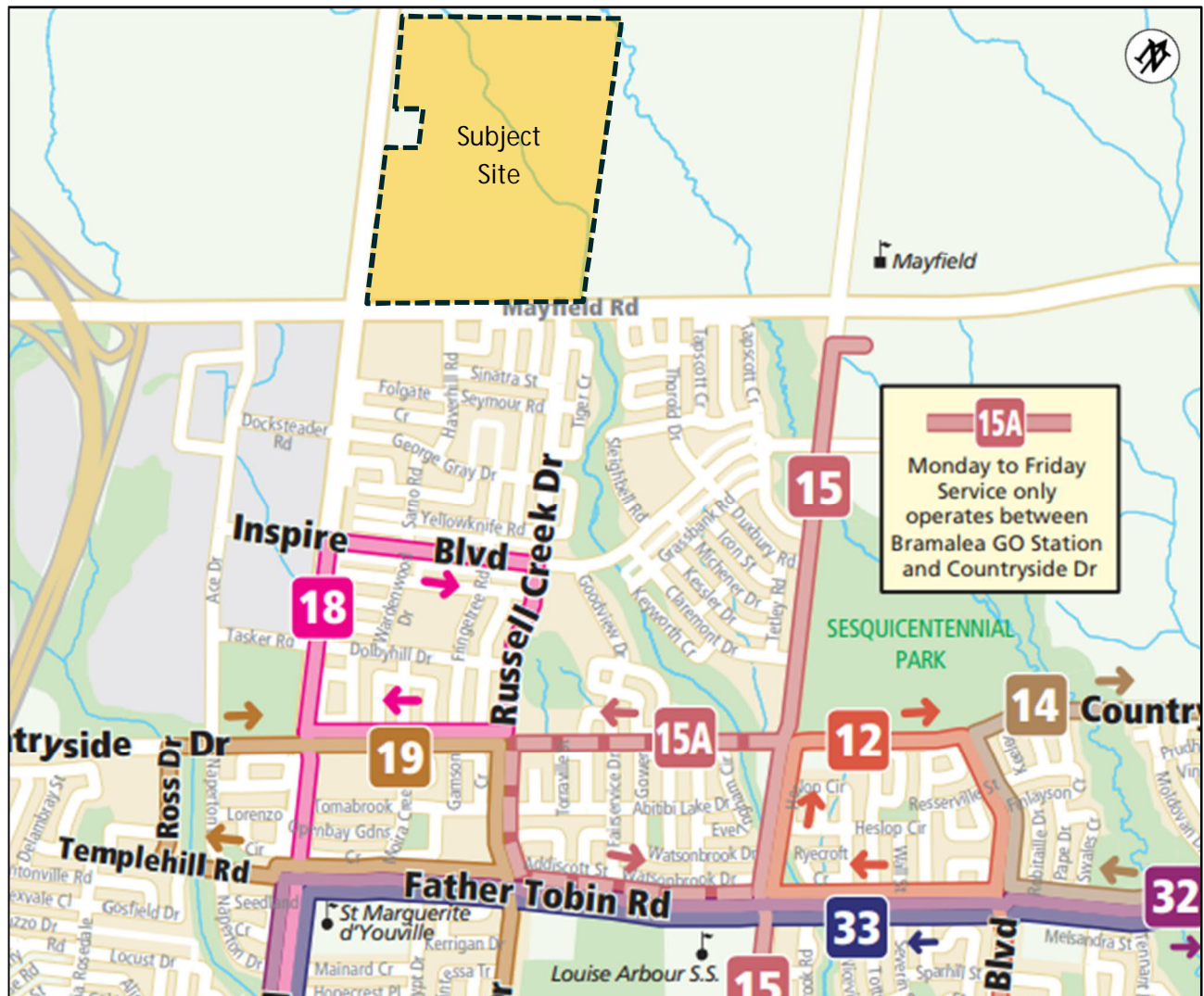


- ▶ Dixie Road is a north-south arterial road within the study area, under the jurisdiction of the Region of Peel. The roadway has a posted speed limit of 80 km/h and operates with a two-lane cross-section (one lane per direction) within the study area.
- ▶ Mayfield Road is an east-west arterial road within the study area, under the jurisdiction of the Region of Peel. The roadway has a posted speed limit of 80 km/h and operates with a six-lane cross-section (three lanes per direction) west of Dixie Road until approximately 275m west of Heart Lake Road, and a five-lane cross-section (three lanes eastbound, 2 lanes westbound) between Dixie Road and Bramalea Road.
- ▶ Bramalea Road is a north-south collector road under the jurisdiction of the Town of Caledon. The roadway has a posted speed limit of 60 km/h and operates with a four-lane cross-section (two lanes per direction) within the study area.
- ▶ Merchant Road is a local road under the jurisdiction of the Town of Caledon. The roadway operates with a two-lane cross-section (one lane per direction) and is assumed to operate with an unposted speed limit of 50 km/h.

2.2 TRANSIT NETWORK

The Town of Caledon currently does not operate public transit within the municipality, except for the local transit line in Bolton serviced by Voyago. There are also inter-regional transit services provided by Brampton Transit, and GO Transit routes. While the proposed development is not conveniently accessible by public transit, the closest bus stop is located approximately 1.5km south of the subject site (equivalent to an 18-minute walk), at the intersection of Dixie Road & Inspire Boulevard. The existing transit network surrounding the study area operated by Brampton Transit is described below, and illustrated in Figure 2-2.

Figure 2-2: Existing Transit Services



Source: Brampton Transit System Map (November, 2020)

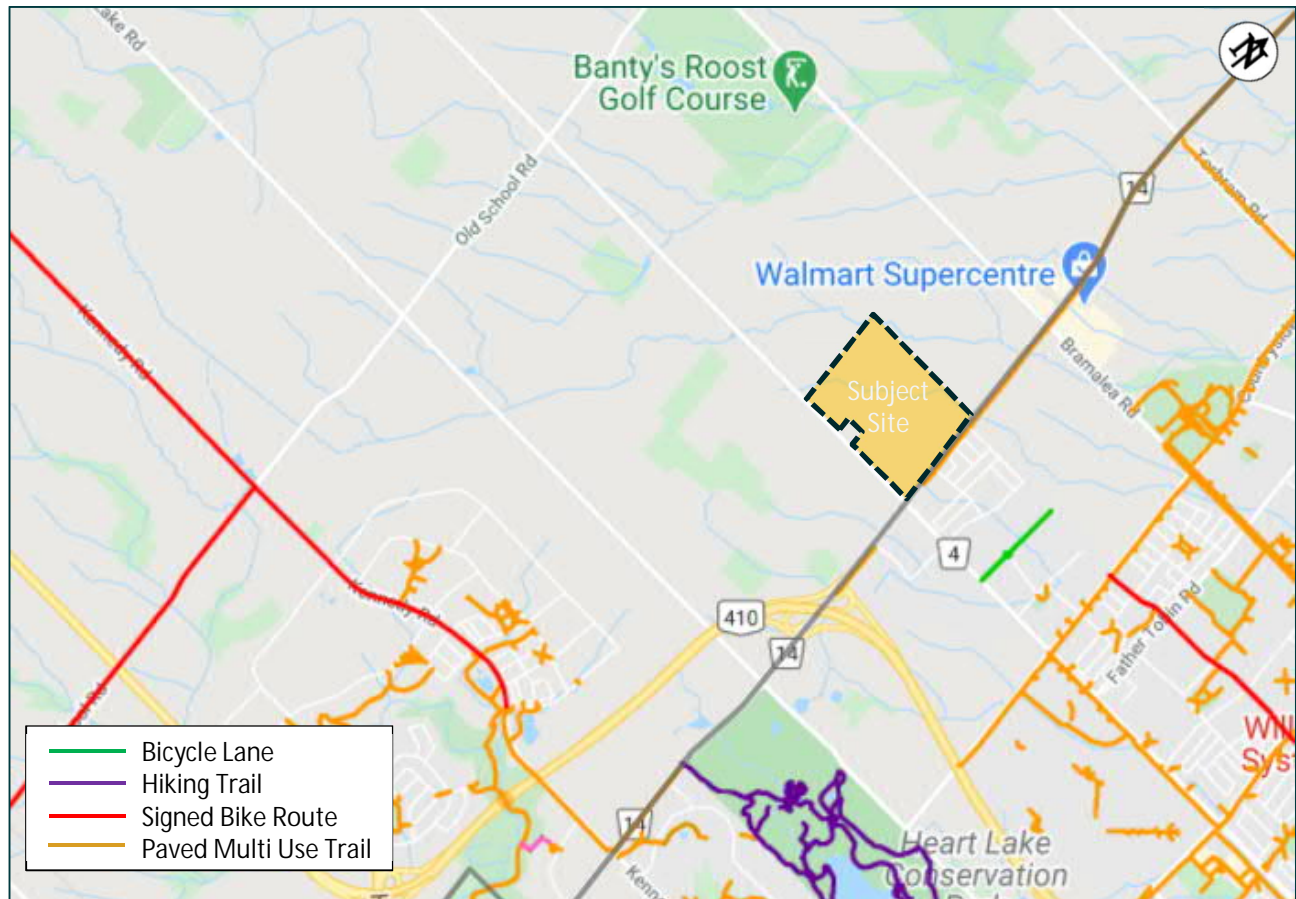
Route 18 Dixie is a bus route that generally runs north-south along Dixie Road between Inspire Boulevard and Meyerside Drive, and connects riders to the Bramalea Terminal. It operates with 10 to 15-minute headways during peak hours and provides connections to Züm Routes 505, 501, and 511.

2.3 CYCLING NETWORK

The nearest cycling infrastructure in the area includes paved multi-use trail along Mayfield Road, which connects to a wider network within the City of Brampton. There is also a paved multi-use trail and signed bike route along Kennedy Road, which is approximately 3.5km from the subject site. This route extends north to the east-west signed bike route along Olde Base Line Road. The signed bike route is also present on

Old School Road, traveling west of Kennedy Road. The cycling network surrounding the subject site is illustrated in Figure 2-3.

Figure 2-3: Existing Cycling Network



Source: walkandrollpeel.ca (2021)

2.4 PEDESTRIAN NETWORK

Given that the area north of Mayfield Road consists of mainly agriculture lands, the study area has minimal pedestrian infrastructure. Despite the absence of sidewalks in the area immediately surrounding the subject site, crosswalks are available at the signalized intersection of Dixie Road & Mayfield Road, and Bramalea Road & Mayfield Road. It should be noted that sidewalk is provided along the south side of Mayfield Road to facilitate the residential uses.

2.5 TRAFFIC DATA COLLECTION

Turning movement counts (TMCs) were used as the source of traffic data in the intersection capacity analyses. The traffic counts for Dixie Road & Mayfield Road, and Bramalea Road & Mayfield Road were

obtained from Spectrum Traffic Data Inc. (Spectrum) and Region of Peel, collected in 2019 and 2016, respectively.

Traffic counts for the intersections at Dixie Road & Merchant Road were not available from Spectrum, Town of Caledon, or the Region of Peel. Resultantly, TMC surveys were conducted by LEA for the intersection during the weekday AM and PM peak periods between 6:30 AM to 9:30 AM and 3:30 PM to 6:30 PM, respectively. Table 2-1 summarizes the traffic data utilized in this study, with detailed TMCs provided in Appendix A.

Table 2-1: Traffic Data Collection Summary

Intersection	Survey Date	Source
Dixie Road & Mayfield Road	Thursday, October 3 rd , 2019	Spectrum
Bramalea Road & Mayfield Road	Tuesday, November 29 th , 2016	Region of Peel
Dixie Road & Merchant Road	Tuesday, December 15 th , 2020	LEA

Given that the traffic data of Dixie & Merchant was collected in the midst of the COVID-19 pandemic, as discussed with Town and Region staff, the TMCs within the study area have been adjusted to remediate the discrepancies in traffic volumes.

The surveyed TMCs at Dixie & Merchant generally reveals higher traffic volumes along Dixie Road compared to the TMCs at Dixie & Mayfield which were collected pre-pandemic. Therefore, in order to derive present day traffic volumes at Dixie & Merchant and Dixie & Mayfield, the traffic volumes on Dixie Road were balanced using the TMCs for the two intersections. This increases the volumes along Dixie Road at the respective intersections. To note, Merchant Road is a local road that only serves the Acklands Grainger warehouse located at 21 Merchant Road, and terminates as a cul-de-sac. Since warehousing and distribution is considered an “essential business” in the Province of Ontario, it was assumed that business operations did not change for this use, and that traffic along Merchant Road remains the same as pre-pandemic conditions. Therefore, traffic volumes on Merchant Road have not been adjusted.

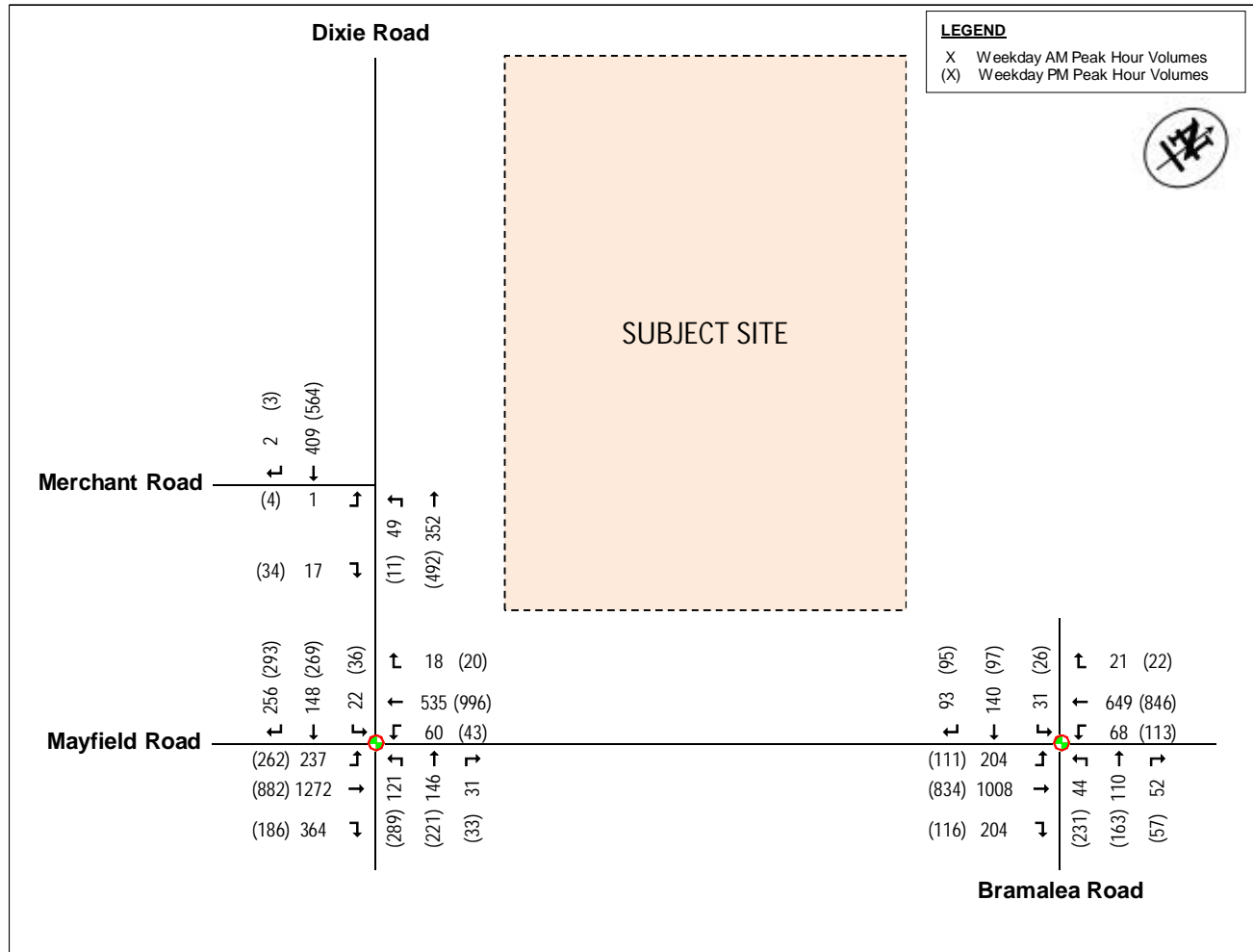
Since the Dixie & Mayfield TMCs were collected less than two (2) years ago, the Mayfield Road volumes at Dixie & Mayfield have not been adjusted. It is assumed that the volumes are representative of present day traffic volumes.

As for the TMCs of Bramalea Road & Mayfield Road, given that the latest available data provided by the Region was collected in 2016, a conservative growth rate of 2% has been applied to through movements to derive 2021 existing traffic volumes.

2.6 INTERSECTION CAPACITY ANALYSIS

The capacity analysis for the study area was undertaken using Synchro version 11.0, which is based on the Highway Capacity Manual (2000) methodology. The intersection capacity analysis has been conducted under Region of Peel Synchro Guidelines (December 2010). In accordance to the guidelines, the peak hour factors (PHF) of all Regional intersections were set at 1.00 for all movements. The adjusted existing traffic volumes in the study area during the weekday peak hours are illustrated in Figure 2-4.

Figure 2-4: Existing Peak Hour Traffic Volumes



The intersection capacity analysis was completed for the weekday AM and PM peak hours. The results for the assessed signalized intersections under existing conditions are summarized in Table 2-2 and Table 2-3, whereas the results for the unsignalized intersections are summarized in Table 2-4. Detailed capacity results can be found in Appendix B.

Table 2-2: Existing Capacity Analysis - Signalized Intersections (AM Peak Hour)

Intersection	Weekday AM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	0.47	19	B	EBL	0.40	7	A	8.2	17.2
				EBT	0.41	11	B	30.4	45.5
				EBR	0.24	10	A	0.0	7.8
				WBL	0.20	9	A	1.8	5.0
				WBT	0.21	12	B	12.2	20.9
				NBL	0.70	62	E	16.1	26.2
				NBT	0.54	50	D	18.9	28.7
				NBR	0.02	42	D	0.0	1.1
				SBL	0.15	44	D	2.7	6.7
				SBT	0.51	49	D	19.1	28.7
SBR	0.18	44	D	0.0	12.4				
Bramalea Road & Mayfield Road	0.37	16	B	EBL	0.33	6	A	7.7	14.1
				EBT	0.29	6	A	18.2	25.4
				EBR	0.13	5	A	0.0	4.3
				WBL	0.24	13	B	4.6	11.6
				WBT	0.23	11	B	15.8	23.5
				WBR	0.02	9	A	0.0	0.0
				NBL	0.40	59	E	6.6	13.5
				NBT	0.60	64	E	16.9	27.3
				NBR	0.04	55	D	0.0	2.8
				SBL	0.21	50	D	4.1	8.9
SBT	0.31	52	D	10.2	16.8				

Table 2-3: Existing Capacity Analysis - Signalized Intersections (PM Peak Hour)

Intersection	Weekday PM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	0.92	30	C	EBL	0.87	41	D	18.2	43.2
				EBT	0.39	21	C	30.1	36.8
				EBR	0.12	18	B	0.0	7.4
				WBL	0.17	17	B	2.6	5.8
				WBT	0.47	24	C	35.6	42.8
				NBL	0.95	77	E	37.7	68.4
				NBT	0.34	30	C	22.1	34.0
				NBR	0.02	27	C	0.0	1.3
				SBL	0.11	28	C	3.3	7.8
				SBT	0.43	32	C	28.0	41.8
				SBR	0.34	31	C	11.4	25.5
Bramalea Road & Mayfield Road	0.49	25	C	EBL	0.27	12	B	6.8	14.2
				EBT	0.30	13	B	23.2	34.4
				EBR	0.07	11	B	0.0	5.6
				WBL	0.38	24	C	11.1	25.8
				WBT	0.35	21	C	29.9	44.3
				WBR	0.02	17	B	0.0	0.0
				NBL	0.82	66	E	34.7	47.7
				NBT	0.36	43	D	21.5	29.9
				NBR	0.04	39	D	0.0	2.9
				SBL	0.08	35	C	2.8	5.8
				SBT	0.13	36	D	5.7	9.7

Under existing conditions, the signalized intersections are operating with an overall level of service (LOS) of 'C' or better during both peak hours. All individual movements are operating within the roadway capacity and acceptable delays during the AM and PM peak hours. However, it should be noted that the northbound left-turn movement at Dixie & Mayfield is approaching capacity with at V/C ratio of 0.95 during the PM peak period.

Table 2-4: Existing Capacity Analysis – Unsignalized Intersections

Intersection	Weekday AM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & Merchant Road	EBLR	18	544	12	0.5	0.03	B
	NBL	49	1106	8	0.6	0.04	A
Intersection	Weekday PM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & Merchant Road	EBLR	38	468	13	1.2	0.08	B
	NBL	11	968	9	0.2	0.01	A

Under existing traffic conditions, the unsignalized intersection within the study area are operating with short delays and ample residual capacity during both peak hours. All movements are operating with LOS of 'B' or better.

3 FUTURE BACKGROUND TRAFFIC CONDITIONS

For the analysis of the future background traffic conditions, this study considers a five-year horizon to the year 2026. Future background traffic includes the traffic added to the network from other future developments within the surrounding area, corridor growth, as well as all planned infrastructure improvements within the study area.

3.1 BACKGROUND DEVELOPMENTS

There is one (1) background development identified within the immediate study area, located north of the subject site at 12892 Dixie Road. The development application for the proposed warehouse buildings at 12892 Dixie Road has recently been submitted to the Town. Since LEA is also the transportation consultant for that proposal, the trip generation, distribution and assignment is estimated using a similar methodology outlined in this study based on the latest site statistics. A summary of the background development is provided in Table 3-1.

Table 3-1: Background Development

Location	Site Statistics	Source
12892 Dixie Road	4 warehouse buildings, Total Approximate GFA of 247,243 m ²	LEA (February, 2021)

3.2 CORRIDOR GROWTH

As a conservative approach, an annual growth rate of 2% was applied to all roadways within the study area during the AM and PM peak hours.

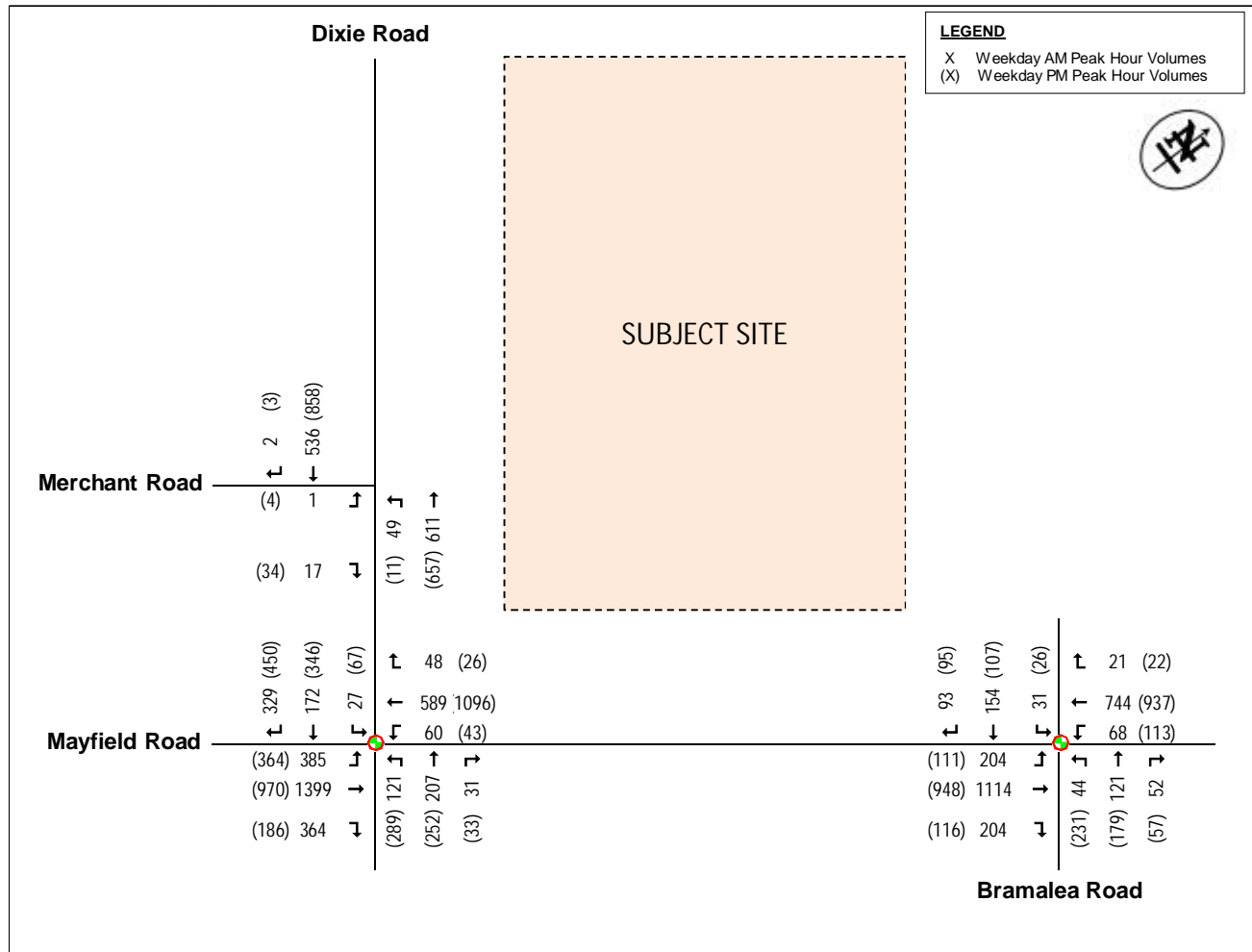
3.3 ROAD NETWORK IMPROVEMENTS

The Peel Region Long Range Transportation Plan (2019) was reviewed to identify any planned roadway improvements within the study area. It was identified that Mayfield Road is proposed to be widened from five (5) to six (6) lanes between Dixie Road and Bramalea Road, as part of the Region's 2031 planning horizon. It is understood that construction is planned to begin in 2024-2025. As the widening is planned to be completed outside of the study's five-year horizon of 2026, this road improvement has not been considered in the future scenarios.

3.4 INTERSECTION CAPACITY ANALYSIS

The future background traffic volumes were determined by incorporating future background traffic to the existing traffic volumes. The future background volumes are illustrated in Figure 3-1.

Figure 3-1: Future Background Peak Hour Traffic Volumes



The results for the assessed signalized intersections under future background conditions are summarized in Table 3-2 and Table 3-3, whereas the results for the unsignalized intersections are summarized in Table 3-4. Detailed capacity results found in Appendix C.

Table 3-2: Future Background Capacity Analysis - Signalized Intersections (AM Peak Hour)

Intersection	Weekday AM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	0.66	22.0	C	EBL	0.63	10.5	B	16.6	31.9
				EBT	0.47	13.1	B	37.3	53.9
				EBR	0.24	11.1	B	0.0	8.2
				WBL	0.24	14.4	B	2.0	5.4
				WBT	0.29	19.5	B	19.0	25.7
				NBL	0.66	56.2	E	15.8	25.9
				NBT	0.67	52.4	D	27.2	38.8
				NBR	0.02	40.0	D	0.0	1.1
				SBL	0.21	43.2	D	3.2	7.8
				SBT	0.52	46.9	D	21.9	32.1
				SBR	0.33	43.9	D	3.9	19.1
Bramalea Road & Mayfield Road	0.40	16.3	B	EBL	0.36	6.2	A	8.0	14.6
				EBT	0.33	6.4	A	21.3	29.5
				EBR	0.13	5.4	A	0.0	4.4
				WBL	0.27	13.7	B	4.8	12.4
				WBT	0.27	11.5	B	19.0	27.9
				WBR	0.02	9.5	A	0.0	0.0
				NBL	0.38	58.2	E	6.6	13.4
				NBT	0.62	63.8	E	18.6	29.4
				NBR	0.04	54.1	D	0.0	2.8
				SBL	0.21	49.8	D	4.0	8.8
				SBT	0.33	51.0	D	11.2	17.9

Table 3-3: Future Background Capacity Analysis - Signalized Intersections (PM Peak Hour)

Intersection	Weekday AM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	1.34	53.8	D	EBL	1.49	266.3	F	~46.4	#82.5
				EBT	0.45	23.1	C	33.9	41.1
				EBR	0.12	19.2	B	0.0	7.4
				WBL	0.20	17.4	B	2.6	5.8
				WBT	0.52	25.1	C	40.4	48.3
				NBL	1.07	114.5	F	~44.8	#76.4
				NBT	0.37	29.1	C	25.7	38.7
				NBR	0.02	24.9	C	0.0	1.3
				SBL	0.20	27.2	C	6.4	13.1
				SBT	0.53	31.8	C	37.8	55.0
				SBR	0.62	34.8	C	34.4	56.8
Bramalea Road & Mayfield Road	0.52	24.6	C	EBL	0.29	12.9	B	6.8	14.5
				EBT	0.34	13.8	B	27.3	40.6
				EBR	0.07	11.3	B	0.0	5.7
				WBL	0.43	26.4	C	11.5	27.4
				WBT	0.39	21.4	C	34.1	49.6
				WBR	0.02	17.0	B	0.0	0.0
				NBL	0.82	65.7	E	34.7	47.3
				NBT	0.39	43.4	D	23.8	32.4
				NBR	0.04	39.1	D	0.0	2.9
				SBL	0.09	34.7	C	2.8	5.7
				SBT	0.14	35.5	D	6.3	10.3

Under future background conditions, the signalized intersections continue to operate acceptably and without constraints during the weekday AM peak hour. At Dixie & Mayfield, the eastbound left-turn movement is operating over capacity with a V/C ratio of 1.49 and long delays during the weekday PM peak hour due to the additional 102 vehicles making this left-turn generated from the background development. Additionally, the northbound left-turn movement at Dixie & Mayfield is now operating over capacity, which was revealed to be reaching capacity under existing conditions.

Table 3-4: Future Background Capacity Analysis - Unsignalized Intersections

Intersection	Weekday AM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & Merchant Road	EBLR	18	426	13.8	0.6	0.04	B
	NBL	49	991	8.8	0.7	0.05	A
Intersection	Weekday PM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & Merchant Road	EBLR	38	300	18.7	1.9	0.13	C
	NBL	11	749	9.9	0.2	0.01	A

Under future background traffic conditions, the unsignalized intersection is expected to continue to operate without capacity constraints during both peak hours. The addition of corridor growth and background development traffic have resulted in minimal increases in delays from existing conditions.

3.5 INTERSECTION CAPACITY ANALYSIS (OPTIMIZED)

In order to improve traffic constraints revealed under future background conditions, LEA recommends signal optimization at Dixie & Mayfield during the weekday PM peak period.

It is recommended that a protected left-turn phase be implemented for the northbound approach, while maintaining the cycle length of 120 seconds. The signal timings should also be adjusted to allocate more green time for the eastbound left-turn and northbound through-right phase at Dixie & Mayfield. The recommended signal timing plan is shown in Table 3-5.

Table 3-5: Optimized Signal Timing Plan at Dixie & Mayfield (Weekday PM)

Timings (seconds)	Northbound		Southbound	Eastbound		Westbound	
	L	TR	LTR	L	TR	L	TR
Existing Signal Timing Plan							
Yellow Time	-	4.6	4.6	3	4.6	3	4.6
All-Red Time	-	2.3	2.3	-	2.3	-	2.3
Total Split	-	50	50	10	60	10	60
Cycle Length	120 seconds						
Optimized Signal Timing Plan							
Yellow Time	3	4.6	4.6	3	4.6	3	4.6
All-Red Time	-	2.3	2.3	-	2.3	-	2.3
Total Split	12.3	60.2	47.9	14.9	51.8	8	44.9
Cycle Length	120 seconds						
Split Difference	+12.3	+10.2	-2.1	+4.9	-8.2	-2	-15.1

The intersection capacity analysis is conducted once again with the optimized signal timing plan. The results of the capacity analysis with the improvements under future background conditions are summarized in Table 3-6. Detailed Synchro outputs are available in Appendix D.

Table 3-6: Future Background Capacity Analysis (Optimized)

Intersection	Weekday PM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	1.04	42.2	D	EBL	0.99	79.0	E	38.9	#92.5
				EBT	0.47	24.7	C	36.4	46.7
				EBR	0.12	20.5	C	0.0	8.5
				WBL	0.22	25.8	C	2.7	7.1
				WBT	0.72	39.4	D	50.5	60.3
				NBL	0.99	87.1	F	28.1	#45.6
				NBT	0.35	27.9	C	24.9	33.2
				NBR	0.02	23.9	C	0.0	0.0
				SBL	0.24	35.1	D	7.3	13.2
				SBT	0.70	45.2	D	43.3	56.6
				SBR	0.72	47.0	D	32.8	51.6

The recommended signal optimization improves the traffic operations at Dixie & Mayfield, where all individual movements are operating within the roadway capacity and acceptable delays. For the eastbound left-turn movement, the V/C ratio reduces to 0.99 and delay decreases by 187 seconds during the weekday PM peak hour. Further, the northbound left-turn movement operates with a V/C ratio of 0.99. Although, this movement still operates with a LOS of 'F', the delay is within one cycle length, which is acceptable.

4 SITE-GENERATED TRAFFIC

4.1 TRIP GENERATION

The proposed buildings are expected to operate similarly to a typical warehouse/distribution centre. To determine the trip generation for the proposed development, the average rate in the Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition for Warehousing (Land Use Code 150) was applied to the proposed uses. The heavy vehicle trip generation rates are derived from the ITE Trip Generation 10th Edition Online Supplement for LUC 150. The heavy vehicle percentages have been calculated by dividing the heavy vehicle trip generation rate by the total vehicle trip generation rate. The vehicle and truck trip rates utilized in the trip generation calculations are shown in Table 4-1, and the trip generation breakdown by building is summarized in Table 4-2.

Table 4-1: Vehicle and Truck Warehousing Trip Rates

Trip Generation	AM Peak Hour			PM Peak Hour		
	In	Out	Total	In	Out	Total
All Vehicle Directional Distribution	77%	23%	100%	27%	73%	100%
All Vehicles Trip Rate (Per 1,000ft ²)	0.13	0.04	0.17	0.05	0.14	0.19
Heavy Vehicle Directional Distribution	52%	48%	100%	52%	48%	100%
Heavy Vehicle Trip Rate (Per 1,000ft ²)	0.01	0.01	0.02	0.02	0.01	0.03
Heavy Vehicle Percentage	8%	26%	12%	39%	7%	16%

Table 4-2: Trip Generation Summary

Building	Trip Generation	AM Peak Hour (Trips)			PM Peak Hour (Trips)		
		In	Out	Total	In	Out	Total
Building A (1,328,874 ft ²)	Total Building A Traffic	174	52	226	68	184	252
	Employee Traffic	161	39	199	41	172	212
	Truck Traffic	13	13	27	27	13	40
Building B (405,705 ft ²)	Total Building B Traffic	53	16	69	21	56	77
	Employee Traffic	49	12	61	13	52	64
	Truck Traffic	4	4	8	8	4	12
Building C (189,827 ft ²)	Total Building C Traffic	25	7	32	10	26	36
	Employee Traffic	23	5	28	6	24	30
	Truck Traffic	2	2	4	4	2	6
Building D (231,519 ft ²)	Total Building D Traffic	30	9	39	12	32	44
	Employee Traffic	28	7	34	7	30	37
	Truck Traffic	2	2	5	5	2	7
Total Site	Total Site Traffic	282	84	366	111	298	409
	Employee Traffic	261	63	322	67	277	344
	Truck Traffic	21	21	44	44	21	65

The proposed development is projected to generate a total of 366 new trips (282 inbound, 84 outbound) and 409 new trips (111 inbound, 298 outbound) during the AM and PM peak hour periods, respectively.

4.2 TRIP DISTRIBUTION AND ASSIGNMENT

The trip distribution of employee vehicle traffic was estimated using Transportation Tomorrow Survey (TTS) 2016 data. The TTS data was filtered for auto home-based work trips during the weekday AM peak period. It is assumed that the PM peak period trip distribution is the reverse of the AM peak period since employees entering the subject site in the morning will be utilizing the same routing in the afternoon to exit, and vice versa. Table 4-3 summarizes the trip distribution for this study. Detailed TTS calculations are available in Appendix E.

Table 4-3: Vehicle Trip Distribution

Direction	Roadway	AM		PM	
		Inbound	Outbound	Inbound	Outbound
North	Dixie Road	33%	23%	23%	33%
South	Dixie Road	15%	11%	11%	15%
East	Mayfield Road	10%	6%	6%	10%
West	Mayfield Road	42%	60%	60%	42%
	TOTAL	100%	100%	100%	100%

The majority of site traffic is expected to use Highway 410 to/from the proposed development which is located west of the subject site. The employee trip assignment was subsequently determined based on the trip origin and destination, site accesses, and the most logical routing. Figure 4-1 illustrates the trip assignment of employee traffic on the study road network.

As for heavy vehicle site traffic, it is assumed that most trucks will utilize the highway network for longer distance travel. Given the subject site's close proximity to Highway 410, heavy vehicle site traffic was assigned to utilize this highway to travel to/from the site, as shown in Figure 4-2.

The total site generated traffic volumes for the weekday AM and PM peak hours are illustrated in Figure 4-3.

Figure 4-1: Employee Vehicle Site Generated Peak Hour Traffic Volumes

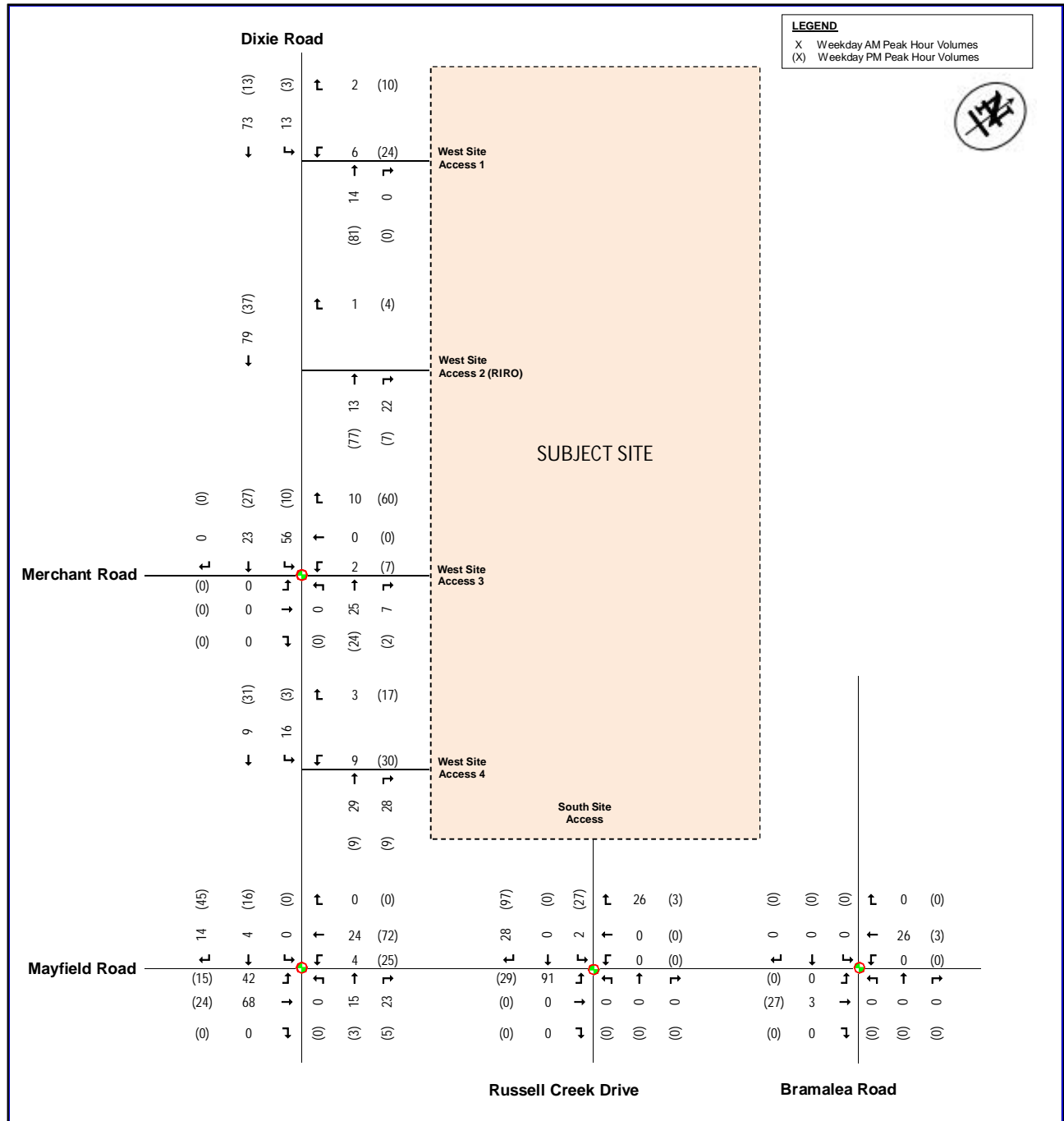


Figure 4-2: Heavy Vehicle Site Generated Peak Hour Traffic Volumes

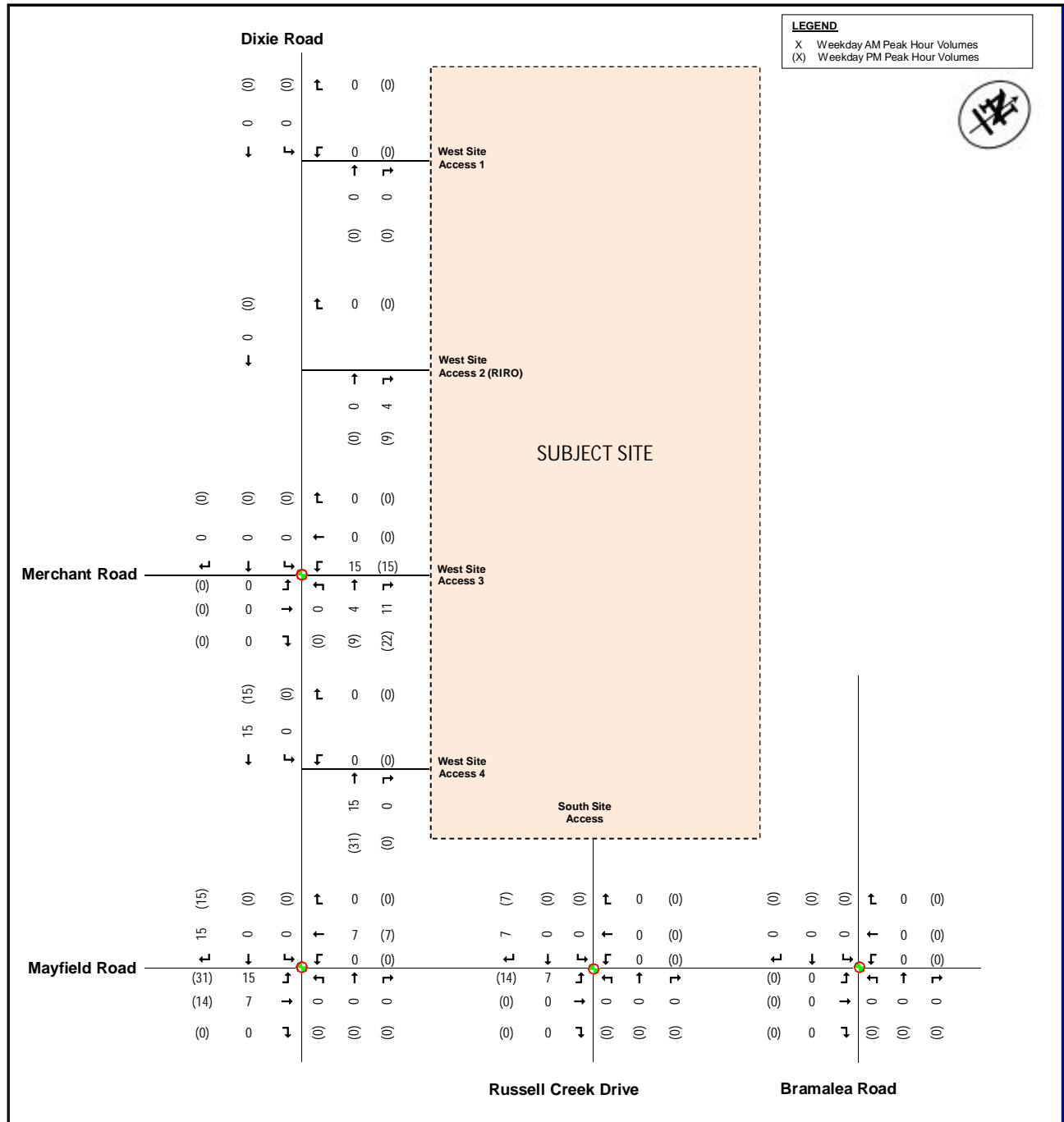
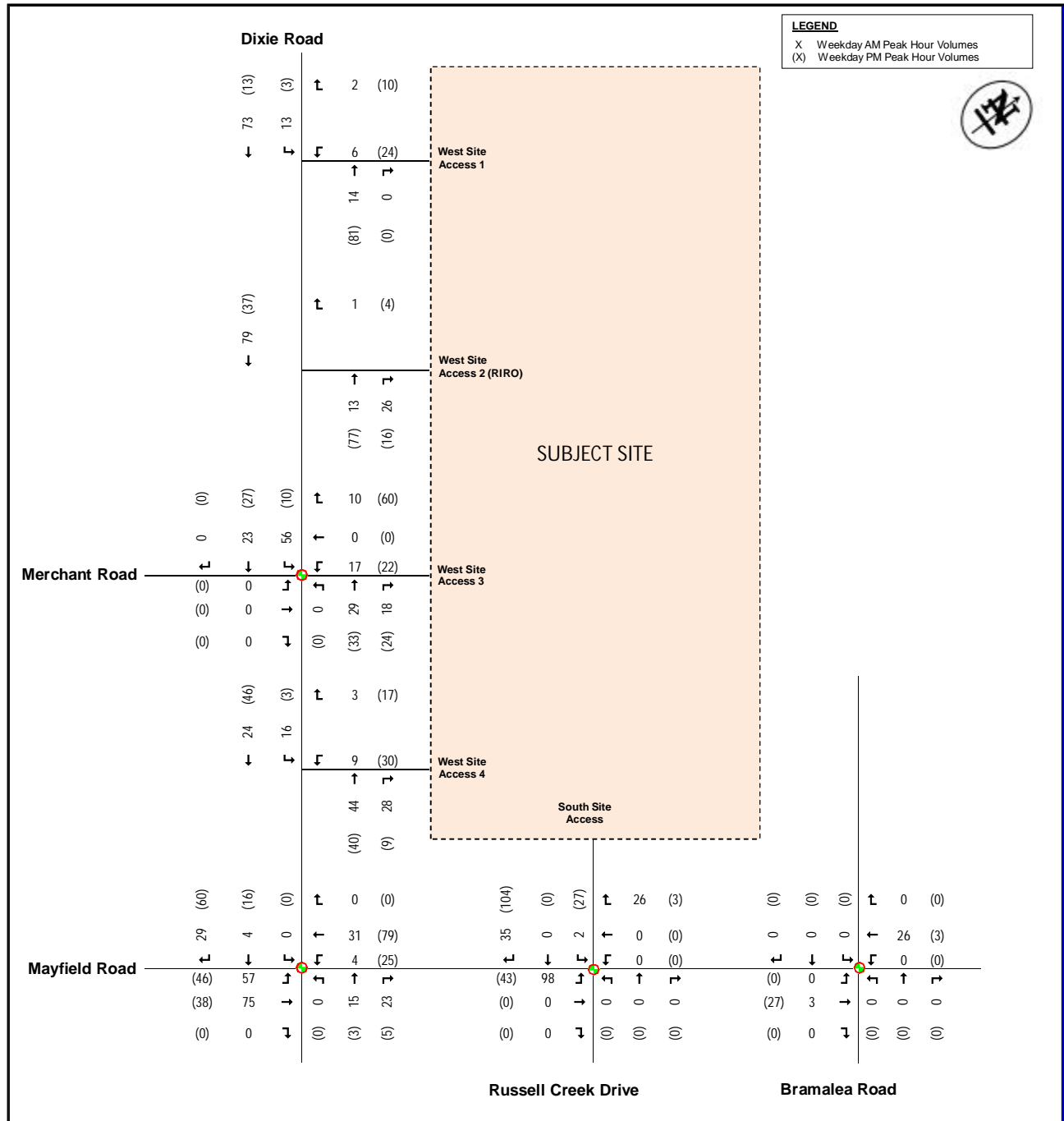


Figure 4-3: Total Site Generated Peak Hour Traffic Volumes



5 FUTURE TOTAL TRAFFIC CONDITIONS

Future total transportation conditions include future background volumes, in addition to the site trips generated by the proposed development.

5.1 INTERSECTION CAPACITY ANALYSIS

Intersection capacity analysis was conducted for the studied intersections with the site traffic added for the planning horizon of 2026. As part of the development proposal, Dixie & Merchant is proposed to operate as West Access #3, and will be signalized, with an exclusive southbound left-turn lane. The additional turn lane will match with the existing geometry of the intersection where a northbound left-turn lane is present. The future total analysis incorporates the intersection modification at Dixie & Merchant, as well as the recommended signal optimization from future background conditions. The future total traffic volumes utilized for the intersection capacity analysis are illustrated in Figure 5-1.

The results for the assessed signalized intersections under future total conditions are summarized in Table 5-1 and Table 5-2, whereas the results for the unsignalized intersections are summarized in Table 5-3. Detailed capacity results are found in Appendix F.

Figure 5-1: Future Total Peak Hour Traffic Volumes

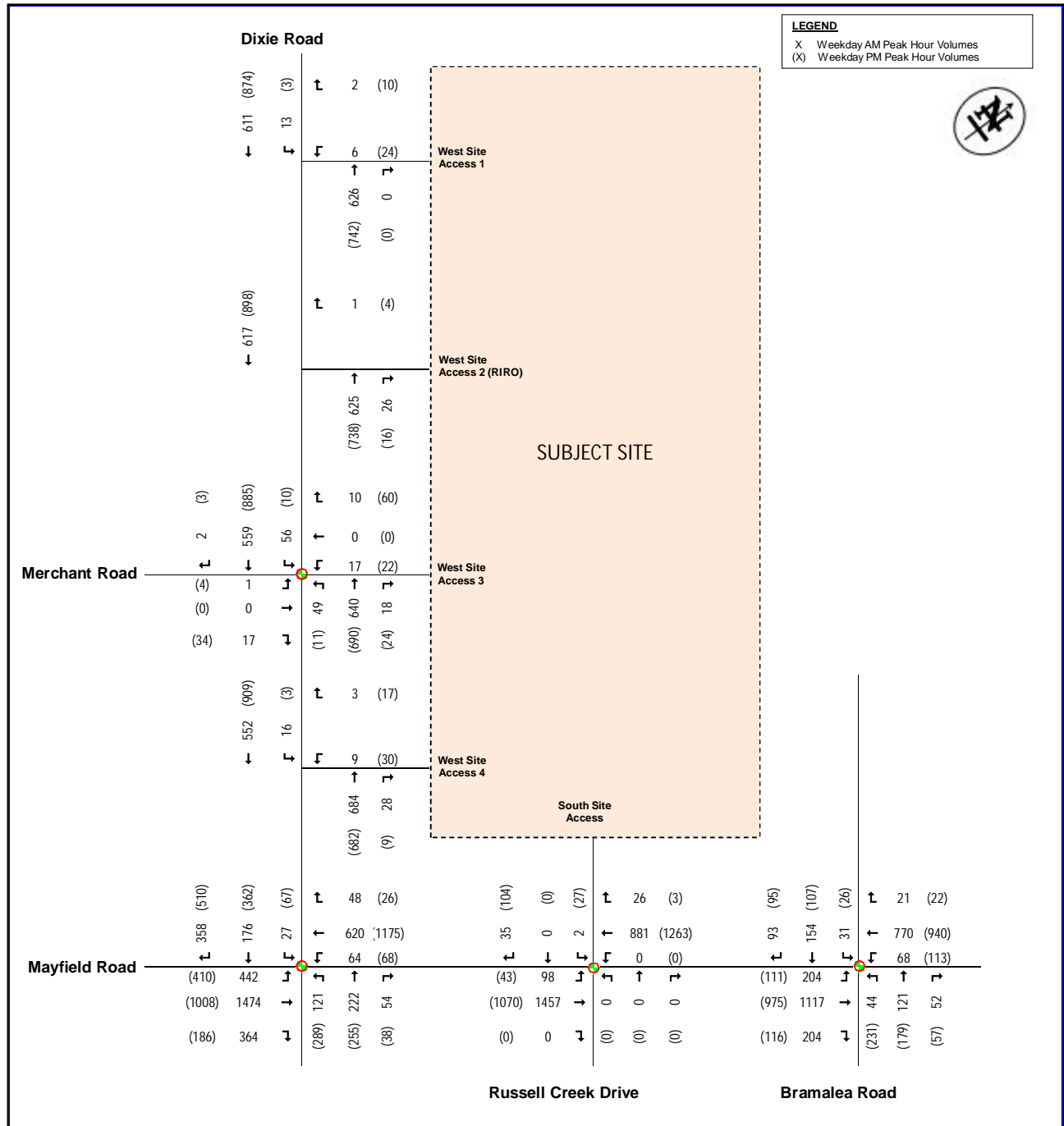


Table 5-1: Future Total Capacity Analysis - Signalized Intersections (AM Peak Hour)

Intersection	Weekday AM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	0.73	23.3	C	EBL	0.73	14.1	B	20.9	#51.0
				EBT	0.50	14.3	B	41.2	60.4
				EBR	0.24	11.8	B	0.0	8.6
				WBL	0.28	17.1	B	2.3	5.8
				WBT	0.33	22.1	C	21.3	26.4
				NBL	0.62	52.1	D	15.7	25.3
				NBT	0.67	51.5	D	29.1	40.5
				NBR	0.04	39.1	D	0.0	4.8
				SBL	0.21	42.0	D	3.2	7.6
				SBT	0.50	45.2	D	22.2	32.0
				SBR	0.47	45.1	D	9.4	26.7
Bramalea Road & Mayfield Road	0.41	16.2	B	EBL	0.37	6.3	A	8.0	14.6
				EBT	0.33	6.4	A	21.3	29.6
				EBR	0.13	5.4	A	0.0	4.4
				WBL	0.27	13.8	B	4.8	12.4
				WBT	0.28	11.6	B	19.8	29.1
				WBR	0.02	9.5	A	0.0	0.0
				NBL	0.38	58.2	E	6.6	13.4
				NBT	0.62	63.8	E	18.6	29.4
				NBR	0.04	54.1	D	0.0	2.8
				SBL	0.21	49.8	D	4.0	8.8
				SBT	0.33	51.0	D	11.2	17.9
Dixie Road & Merchant Road/West Access 3	0.55	9.2	A	EBT	0.01	39.5	D	0.0	0.0
				WBT	0.49	44.0	D	7.7	1.7
				NBL	0.09	3.6	A	1.2	3.6
				NBT	0.55	7.0	A	27.3	51.9
				SBL	0.46	7.8	A	7.8	3.2
Russell Creek Drive/South Access & Mayfield Road	0.32	1.9	A	SBT	0.42	5.4	A	18.5	34.5
				EBL	0.20	0.9	A	0.1	0.2
				EBT	0.33	0.2	A	0.4	0.6
				WBT	0.30	2.3	A	12.5	18.1
				SBT	0.05	55.3	E	0.3	6.4

Table 5-2: Future Total Capacity Analysis - Signalized Intersections (PM Peak Hour)

Intersection	Weekday AM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	1.19	55.8	E	EBL	1.28	182.5	F	~66.5	#111.9
				EBT	0.50	26.3	C	40.4	48.7
				EBR	0.12	21.4	C	0.0	8.5
				WBL	0.37	42.3	D	5.5	14.4
				WBT	0.78	52.4	D	59.0	74.4
				NBL	0.96	76.2	E	26.4	#45.4
				NBT	0.34	26.3	C	23.9	33.5
				NBR	0.02	22.6	C	0.0	0.0
				SBL	0.22	33.3	C	6.9	13.2
				SBT	0.69	42.8	D	43.6	59.4
Bramalea Road & Mayfield Road	0.53	24.6	C	SBR	0.82	52.4	D	41.8	65.6
				EBL	0.29	12.9	B	6.8	14.5
				EBT	0.35	13.9	B	28.4	41.9
				EBR	0.07	11.3	B	0.0	5.7
				WBL	0.44	27.0	C	11.6	27.8
				WBT	0.39	21.4	C	34.2	49.8
				WBR	0.02	17.0	B	0.0	0.0
				NBL	0.82	65.7	E	34.7	47.3
				NBT	0.39	43.4	D	23.8	32.4
				NBR	0.04	39.1	D	0.0	2.9
Dixie Road & Merchant Road/West Access 3	0.74	19.9	B	SBL	0.09	34.7	C	2.8	5.7
				SBT	0.14	35.5	D	6.3	10.3
				EBT	0.03	33.2	C	0.3	0.0
				WBT	0.77	50.6	D	24.1	0.4
				NBL	0.05	6.2	A	0.4	2.1
Russell Creek Drive/South Access & Mayfield Road	0.46	6.0	A	NBT	0.65	12.7	B	48.0	96.9
				SBL	0.12	6.9	A	1.5	1.3
				SBT	0.73	15.0	B	60.6	122.9
				EBL	0.15	1.3	A	0.1	m0.3
				EBT	0.27	0.9	A	1.0	1.4
				WBT	0.45	5.5	A	27.7	43.0
				SBT	0.50	54.3	D	11.4	22.2

Under future total conditions, the signalized intersections continue to operate acceptably and without constraints during the weekday AM peak hour. However, with the addition of 47 trucks and vehicles making

the eastbound left-turn at Dixie & Mayfield during the PM peak hour, the movement is operating over capacity with a V/C ratio of 1.28 and long delays.

The capacity analysis demonstrates that both signalized site accesses are operating within capacity and with acceptable LOS during both peak hours.

Table 5-3: Future Total Capacity Analysis - Unsignalized Intersections

Intersection	Weekday AM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & West Access 1	WBLR	8	202	23.5	0.6	0.04	C
	SBLT	13	936	0.4	0.2	0.01	A
Dixie Road & West Access 2	WBR	1	501	12.2	0.0	0.00	B
Dixie Road & West Access 4	WBLR	12	265	19.2	0.6	0.05	C
	SBLT	16	840	0.5	0.3	0.02	A
Intersection	Weekday PM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & West Access 1	WBLR	34	121	46.2	4.8	0.28	E
	SBLT	3	831	0.1	0.0	0.00	A
Dixie Road & West Access 2	WBR	4	427	13.5	0.1	0.01	B
Dixie Road & West Access 4	WBLR	47	307	18.8	2.4	0.15	C
	SBLT	3	860	0.1	0.0	0.00	A

Under future total traffic conditions, all unsignalized accesses are expected to operate well during both peak hours. The proposed site accesses are expected to operate with LOS 'E' or better with minimal delays and queuing.

5.2 INTERSECTION CAPACITY ANALYSIS (OPTIMIZED)

In order to improve the traffic constraints revealed under future total conditions, LEA recommends signal optimization at Dixie & Mayfield intersection during the weekday PM peak period.

It is recommended that the signal timing plan be adjusted to allocate more green time for northbound and eastbound phases, and also to increase the cycle length by 15 seconds to 135 seconds. This cycle length would align with the existing cycle length at the adjacent intersection located at Bramalea & Mayfield. The recommended signal timing plan is shown in Table 5-4.

Table 5-4: Optimized Signal Timing Plan at Dixie & Mayfield (Weekday PM)

Timings (seconds)	Northbound		Southbound	Eastbound		Westbound	
	L	TR	LTR	L	TR	L	TR
Future Background Optimized Signal Timing Plan							
Yellow Time	3	4.6	4.6	3	4.6	3	4.6
All-Red Time	-	2.3	2.3	-	2.3	-	2.3
Total Split	12.3	60.2	47.9	14.9	51.8	8	44.9
Cycle Length	120 seconds						
Future Total Optimized Signal Timing Plan							
Yellow Time	3	4.6	4.6	3	4.6	3	4.6
All-Red Time	-	2.3	2.3	-	2.3	-	2.3
Total Split	15.7	63.6	47.9	26.5	63.4	8	44.9
Cycle Length	135 seconds						
Split Difference	+3.4	+3.4	0	+11.6	+11.6	0	0

The intersection capacity analysis is conducted once again with the optimized signal timing plan. The results of the capacity analysis with the improvements under future total conditions are summarized in Table 5-5. Detailed synchro outputs are provided in Appendix G.

Table 5-5: Future Total Capacity Analysis (Optimized)

Intersection	Weekday PM Peak Hour								
	Overall			Movements of Interest					
	V/C	Delay (s)	LOS	Movement	V/C	Delay (s)	LOS	Queue (m)	
								50th	95th
Dixie Road & Mayfield Road	1.02	48.2	D	EBL	0.98	80.6	F	~55.8	#104.7
				EBT	0.47	26.3	C	42.4	50.3
				EBR	0.12	21.7	C	0.0	8.3
				WBL	0.41	35.9	D	5.0	10.3
				WBT	0.87	54.1	D	66.2	77.2
				NBL	0.99	86.8	F	31.5	#55.8
				NBT	0.35	30.6	C	28.2	39.0
				NBR	0.02	26.3	C	0.0	0.1
				SBL	0.24	40.1	D	8.3	15.3
				SBT	0.75	53.5	D	52.1	70.0
				SBR	0.64	48.5	D	25.3	49.7

With the implementation of the optimized signal timing plan, the traffic operations at Dixie & Mayfield have improved significantly from previous conditions. The V/C ratio for the eastbound left-turn movement reduces to 0.98 and delay decreases by 102 seconds. Although the northbound left-turn movement operates with a V/C ratio of 0.99 and LOS of 'F', this movement operates within the roadway capacity and delay is within one cycle length, which is acceptable.

Despite the analysis presented above, it should be reminded that the optimized signal timing plan was recommended to alleviate traffic constraints at Dixie & Mayfield following the proposed development's full-build out. However, given that the four (4) buildings will not be constructed at the same time, the recommended signal timing plan improvements will not be required immediately. Instead, the level of service at Dixie & Mayfield should be monitored as the development advances. This process will confirm if and when the signal timing optimization is required, that is only when site generated traffic volumes surpass the roadway capacity and results in deteriorating traffic operations.

Additionally, as discussed in Section 3.3, the Mayfield Road widening construction is planned to begin in 2024-2025 but to be completed beyond the study horizon year. It is expected that changes to the signal timing plan will occur to adapt to the new traffic flows associated with the additional lane, in which case, the recommended optimization may not be necessary. Furthermore, the Region of Peel and Town of Caledon is currently undergoing their Municipal Comprehensive and Settlement Boundary Expansion Studies. It is understood that the subject site is located within the Focus Study Area and has been highlighted as a prime area for boundary expansion, employment uses, and servicing infrastructure. As a result, it can be anticipated that traffic volumes in the area will grow significantly within the next 5-10 years as an increased level of development occurs. Since the increase in traffic will not be generated by the proposed development alone, the onus of maintaining acceptable operations at Dixie & Mayfield in the future should be shared between the developers and the Region.

6 SIGNAL WARRANT ANALYSIS

The West Access #3 accesses along Dixie Road, and South Access along Mayfield Road were examined to determine if traffic signals are required upon realization of the proposed development. The signal warrant is based on Justification 7 in the Ontario Traffic Manual (OTM) Book 12 which considers projected volumes. This is appropriate to determine the future need for signalization due the addition of development traffic in the area. Since it is difficult to predict eight-hour volumes with accuracy, peak hour volumes (PHV) estimated in Section 5 are expanded to obtain average hourly volumes (AHV). Average hourly volume is calculated from peak hour volumes using this relationship:

$$AHV = \frac{amPHV + pmPHV}{4}$$

Justification 7 takes the required volumes from Justifications 1 and 2 and increases it by 20% for an existing intersection. This is because the use of peak hour volumes lessens the warrant due to averaging and uncertainty is increased. The warrant also considers the type of intersection, lane configuration and location context. West Access #3 is a three-leg intersection, whereas South Access is proposed to align with Russel Creek Drive. Both accesses are located in a rural area or free flow conditions. The major roads considered in this analysis are Dixie Road and Mayfield Road. Dixie Road has one (1) through lane in both north and south directions, whereas Mayfield Road has two (2) and three (3) through lanes in the east and west directions, respectively. The site driveways are considered to be the minor approaches, where West Access #3 is proposed with a shared left- and right-turn lane, and South Access is proposed with a shared left-through-right lane. For the purpose of this analysis, the minor roads are considered to have one lane in each direction. This presents a conservative analysis as the thresholds are lower for a single lane of traffic per direction. According to the guidelines, right-turn volumes from the minor approaches should be excluded from criteria 2B as they are not considered traffic crossing a road.

The traffic volumes under future total conditions for each access were utilized in the signal warrant analysis. The installation of a traffic signal is warranted if all volume requirements are met as per Table 21 “Justification 7 Projected Volumes” and Table 22 “Future Development: Volume Expansion Required to Meet Justifications” in OTM Book 12. The results for all three (3) accesses are summarized in Table 6-1, and detailed analysis is available in Appendix H.

Table 6-1: Signal Warrant Analysis Results

Proposed Access	Justification 7 (Projected Volumes)		Compliance	Signal Justified?	
				YES	NO
West Access #3	1. Minimum Vehicular Volume	A Total Volume (Average Hour)	100%		x
		B Crossing Volume (Average Hour)	29%		x
	2. Delay to Cross Traffic	A Main Road (Average Hour)	100%		x
		B Crossing Road (Average Hour)	18%		x
South Access	1. Minimum Vehicular Volume	A Total Volume (Average Hour)	100%		x
		B Crossing Volume (Average Hour)	29%		x
	2. Delay to Cross Traffic	A Main Road (Average Hour)	100%		x
		B Crossing Road (Average Hour)	12%		x

Based on the analysis, the projected average hourly volumes for both accesses do not fulfill Justification 7. Although criteria 1A and 2A are met with 100% for both accesses, a signal is not warranted due to low minor road and crossing volumes. However, it should be noted that the signal warrant analyses were conducted with peak hour traffic volumes which is primarily composed of employee vehicle traffic. It is assumed that warehouse truck operations would not typically operate during peak periods such that heavy vehicle traffic would be much higher during off-peak periods. Given that the proposed development will provide a total of 445 trailer parking spaces, this volume of trucks can potentially be entering and leaving the subject site at the same time as a worst-case scenario. Therefore, signalization is proposed at both accesses to facilitate warehouse truck operations.

Furthermore, LEA has conducted an additional analysis which examines the operations of an unsignalized West Access #3 under future total conditions. The results are summarized below in Table 6-2, and detailed capacity results are found in Appendix F.

Table 6-2: Future Total Capacity Analysis - Unsignalized West Access #3

Intersection	Weekday AM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & West Access 3	EBLR	18	245	20.9	1.1	0.07	C
	WBLR	108	71	397.8	41.0	1.53	F
	NBL	49	972	8.9	0.7	0.05	A
	SBL	224	896	10.4	4.4	0.25	B
Intersection	Weekday PM Peak Hour						
	Movement of Interest	Flow Rate (vph)	Capacity (vph)	Delay (s)	95 th Queue (m)	V/C	LOS
Dixie Road & West Access 3	EBLR	38	132	43.0	5.0	0.29	E
	WBLR	328	156	565.4	117.9	2.10	F
	NBL	11	732	10.0	0.2	0.02	A
	SBL	40	842	9.5	0.7	0.05	A

The results show that without signalization, the westbound movement is operating at LOS 'F' during both peak hours. This movement is operating with significant delays and over capacity with V/C ratios of 1.53 and 2.10 during the AM and PM peak hour, respectively.

In contrast to the results shown previously in Section 5.1, it can be concluded that the signalization of Dixie Road & West Access #3 will improve the intersection's future operations as compared to remaining an unsignalized intersection. With signalization, the westbound movement would improve from LOS 'F' to 'D' during both peak hours. Therefore, the signalization of West Access #3 would benefit truck operations, as well as employee vehicles entering or exiting through this access.

7 PARKING REVIEW

The subject site is governed by the parking standards in the Town of Caledon Zoning By-law 2006-50. The parking requirements for the development assumes that the office net floor area associated with each building is 15% or less of the total net floor area (NFA). In accordance to the bylaw, a building with an NFA between 7,000m² to 20,000m² would yield 78 parking spaces, plus one (1) parking space per 145m² of NFA over 7,000m². Additionally, a building with a NFA of over 20,000m² would yield 168 parking spaces, plus one (1) parking space per 170m² of NFA or portion thereof over 20,000m². To note, at this stage of the development proposal, the NFA has not yet been determined for each building. Therefore, as a conservative method, the gross floor area (GFA) has been utilized for the following parking calculations. The parking requirements is summarized in Table 7-1.

Table 7-1: Zoning By-law Parking Requirements

Building	Land Use	GFA (m ²)	Town of Caledon Zoning By-law 2006-50		Parking Supply
			Parking Standard	Parking Required	
Building A	Warehouse (>20,000 m ²)	123,457	168 spaces + 1 space per 170 m ² of GFA over 20,000 m ²	777	1,483
Building B	Warehouse (>20,000 m ²)	37,691	168 spaces + 1 space per 170 m ² of GFA over 20,000 m ²	273	264
Building C	Warehouse (7,000-20,000 m ²)	17,636	78 spaces + 1 space per 145 m ² of GFA over 7,000 m ²	152	166
Building D	Warehouse (>20,000 m ²)	21,509	168 spaces + 1 space per 170 m ² of GFA over 20,000 m ²	177	198
TOTAL				1,379	2,111
Parking Rate (spaces per 100m ² of GFA)				0.69	1.05

Based on the minimum parking requirements under the Town of Caledon Zoning By-law, the proposed development is required to provide a total of 1,379 parking spaces. The development is proposing to provide a total of 2,111 parking spaces, exceeding the by-law minimum parking requirements by 732 parking spaces. This proposed provision is equivalent to an overall parking rate of 1.05 spaces per 100m² GFA.

Although the proposed parking supply provided for Building B is deficient from the individual building's parking requirement by 9 parking spaces, employees will be able to utilize the surplus parking of 14 spaces provided at the adjacent Building C. The buildings are connected by the internal driveway, and also within a walkable distance from each other. Employees of Building B utilizing Building C parking spaces will be able to enter the building through entrances located on the north side of Building B.

8 LOADING REVIEW

The proposed development is subject to the loading standards outlined in the Town of Caledon Zoning By-law 2006-50. The warehouse loading space requirements include three (3) loading spaces for a minimum GFA of 7,441 m², and one (1) loading space required for each additional 9,300 m² GFA or portion thereof in excess of 7,441 m². Table 8-1 summarizes the loading space requirements and proposed loading spaces per building.

Table 8-1: Zoning By-law Loading Requirements

Building	Land Use	GFA (m ²)	Town of Caledon Zoning By-law 2006-50		Loading Supply
			Loading Standard	Loading Required	
Building A	Warehouse (>7,441 m ²)	123,457	3 spaces + 1 space per 9,300 m ² of GFA over 7,441 m ²	16	98
Building B	Warehouse (>7,441 m ²)	37,691	3 spaces + 1 space per 9,300 m ² of GFA over 7,441 m ²	7	63
Building C	Warehouse (>7,441 m ²)	17,636	3 spaces + 1 space per 9,300 m ² of GFA over 7,441 m ²	5	34
Building D	Warehouse (>7,441 m ²)	21,509	3 spaces + 1 space per 9,300 m ² of GFA over 7,441 m ²	5	36
TOTAL				33	231

The proposed loading supply of 231 spaces will satisfy the total by-law requirement of 33 loading spaces. The swept path diagrams demonstrating loading functionality is available in Appendix I.

9 TRANSPORTATION DEMAND MANAGEMENT (TDM)

Transportation Demand Management (TDM) is a set of strategies which strive towards a more efficient transportation network by influencing travel behavior. Effective TDM measures can reduce vehicle usage and encourage people to engage in more sustainable methods of travel. There are several opportunities to incorporate TDM measures that support alternative modes of transportation. The recommendations should enhance non-single occupant vehicle trips for employees traveling to and from the subject site.

9.1 TRANSIT-BASED STRATEGIES

1. Addition of bus stops on-site to provide connection to transit network.

The proposed development will implement bus stops on site to encourage employees to use transit. The bus locations are proposed along the driveways of West Access #3 along Dixie Road, as well as South Access along Mayfield Road. The exact bus stop locations and design will be determined in consultation with the Town of Caledon and Region of Peel, along with transit routing and schedules.

2. Provision of real-time transit schedule screens.

It is recommended that screens be provided in the employees' lounges and main exits to display real-time data for transit services, including schedules and service alerts.

9.2 TRAVEL AND PARKING MANAGEMENT STRATEGIES

3. Signed carpool spaces.

It is recommended that the proposed development include designated carpool spaces as a means to reduce single occupancy automobile usage. These carpool spaces should be clearly signed and be located conveniently close to the main entrances to provide a greater incentive for employees carpooling.

4. Smart Commute Membership.

Once tenants are secured, it is recommended that future tenants/owners register with the Smart Commute program. Smart Commute provides the means for businesses to help provide an alternative option for their employees to get to and from work through ride matching. One benefit with Smart Commute is the Emergency Ride Home program that provides carpoolers with a sense of reassurance under urgent circumstances. The Owner could also help tenants in establishing an employer-based carpool program specifically for the employees that would be working on-site.

5. Communications Strategy.

The Owner should provide communications and distribute information to employees via information packages or through email regarding the different travel demand management measures and programs that are offered. Information on Smart Commute, Emergency Ride Home, or other incentives can be obtained from the Region, and be included as part of this material. The Region and/or Town should also be responsible for making Smart Commute information brochures, pedestrian/cycling maps, transit maps, and

other general information available for distribution to the building occupant to help commuters become aware of the various travel alternatives.

10 CONCLUSIONS

- ▶ The development proposal will introduce four (4) warehouse/distribution buildings with a combined ground floor area (GFA) of approximately 200,292m². Five (5) accesses will be provided to the site: three (3) all-moves accesses and one (1) right-in/right-out (RIRO) access along Dixie Road, as well as one (1) all-moves access along Mayfield Road. The West Access #3 along Dixie Road, as well as South Access are proposed to be signalized.
- ▶ The subject site is located in a predominantly rural area, with limited access to the Town's active transportation networks. Therefore, there is a lack of pedestrian and cycling infrastructure within the study area.
- ▶ Under existing traffic conditions, all studied intersections operate well with an overall LOS of 'C' or better during both peak periods. Of note, the northbound left-turn movement at Dixie & Mayfield is approaching capacity during the PM peak hour.
- ▶ Under future background conditions, the studied intersections continue to operate acceptably without any capacity constraints during the weekday AM peak hour. However, the eastbound left-turn and northbound left-turn movements at Dixie & Mayfield is operating over capacity during the weekday PM peak hour due to the additional traffic generated by the background development.
- ▶ Signal timing adjustments, with the addition of a protected northbound left-turn phase, while maintaining the existing cycle length are recommended at Dixie & Mayfield during the PM peak period to alleviate the traffic constraints revealed under future background conditions. With the optimized signal timing plan, the intersection operates with acceptable levels of service.
- ▶ The proposed development is projected to generate 366 and 409 two-way trips during the AM and PM peak hour periods, respectively.
- ▶ Under future total conditions, the eastbound left-turn movement at Dixie & Mayfield is operating with capacity constraints during the PM peak hour. The proposed site accesses are expected to operate within capacity and with minimal delays.
- ▶ Additional signal timing adjustments are recommended at Dixie & Mayfield during the PM peak period,. With this improvement, all individual movements are operating within the roadway capacity and acceptable delays.
- ▶ To note, the signal timing optimization was recommended based on the traffic generated by the full build-out of the proposed development. This improvement would not be required immediately as the four (4) buildings are not proposed to be constructed at the same time. Instead, Dixie & Mayfield should be monitored as the development advances, in order to confirm the necessity and timing of signal timing improvements. The Mayfield Road widening and Settlement Boundary Expansion Study conducted by the Region and Town may also affect the need for the signal timing optimization at this intersection.
- ▶ The proposed parking provision of 2,111 parking spaces satisfies the Town of Caledon Zoning By-law parking requirements.
- ▶ The proposed loading provision of 231 spaces satisfies the Town of Caledon Zoning By-law loading requirement.

- ▶ A number of TDM measures have been recommended, including carpool spaces, real-time transportation screens, and information packages on travel alternatives.
- ▶ The future on-site bus stops will allow employees to engage in sustainable modes of transportation and reduce auto-based travel. The proposed bus stops provide an opportunity for public transit connection to extend north from the existing bus stop south of Dixie Road.



APPENDIX A

Existing Traffic Data



Count Name: 21211_Dixie Rd & Merchant Rd-AM
Site Code: 21211
Start Date: 12/15/2020
Page No: 3

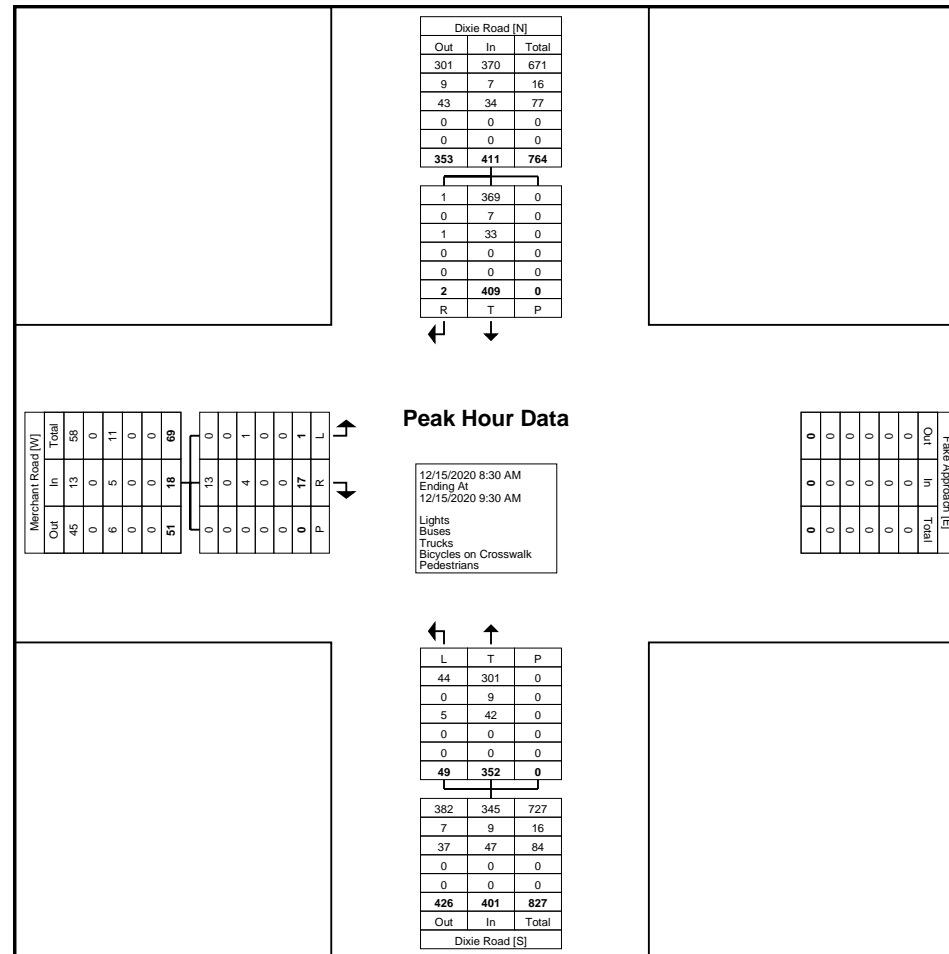
[illegible]



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Count Name: 21211_Dixie Rd & Merchant Rd-
AM
Site Code: 21211
Start Date: 12/15/2020
Page No: 4





Count Name: 21211_Dixie Rd & Merchant Rd-
PM
Site Code: 21211
Start Date: 12/15/2020
Page No: 3

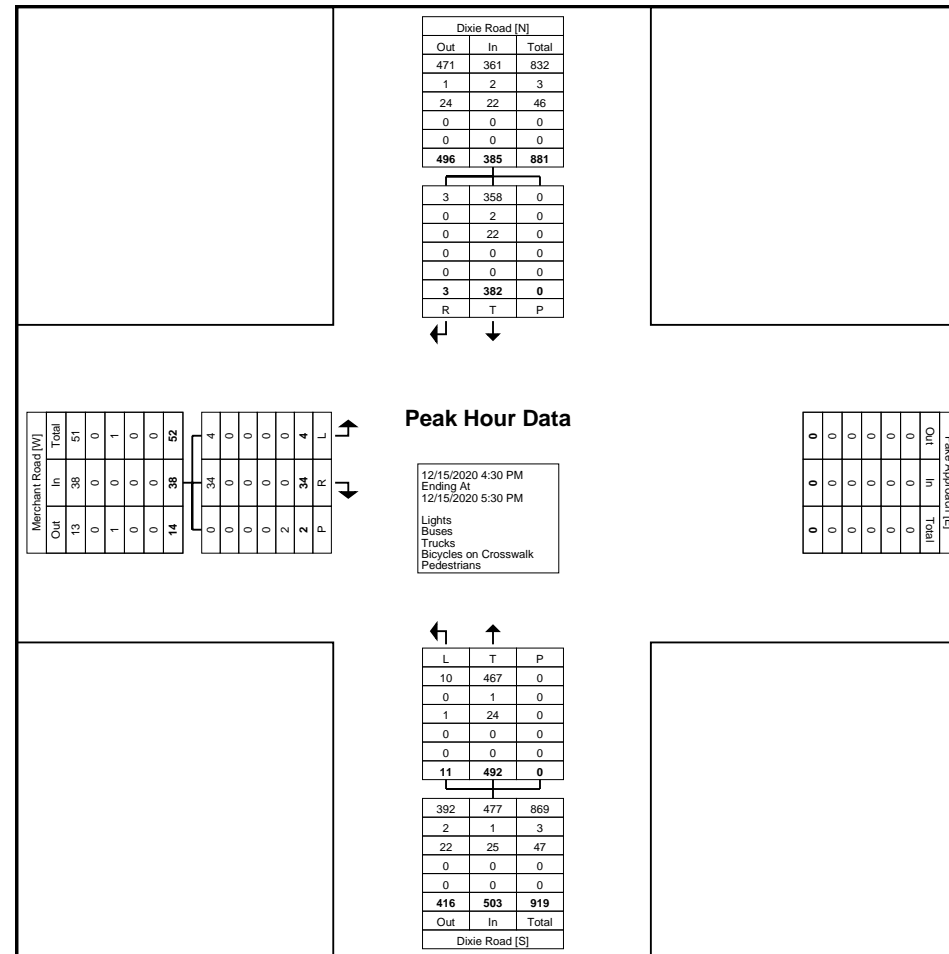
Start Time	Dixie Road Southbound				Dixie Road Northbound				Merchant Road Eastbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	
4:30 PM	83	0	0	83	2	136	0	138	0	16	2	16	237
4:45 PM	114	1	0	115	4	137	0	141	3	3	0	6	262
5:00 PM	97	2	0	99	3	100	0	103	0	9	0	9	211
5:15 PM	88	0	0	88	2	119	0	121	1	6	0	7	216
Total	382	3	0	385	11	492	0	503	4	34	2	38	926
Approach %	99.2	0.8	-	-	2.2	97.8	-	-	10.5	89.5	-	-	-
Total %	41.3	0.3	-	41.6	1.2	53.1	-	54.3	0.4	3.7	-	4.1	-
PHF	0.838	0.375	-	0.837	0.688	0.898	-	0.892	0.333	0.531	-	0.594	0.884
Lights	358	3	-	361	10	467	-	477	4	34	-	38	876
% Lights	93.7	100.0	-	93.8	90.9	94.9	-	94.8	100.0	100.0	-	100.0	94.6
Buses	2	0	-	2	0	1	-	1	0	0	-	0	3
% Buses	0.5	0.0	-	0.5	0.0	0.2	-	0.2	0.0	0.0	-	0.0	0.3
Trucks	22	0	-	22	1	24	-	25	0	0	-	0	47
% Trucks	5.8	0.0	-	5.7	9.1	4.9	-	5.0	0.0	0.0	-	0.0	5.1
Bicycles on Crosswalk	-	-	0	-	-	-	0	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	0	-	-	-	0	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-



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Count Name: 21211_Dixie Rd & Merchant Rd-
PM
Site Code: 21211
Start Date: 12/15/2020
Page No: 4



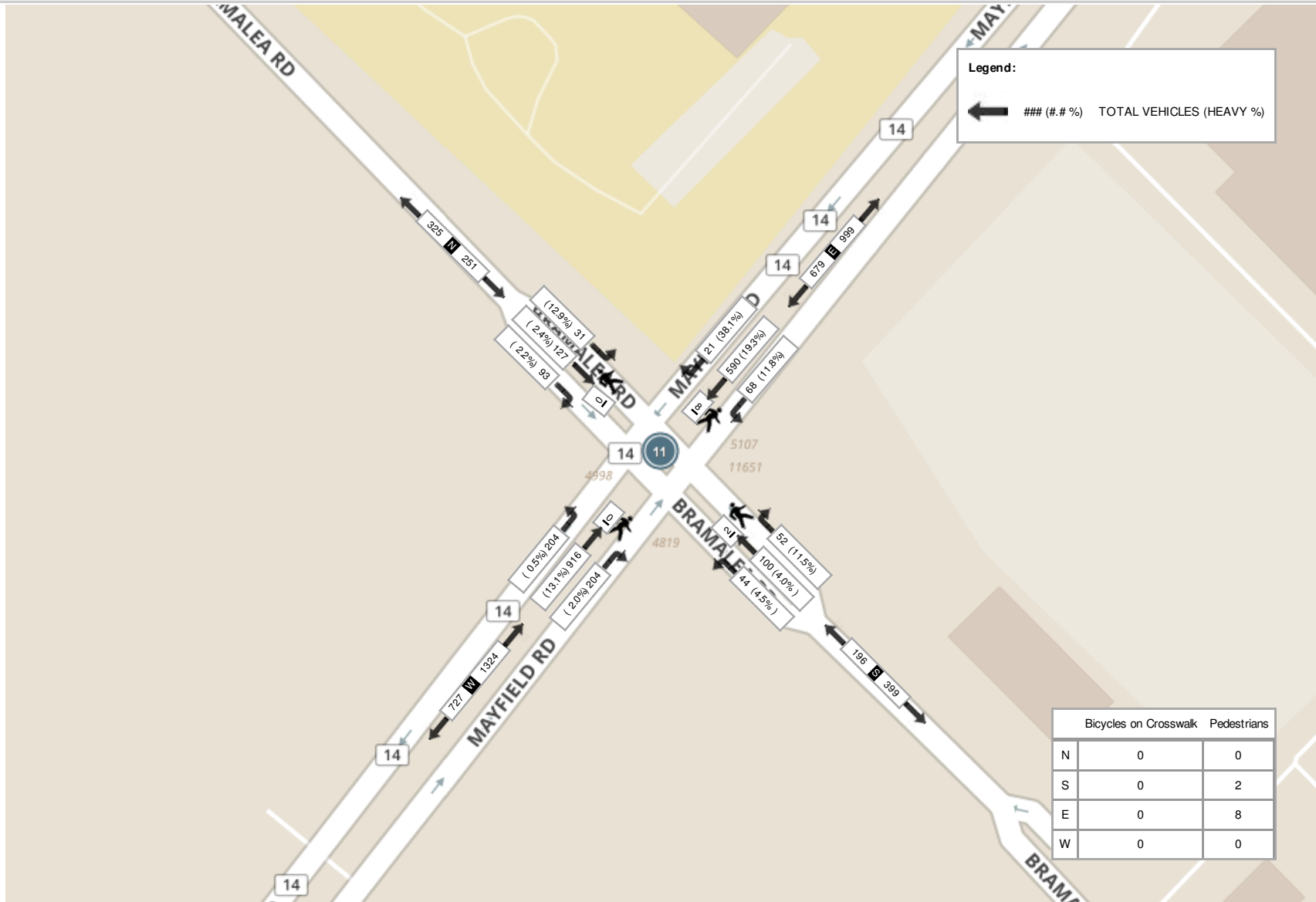
Turning Movement Peak Hour Data Plot (4:30 PM)



Peak Hour: 07:00 AM - 08:00 AM Weather: Mostly Cloudy (6.2 °C)

Start Time	Southbound BRAMALEA ROAD						Westbound MAYFIELD RD						Northbound BRAMALEA ROAD						Eastbound MAYFIELD RD						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
07:00:00	3	12	7	0	0	22	12	140	2	0	0	154	6	8	13	0	0	27	9	220	54	0	0	283	486
07:15:00	7	23	7	0	0	37	16	152	1	0	1	169	6	8	11	0	0	25	19	208	49	0	0	276	507
07:30:00	8	41	29	0	0	78	14	130	5	0	5	149	15	34	12	0	1	61	59	254	47	0	0	360	648
07:45:00	13	51	50	0	0	114	26	168	13	0	2	207	17	50	16	0	1	83	117	234	54	0	0	405	809
Grand Total	31	127	93	0	0	251	68	590	21	0	8	679	44	100	52	0	2	196	204	916	204	0	0	1324	2450
Approach%	12.4%	50.6%	37.1%	0%		-	10%	86.9%	3.1%	0%		-	22.4%	51%	26.5%	0%		-	15.4%	69.2%	15.4%	0%		-	-
Totals %	1.3%	5.2%	3.8%	0%		10.2%	2.8%	24.1%	0.9%	0%		27.7%	1.8%	4.1%	2.1%	0%		8%	8.3%	37.4%	8.3%	0%		54%	-
PHF	0.6	0.62	0.47	0		0.55	0.65	0.88	0.4	0		0.82	0.65	0.5	0.81	0		0.59	0.44	0.9	0.94	0		0.82	-
Heavy	4	3	2	0		9	8	114	8	0		130	2	4	6	0		12	1	120	4	0		125	-
Heavy %	12.9%	2.4%	2.2%	0%		3.6%	11.8%	19.3%	38.1%	0%		19.1%	4.5%	4%	11.5%	0%		6.1%	0.5%	13.1%	2%	0%		9.4%	-
Lights	27	124	91	0		242	60	476	13	0		549	42	96	46	0		184	203	796	200	0		1199	-
Lights %	87.1%	97.6%	97.8%	0%		96.4%	88.2%	80.7%	61.9%	0%		80.9%	95.5%	96%	88.5%	0%		93.9%	99.5%	86.9%	98%	0%		90.6%	-
Single-Unit Trucks	0	1	0	0		1	0	36	0	0		36	0	0	1	0		1	1	50	3	0		54	-
Single-Unit Trucks %	0%	0.8%	0%	0%		0.4%	0%	6.1%	0%	0%		5.3%	0%	0%	1.9%	0%		0.5%	0.5%	5.5%	1.5%	0%		4.1%	-
Buses	4	2	2	0		8	8	35	8	0		51	2	4	5	0		11	0	32	1	0		33	-
Buses %	12.9%	1.6%	2.2%	0%		3.2%	11.8%	5.9%	38.1%	0%		7.5%	4.5%	4%	9.6%	0%		5.6%	0%	3.5%	0.5%	0%		2.5%	-
Articulated Trucks	0	0	0	0		0	0	43	0	0		43	0	0	0	0		0	0	38	0	0		38	-
Articulated Trucks %	0%	0%	0%	0%		0%	0%	7.3%	0%	0%		6.3%	0%	0%	0%	0%		0%	0%	4.1%	0%	0%		2.9%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	8	-	-	-	-	-	2	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	80%	-	-	-	-	-	20%	-	-	-	-	-	0%	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	-
Bicycles on Road%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-

Peak Hour: 07:00 AM - 08:00 AM Weather: Mostly Cloudy (6.2 °C)

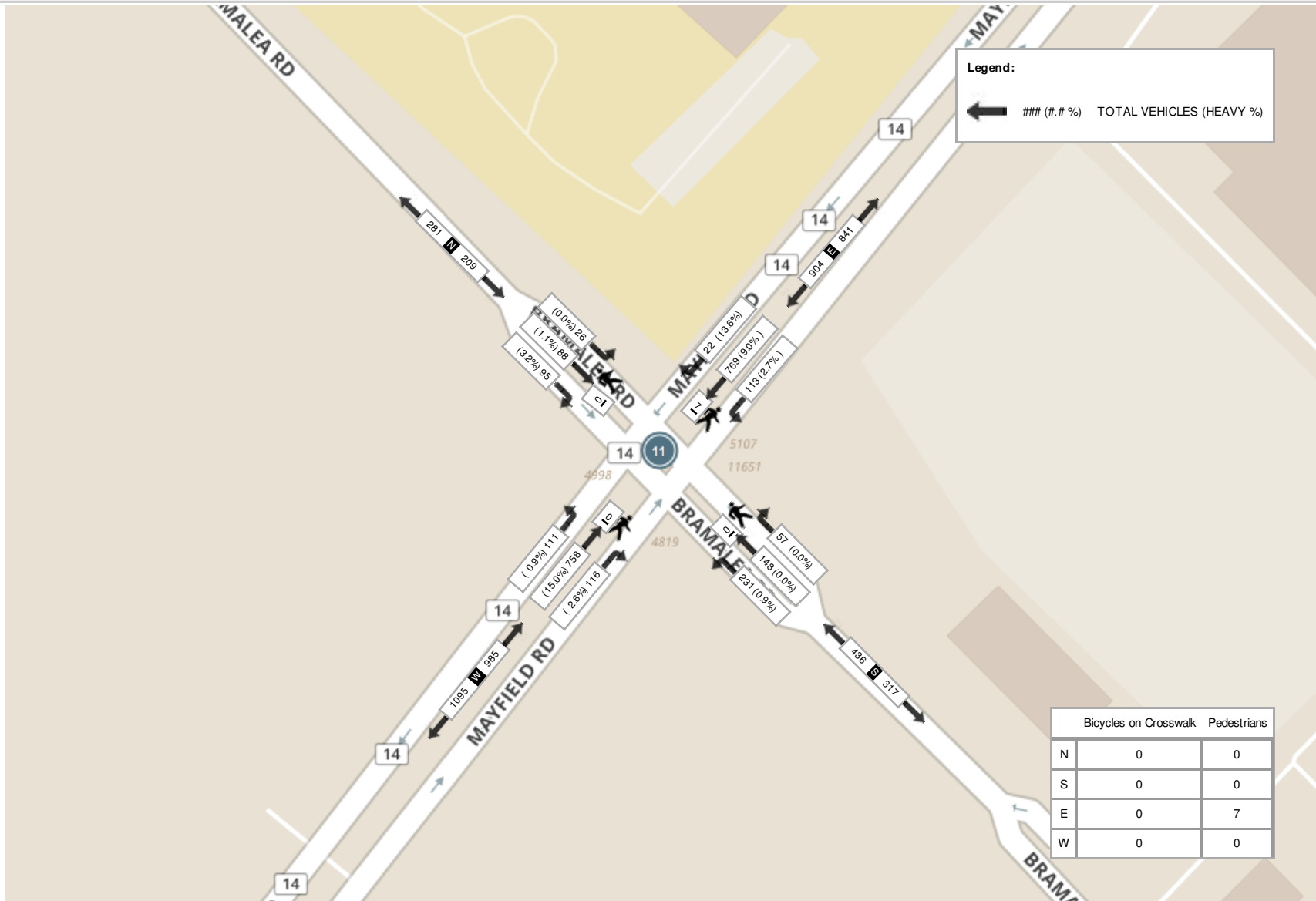




Peak Hour: 04:00 PM - 05:00 PM Weather: Mostly Cloudy (13.2 °C)

Start Time	Southbound BRAMALEA ROAD						Westbound MAYFIELD RD						Northbound BRAMALEA ROAD						Eastbound MAYFIELD RD						Int. Total (15 min)
	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	Left	Thru	Right	U-Turn	Peds	Approach Total	
16:00:00	6	25	24	0	0	55	21	169	5	1	3	196	54	40	15	0	0	109	23	190	27	0	0	240	600
16:15:00	11	17	25	0	0	53	34	190	4	0	0	228	72	32	18	0	0	122	24	175	30	0	0	229	632
16:30:00	4	31	25	0	0	60	34	199	8	0	0	241	54	44	11	0	0	109	39	199	28	0	0	266	676
16:45:00	5	15	21	0	0	41	24	211	5	0	4	240	51	32	13	0	0	96	25	194	31	0	0	250	627
Grand Total	26	88	95	0	0	209	113	769	22	1	7	905	231	148	57	0	0	436	111	758	116	0	0	985	2535
Approach%	12.4%	42.1%	45.5%	0%	-	-	12.5%	85%	2.4%	0.1%	-	-	53%	33.9%	13.1%	0%	-	-	11.3%	77%	11.8%	0%	-	-	-
Totals %	1%	3.5%	3.7%	0%	8.2%	4.5%	30.3%	0.9%	0%	35.7%	9.1%	5.8%	2.2%	0%	17.2%	4.4%	29.9%	4.6%	0%	38.9%	-	-	-	-	-
PHF	0.59	0.71	0.95	0	0.87	0.83	0.91	0.69	0.25	0.94	0.8	0.84	0.79	0	0.89	0.71	0.95	0.94	0	0.93	-	-	-	-	-
Heavy	0	1	3	0	4	3	69	3	0	75	2	0	0	0	2	1	114	3	0	118	-	-	-	-	-
Heavy %	0%	1.1%	3.2%	0%	1.9%	2.7%	9%	13.6%	0%	8.3%	0.9%	0%	0%	0%	0.5%	0.9%	15%	2.6%	0%	12%	-	-	-	-	-
Lights	26	87	92	0	205	110	700	19	1	830	229	148	57	0	434	110	644	113	0	867	-	-	-	-	-
Lights %	100%	98.9%	96.8%	0%	98.1%	97.3%	91%	86.4%	100%	91.7%	99.1%	100%	100%	0%	99.5%	99.1%	85%	97.4%	0%	88%	-	-	-	-	-
Single-Unit Trucks	0	0	2	0	2	0	28	1	0	29	1	0	0	0	1	1	29	1	0	31	-	-	-	-	-
Single-Unit Trucks %	0%	0%	2.1%	0%	1%	0%	3.6%	4.5%	0%	3.2%	0.4%	0%	0%	0%	0.2%	0.9%	3.8%	0.9%	0%	3.1%	-	-	-	-	-
Buses	0	1	1	0	2	3	5	2	0	10	1	0	0	0	1	0	28	2	0	30	-	-	-	-	-
Buses %	0%	1.1%	1.1%	0%	1%	2.7%	0.7%	9.1%	0%	1.1%	0.4%	0%	0%	0%	0.2%	0%	3.7%	1.7%	0%	3%	-	-	-	-	-
Articulated Trucks	0	0	0	0	0	0	36	0	0	36	0	0	0	0	0	0	57	0	0	57	-	-	-	-	-
Articulated Trucks %	0%	0%	0%	0%	0%	0%	4.7%	0%	0%	4%	0%	0%	0%	0%	0%	0%	7.5%	0%	0%	5.8%	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	7	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-
Bicycles on Crosswalk%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-
Bicycles on Road	0	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	-	-	-	-
Bicycles on Road%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-

Peak Hour: 04:00 PM - 05:00 PM Weather: Mostly Cloudy (13.2 °C)

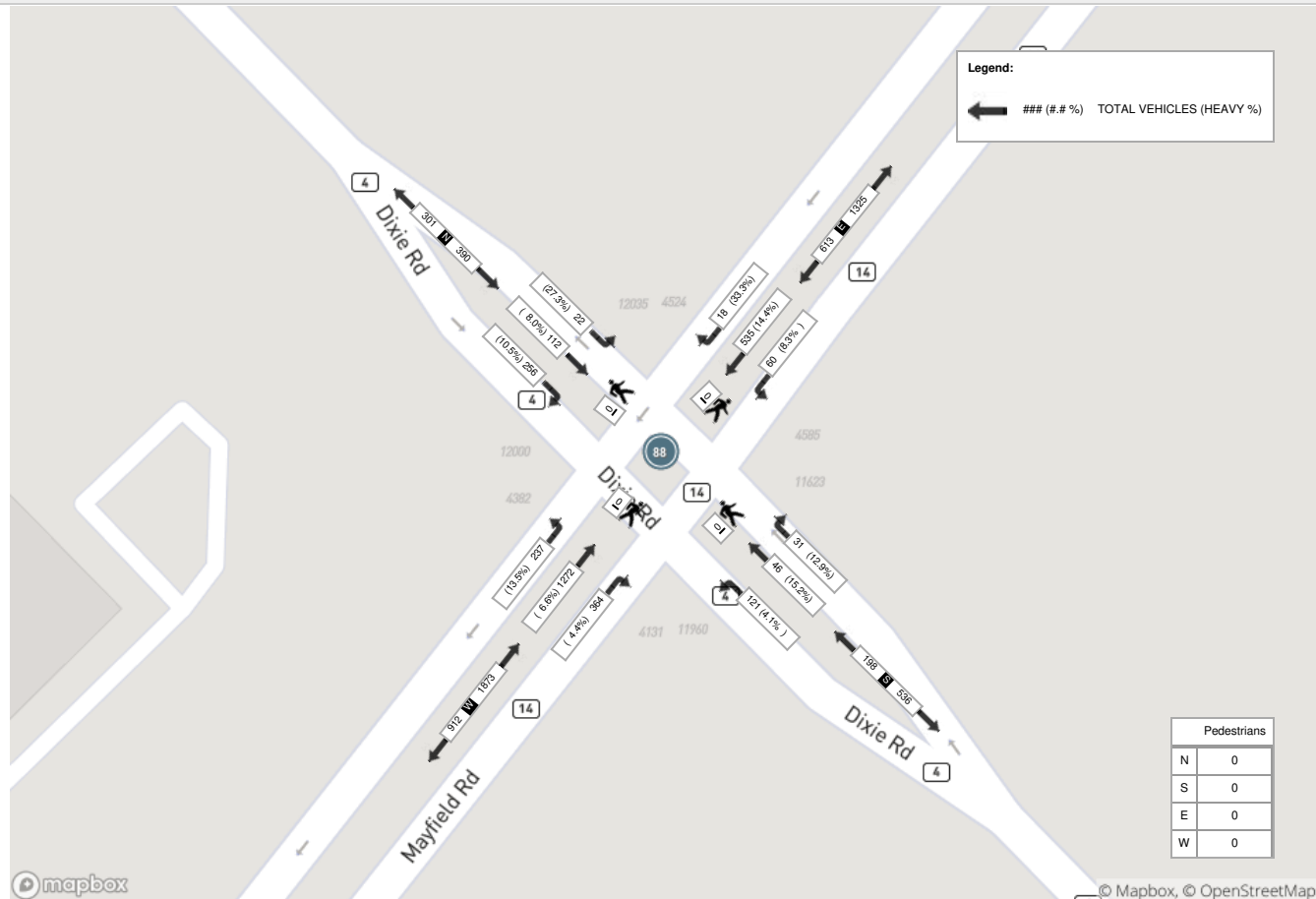




Peak Hour: 07:15 AM - 08:15 AM Weather: Moderate Rain (9.08 °C)

Start Time	N Approach DIXIE ROAD						E Approach MAYFIELD RD						S Approach DIXIE RD						W Approach MAYFIELD RD						Int. Total (15 min)
	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
07:15:00	6	60	104	0	0	170	10	105	6	0	0	121	23	14	2	0	0	39	58	259	72	0	0	389	719
07:30:00	2	9	57	0	0	68	10	115	7	0	0	132	31	7	7	0	0	45	68	302	90	0	0	460	705
07:45:00	4	22	56	0	0	82	18	163	3	0	0	184	27	12	11	0	0	50	50	412	94	0	0	556	872
08:00:00	10	21	39	0	0	70	22	152	2	0	0	176	40	13	11	0	0	64	61	299	108	0	0	468	778
Grand Total	22	112	256	0	0	390	60	535	18	0	0	613	121	46	31	0	0	198	237	1272	364	0	0	1873	3074
Approach%	5.6%	28.7%	65.6%	0%		-	9.8%	87.3%	2.9%	0%		-	61.1%	23.2%	15.7%	0%		-	12.7%	67.9%	19.4%	0%		-	-
Totals %	0.7%	3.6%	8.3%	0%		12.7%	2%	17.4%	0.6%	0%		19.9%	3.9%	1.5%	1%	0%		6.4%	7.7%	41.4%	11.8%	0%		60.9%	-
PHF	0.55	0.47	0.62	0		0.57	0.68	0.82	0.64	0		0.83	0.76	0.82	0.7	0		0.77	0.87	0.77	0.84	0		0.84	-
Heavy	6	9	27	0		42	5	77	6	0		88	5	7	4	0		16	32	84	16	0		132	-
Heavy %	27.3%	8%	10.5%	0%		10.8%	8.3%	14.4%	33.3%	0%		14.4%	4.1%	15.2%	12.9%	0%		8.1%	13.5%	6.6%	4.4%	0%		7%	-
Lights	16	103	229	0		348	55	458	12	0		525	116	39	27	0		182	205	1188	348	0		1741	-
Lights %	72.7%	92%	89.5%	0%		89.2%	91.7%	85.6%	66.7%	0%		85.6%	95.9%	84.8%	87.1%	0%		91.9%	86.5%	93.4%	95.6%	0%		93%	-
Single-Unit Trucks	2	6	20	0		28	1	39	2	0		42	4	5	1	0		10	21	22	7	0		50	-
Single-Unit Trucks %	9.1%	5.4%	7.8%	0%		7.2%	1.7%	7.3%	11.1%	0%		6.9%	3.3%	10.9%	3.2%	0%		5.1%	8.9%	1.7%	1.9%	0%		2.7%	-
Buses	2	1	2	0		5	3	18	3	0		24	1	2	2	0		5	3	31	6	0		40	-
Buses %	9.1%	0.9%	0.8%	0%		1.3%	5%	3.4%	16.7%	0%		3.9%	0.8%	4.3%	6.5%	0%		2.5%	1.3%	2.4%	1.6%	0%		2.1%	-
Articulated Trucks	2	2	5	0		9	1	20	1	0		22	0	0	1	0		1	8	31	3	0		42	-
Articulated Trucks %	9.1%	1.8%	2%	0%		2.3%	1.7%	3.7%	5.6%	0%		3.6%	0%	0%	3.2%	0%		0.5%	3.4%	2.4%	0.8%	0%		2.2%	-
Pedestrians	-	-	-	-	0	-	-	-	-	0	-	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	0%	-	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-

Peak Hour: 07:15 AM - 08:15 AM Weather: Moderate Rain (9.08 °C)

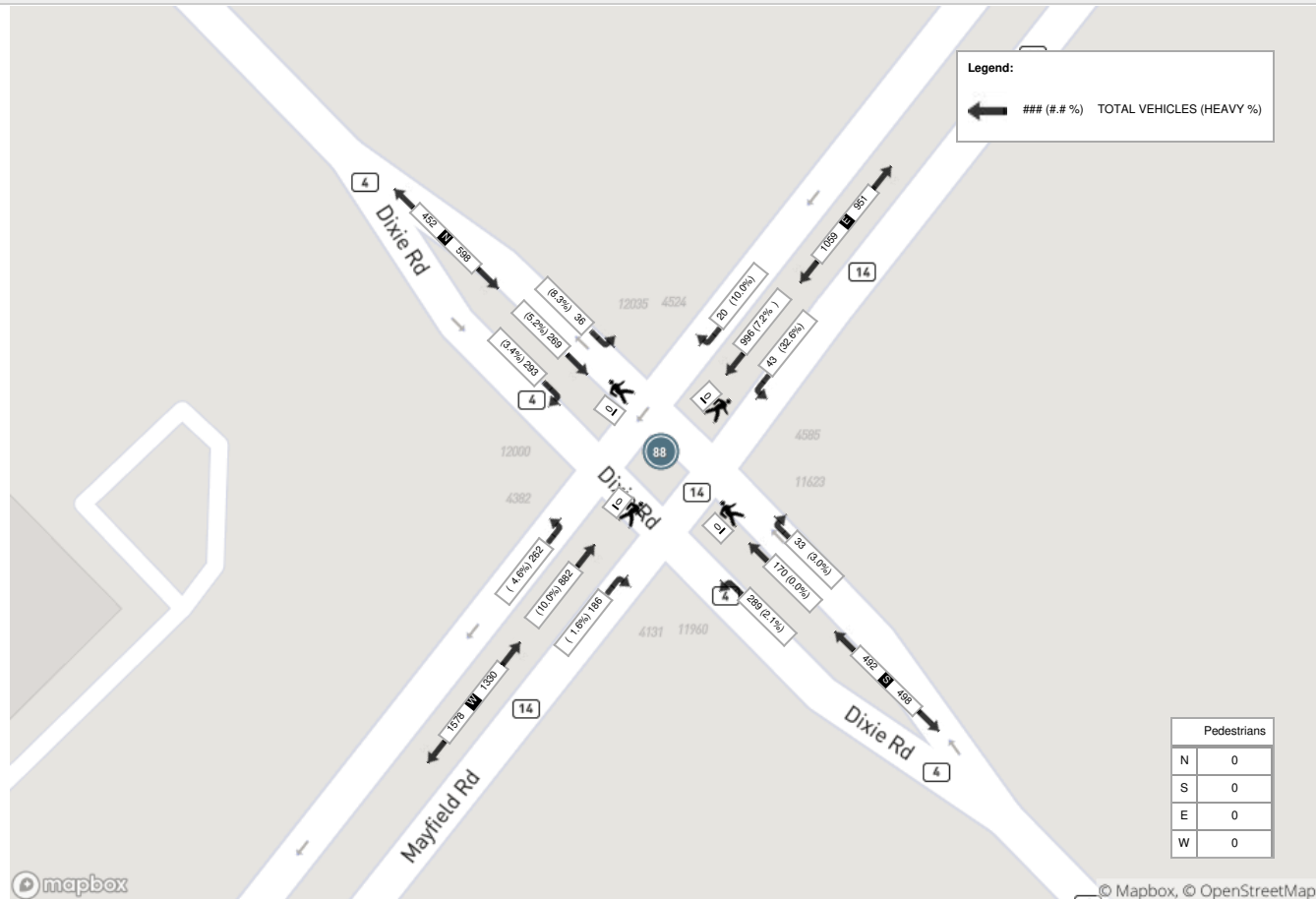




Peak Hour: 04:15 PM - 05:15 PM Weather: Light Rain (10.54 °C)

Start Time	N Approach DIXIE ROAD						E Approach MAYFIELD RD						S Approach DIXIE RD						W Approach MAYFIELD RD						Int. Total (15 min)
	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	Left	Thru	Right	UTurn	Peds	Approach Total	
16:15:00	6	60	88	0	0	154	10	270	5	0	0	285	69	38	11	0	0	118	58	234	48	0	0	340	897
16:30:00	6	73	78	0	0	157	18	233	4	0	0	255	80	57	8	0	0	145	70	212	49	1	0	332	889
16:45:00	12	76	63	0	0	151	7	267	5	0	0	279	66	30	7	0	0	103	70	228	44	0	0	342	875
17:00:00	12	60	64	0	0	136	8	226	6	0	0	240	74	45	7	0	0	126	64	208	45	0	0	317	819
Grand Total	36	269	293	0	0	598	43	996	20	0	0	1059	289	170	33	0	0	492	262	882	186	1	0	1331	3480
Approach%	6%	45%	49%	0%		-	4.1%	94.1%	1.9%	0%		-	58.7%	34.6%	6.7%	0%		-	19.7%	66.3%	14%	0.1%		-	-
Totals %	1%	7.7%	8.4%	0%		17.2%	1.2%	28.6%	0.6%	0%		30.4%	8.3%	4.9%	0.9%	0%		14.1%	7.5%	25.3%	5.3%	0%		38.2%	-
PHF	0.75	0.88	0.83	0		0.95	0.6	0.92	0.83	0		0.93	0.9	0.75	0.75	0		0.85	0.94	0.94	0.95	0.25		0.97	-
Heavy	3	14	10	0		27	14	72	2	0		88	6	0	1	0		7	12	88	3	0		103	-
Heavy %	8.3%	5.2%	3.4%	0%		4.5%	32.6%	7.2%	10%	0%		8.3%	2.1%	0%	3%	0%		1.4%	4.6%	10%	1.6%	0%		7.7%	-
Lights	33	255	283	0		571	29	924	18	0		971	283	170	32	0		485	250	794	183	1		1228	-
Lights %	91.7%	94.8%	96.6%	0%		95.5%	67.4%	92.8%	90%	0%		91.7%	97.9%	100%	97%	0%		98.6%	95.4%	90%	98.4%	100%		92.3%	-
Single-Unit Trucks	2	10	10	0		22	12	31	1	0		44	1	0	1	0		2	8	27	0	0		35	-
Single-Unit Trucks %	5.6%	3.7%	3.4%	0%		3.7%	27.9%	3.1%	5%	0%		4.2%	0.3%	0%	3%	0%		0.4%	3.1%	3.1%	0%	0%		2.6%	-
Buses	1	3	0	0		4	0	7	0	0		7	4	0	0	0		4	0	18	3	0		21	-
Buses %	2.8%	1.1%	0%	0%		0.7%	0%	0.7%	0%	0%		0.7%	1.4%	0%	0%	0%		0.8%	0%	2%	1.6%	0%		1.6%	-
Articulated Trucks	0	1	0	0		1	2	34	1	0		37	1	0	0	0		1	4	43	0	0		47	-
Articulated Trucks %	0%	0.4%	0%	0%		0.2%	4.7%	3.4%	5%	0%		3.5%	0.3%	0%	0%	0%		0.2%	1.5%	4.9%	0%	0%		3.5%	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
Pedestrians%	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-	-	-	-	0%	-	-

Peak Hour: 04:15 PM - 05:15 PM Weather: Light Rain (10.54 °C)



REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	January 8, 2018		Prepared Date	December 8, 2020
Database Rev	27		Completed By	JP
Timing Card / Field rev			Checked By	SJ

Location	Dixie Road at Mayfield Road								
Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	OFF MAX	PM SPLITS
1	Mayfield Road - WB P.P. LT	5	0	0	30	0	10	13	10
2	Mayfield Road - EB	8	8	30	46	23	60	16.9	60
3	Not in use	-	-	-	-	-	-	-	-
4	Dixie Road - NB	8	8	33	46	23	50	46.9	50
5	Mayfield Road - EB P.P. LT	5	0	0	30	0	10	13	10
6	Mayfield Road - WB	8	8	30	46	23	60	16.9	60
7	Not in use	-	-	-	-	-	-	-	-
8	Dixie Road - SB	8	8	33	46	23	50	46.9	50

System Control No Semi-Actuated Mode Yes	TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
	07:00 - 09:00	AM	120	44
	FREE	OFF	0	0
	15:00 - 18:00	PM	120	32

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

Database Date	June 5, 2015		Prepared Date	December 8, 2020
Database Rev	26		Completed By	JP
Timing Card / Field rev	-		Checked By	SJ

Location	Mayfield Road at Bramalea Road								
Phase #	Street Name - Direction	Vehicle Minimum (s)	Pedestrian Minimum (s)		Amber (s)	All Red (s)	TIME PERIOD (s) (Green+Amber+All Red)		
			WALK	FDWALK			AM SPLITS	OFF SPLITS	PM SPLITS
1	Not in use	-	-	-	-	-	-	-	-
2	Mayfield Road - EB	12	8	40	4	3.2	70	59	70
3	Bramalea Road - SB PP LT	5	0	0	3	0	9	0	9
4	Bramalea Road - NB	8	8	39	4	3.1	56	56	56
5	Mayfield Road - EB PP LT	5	0	0	3	0	13	0	12
6	Mayfield Road - WB	12	8	40	4	3.2	57	59	58
7	Not in use	-	-	-	-	-	-	-	-
8	Bramalea Road - SB	8	8	39	4	3.1	65	56	65

System Control No Semi-Actuated Mode Yes	TIME (M-F)	PEAK	CYCLE LENGTH (s)	OFFSET (s)
	06:00 - 09:00	AM	135	0
	09:00 - 14:30	OFF	115	0
	14:30 - 19:00	PM	135	16



APPENDIX B







Intersection Capacity Analysis Results –
Existing Conditions

HCM Unsignalized Intersection Capacity Analysis

1: Dixie Road & Merchant Road

Existing Conditions

Weekday AM Peak












Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	17	49	352	409	2
Future Volume (Veh/h)	1	17	49	352	409	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	17	49	352	409	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	859	409	411			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	859	409	411			
tC, single (s)	7.4	6.4	4.2			
tC, 2 stage (s)						
tF (s)	4.4	3.5	2.3			
p0 queue free %	100	97	96			
cM capacity (veh/h)	216	598	1106			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	18	49	352	409	2	
Volume Left	1	49	0	0	0	
Volume Right	17	0	0	0	2	
cSH	544	1106	1700	1700	1700	
Volume to Capacity	0.03	0.04	0.21	0.24	0.00	
Queue Length 95th (m)	0.5	0.6	0.0	0.0	0.0	
Control Delay (s)	11.8	8.4	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	11.8	1.0		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			38.2%		ICU Level of Service	A
Analysis Period (min)			15			

Queues

2: Dixie Road & Mayfield Road

Existing Conditions

Weekday AM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	237	1272	364	60	535	121	146	31	22	148	256
Future Volume (vph)	237	1272	364	60	535	121	146	31	22	148	256
Lane Group Flow (vph)	237	1272	364	60	535	121	146	31	22	148	256
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		4		4	8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	47.9	47.9	47.9	47.9	47.9	47.9
Total Split (s)	10.0	60.0	60.0	10.0	60.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	8.3%	50.0%	50.0%	8.3%	50.0%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag						
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	0.39	0.40	0.33	0.18	0.21	0.70	0.54	0.11	0.15	0.51	0.57
Control Delay	6.9	12.2	2.1	6.5	13.0	66.9	52.2	2.3	42.5	50.8	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.9	12.2	2.1	6.5	13.0	66.9	52.2	2.3	42.5	50.8	10.1
Queue Length 50th (m)	8.2	30.4	0.0	1.8	12.2	16.1	18.9	0.0	2.7	19.1	0.0
Queue Length 95th (m)	17.2	45.5	7.8	5.0	20.9	26.2	28.7	1.1	6.7	28.7	12.4
Internal Link Dist (m)		1129.7			1348.2		456.4			472.6	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	614	3146	1116	335	2675	384	600	547	317	638	680
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.40	0.33	0.18	0.21	0.32	0.24	0.06	0.07	0.23	0.38

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 44 (37%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 105

Control Type: Actuated-Coordinated

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis 2: Dixie Road & Mayfield Road

Existing Conditions
Weekday AM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	237	1272	364	60	535	18	121	146	31	22	148	256
Future Volume (vph)	237	1272	364	60	535	18	121	146	31	22	148	256
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9		6.9	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1566	4902	1536	1653	4553		1716	1671	1413	1405	1779	1439
Flt Permitted	0.42	1.00	1.00	0.20	1.00		0.59	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	687	4902	1536	347	4553		1069	1671	1413	884	1779	1439
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	237	1272	364	60	535	18	121	146	31	22	148	256
RTOR Reduction (vph)	0	0	132	0	2	0	0	0	26	0	0	214
Lane Group Flow (vph)	237	1272	232	60	551	0	121	146	5	22	148	42
Heavy Vehicles (%)	14%	7%	4%	8%	14%	33%	4%	15%	13%	27%	8%	11%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	86.6	76.4	76.4	77.6	70.4		19.6	19.6	19.6	19.6	19.6	19.6
Effective Green, g (s)	86.6	76.4	76.4	77.6	70.4		19.6	19.6	19.6	19.6	19.6	19.6
Actuated g/C Ratio	0.72	0.64	0.64	0.65	0.59		0.16	0.16	0.16	0.16	0.16	0.16
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9		6.9	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	592	3120	977	302	2671		174	272	230	144	290	235
v/s Ratio Prot	c0.04	c0.26		0.01	0.12			0.09			0.08	
v/s Ratio Perm	0.24		0.15	0.12		c0.11		0.00	0.02		0.03	
v/c Ratio	0.40	0.41	0.24	0.20	0.21		0.70	0.54	0.02	0.15	0.51	0.18
Uniform Delay, d1	5.5	10.7	9.3	7.8	11.7		47.4	46.0	42.2	43.1	45.8	43.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.4	0.6	0.7	0.2		14.3	3.7	0.1	1.0	3.0	0.8
Delay (s)	6.5	11.1	9.9	8.5	11.8		61.7	49.7	42.2	44.1	48.8	44.0
Level of Service	A	B	A	A	B		E	D	D	D	D	D
Approach Delay (s)		10.3			11.5			53.8			45.7	
Approach LOS		B			B			D			D	

Intersection Summary

HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Bramalea Road & Mayfield Road

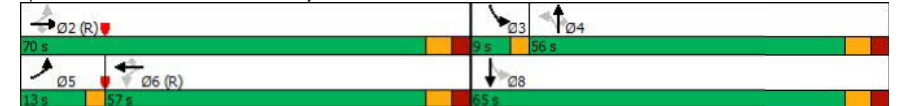
Existing Conditions
Weekday AM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	204	1008	204	68	649	21	44	110	52	31	140
Future Volume (vph)	204	1008	204	68	649	21	44	110	52	31	140
Lane Group Flow (vph)	204	1008	204	68	649	21	44	110	52	31	233
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases	5	2			6			4		3	8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	5	2	2	6	6	6	4	4	4	3	8
Switch Phase											
Minimum Initial (s)	5.0	12.0	12.0	12.0	12.0	12.0	8.0	8.0	8.0	5.0	8.0
Minimum Split (s)	8.0	55.2	55.2	55.2	55.2	55.2	54.1	54.1	54.1	8.0	54.1
Total Split (s)	13.0	70.0	70.0	57.0	57.0	57.0	56.0	56.0	56.0	9.0	65.0
Total Split (%)	9.6%	51.9%	51.9%	42.2%	42.2%	42.2%	41.5%	41.5%	41.5%	6.7%	48.1%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	0.0	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.32	0.29	0.17	0.23	0.23	0.03	0.40	0.60	0.24	0.17	0.43
Control Delay	5.8	6.2	1.2	15.6	11.5	0.0	66.3	71.2	6.1	45.5	32.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	6.2	1.2	15.6	11.5	0.0	66.3	71.2	6.1	45.5	32.2
Queue Length 50th (m)	7.7	18.2	0.0	4.6	15.8	0.0	6.6	16.9	0.0	4.1	10.2
Queue Length 95th (m)	14.1	25.4	4.3	11.6	23.5	0.0	13.5	27.3	2.8	8.9	16.8
Internal Link Dist (m)		1348.2			329.1			492.7			373.4
Turn Bay Length (m)	125.0		110.0	75.0		100.0	75.0			75.0	
Base Capacity (vph)	647	3494	1212	293	2839	774	393	654	568	182	1464
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.29	0.17	0.23	0.23	0.03	0.11	0.17	0.09	0.17	0.16

Intersection Summary

Cycle Length: 135
Actuated Cycle Length: 135
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Splits and Phases: 3: Bramalea Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis

Existing Conditions

3: Bramalea Road & Mayfield Road

Weekday AM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	1008	204	68	649	21	44	110	52	31	140	93
Future Volume (vph)	204	1008	204	68	649	21	44	110	52	31	140	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	7.1
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	0.95	
Flpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	4641	1544	1593	4407	1157	1700	1807	1426	1580	3290	
Flt Permitted	0.38	1.00	1.00	0.27	1.00	1.00	0.61	1.00	1.00	0.53	1.00	
Satd. Flow (perm)	706	4641	1544	456	4407	1157	1086	1807	1426	882	3290	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	204	1008	204	68	649	21	44	110	52	31	140	93
RTOR Reduction (vph)	0	0	52	0	0	8	0	0	47	0	79	0
Lane Group Flow (vph)	204	1008	152	68	649	13	44	110	5	31	154	0
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	1%	13%	2%	12%	19%	38%	5%	4%	12%	13%	2%	2%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	100.4	100.4	100.4	85.7	85.7	85.7	13.7	13.7	13.7	20.3	20.3	
Effective Green, g (s)	100.4	100.4	100.4	85.7	85.7	85.7	13.7	13.7	13.7	20.3	20.3	
Actuated g/C Ratio	0.74	0.74	0.74	0.63	0.63	0.63	0.10	0.10	0.10	0.15	0.15	
Clearance Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	617	3451	1148	289	2797	734	110	183	144	151	494	
v/s Ratio Prot	c0.03	0.22			0.15			c0.06		0.01	c0.05	
v/s Ratio Perm	c0.22		0.10	0.15		0.01	0.04		0.00	0.03		
v/c Ratio	0.33	0.29	0.13	0.24	0.23	0.02	0.40	0.60	0.04	0.21	0.31	
Uniform Delay, d1	5.1	5.7	4.9	10.6	10.6	9.1	56.8	58.0	54.7	49.8	51.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.2	0.2	1.9	0.2	0.0	2.4	5.5	0.1	0.7	0.4	
Delay (s)	5.7	5.9	5.2	12.5	10.8	9.2	59.2	63.5	54.8	50.4	51.5	
Level of Service	A	A	A	B	B	A	E	E	D	D	D	
Approach Delay (s)		5.8			10.9			60.4			51.4	
Approach LOS		A			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			16.1		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			135.0		Sum of lost time (s)					20.3		
Intersection Capacity Utilization			87.4%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

1: Dixie Road & Merchant Road

Existing Conditions

Weekday PM Peak

	EBL	EBR	NBL	NBT	SBT	SBR
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Traffic Volume (veh/h)	4	34	11	492	564	3
Future Volume (Veh/h)	4	34	11	492	564	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	34	11	492	564	3
Pedestrians	2					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1080	566	569			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1080	566	569			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	98	94	99			
cM capacity (veh/h)	240	527	968			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	38	11	492	564	3	
Volume Left	4	11	0	0	0	
Volume Right	34	0	0	0	3	
cSH	468	968	1700	1700	1700	
Volume to Capacity	0.08	0.01	0.29	0.33	0.00	
Queue Length 95th (m)	1.2	0.2	0.0	0.0	0.0	
Control Delay (s)	13.4	8.8	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	13.4	0.2		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			39.7%		ICU Level of Service	A
Analysis Period (min)			15			

Queues

2: Dixie Road & Mayfield Road

Existing Conditions

Weekday PM Peak

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↗	↖	↗	↖	↗	↖	↖	↗	↗
Traffic Volume (vph)	262	882	186	43	996	289	221	33	36	269	293
Future Volume (vph)	262	882	186	43	996	289	221	33	36	269	293
Lane Group Flow (vph)	262	882	186	43	1016	289	221	33	36	269	293
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		4		4	8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	47.9	47.9	47.9	47.9	47.9	47.9
Total Split (s)	10.0	60.0	60.0	10.0	60.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	8.3%	50.0%	50.0%	8.3%	50.0%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag						
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	0.85	0.39	0.22	0.16	0.47	0.95	0.34	0.06	0.11	0.43	0.46
Control Delay	45.2	21.7	3.5	13.4	24.1	78.7	30.7	1.6	27.0	32.8	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.2	21.7	3.5	13.4	24.1	78.7	30.7	1.6	27.0	32.8	13.9
Queue Length 50th (m)	18.2	30.1	0.0	2.6	35.6	37.7	22.1	0.0	3.3	28.0	11.4
Queue Length 95th (m)	#43.2	36.8	7.4	5.8	42.8	#68.4	34.0	1.3	7.8	41.8	25.5
Internal Link Dist (m)		1129.7			1348.2		456.4			472.6	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	307	2278	845	277	2179	324	689	597	347	657	668
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.85	0.39	0.22	0.16	0.47	0.89	0.32	0.06	0.10	0.41	0.44

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 32 (27%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 105

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis 2: Dixie Road & Mayfield Road

Existing Conditions
Weekday PM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	262	882	186	43	996	20	289	221	33	36	269	293
Future Volume (vph)	262	882	186	43	996	20	289	221	33	36	269	293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.85	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1700	4768	1566	1342	4884	1750	1921	1551	1653	1830	1551	1551
Flt Permitted	0.21	1.00	1.00	0.29	1.00	0.49	1.00	1.00	0.56	1.00	1.00	1.00
Satd. Flow (perm)	368	4768	1566	407	4884	904	1921	1551	967	1830	1551	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	262	882	186	43	996	20	289	221	33	36	269	293
RTOR Reduction (vph)	0	0	98	0	2	0	0	0	22	0	0	115
Lane Group Flow (vph)	262	882	88	43	1014	0	289	221	11	36	269	178
Heavy Vehicles (%)	5%	10%	2%	33%	7%	10%	2%	0%	3%	8%	5%	3%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm
Protected Phases	5	2		1	6		4			8		
Permitted Phases	2		2	6		4		4	8		8	
Actuated Green, G (s)	65.6	56.7	56.7	59.4	53.5	40.6	40.6	40.6	40.6	40.6	40.6	40.6
Effective Green, g (s)	65.6	56.7	56.7	59.4	53.5	40.6	40.6	40.6	40.6	40.6	40.6	40.6
Actuated g/C Ratio	0.55	0.47	0.47	0.49	0.45	0.34	0.34	0.34	0.34	0.34	0.34	0.34
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	302	2252	739	247	2177	305	649	524	327	619	524	524
v/s Ratio Prot	c0.07	0.18		0.01	0.21		0.12			0.15		
v/s Ratio Perm	c0.41		0.06	0.08		c0.32		0.01	0.04		0.11	
v/c Ratio	0.87	0.39	0.12	0.17	0.47	0.95	0.34	0.02	0.11	0.43	0.34	0.34
Uniform Delay, d1	17.4	20.5	17.7	15.9	23.3	38.7	29.7	26.5	27.3	30.8	29.7	29.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	23.8	0.5	0.3	0.7	0.7	38.2	0.7	0.0	0.3	1.0	0.8	0.8
Delay (s)	41.2	21.0	18.0	16.6	24.0	76.9	30.3	26.5	27.6	31.8	30.5	30.5
Level of Service	D	C	B	B	C	E	C	C	C	C	C	C
Approach Delay (s)		24.6			23.7		54.9			30.9		
Approach LOS		C			C		D			C		

Intersection Summary

HCM 2000 Control Delay	30.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Bramalea Road & Mayfield Road

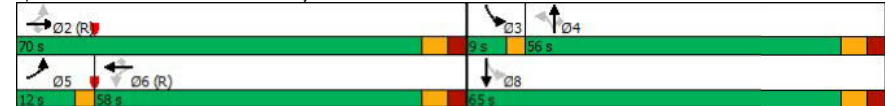
Existing Conditions
Weekday PM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	111	834	116	113	846	22	231	163	57	26	97
Future Volume (vph)	111	834	116	113	846	22	231	163	57	26	97
Lane Group Flow (vph)	111	834	116	113	846	22	231	163	57	26	192
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases	5	2			6		6	4		4	8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	5	2	2	6	6	6	4	4	4	3	8
Switch Phase											
Minimum Initial (s)	5.0	12.0	12.0	12.0	12.0	12.0	8.0	8.0	8.0	5.0	8.0
Minimum Split (s)	8.0	55.2	55.2	55.2	55.2	55.2	54.1	54.1	54.1	8.0	54.1
Total Split (s)	12.0	70.0	70.0	58.0	58.0	58.0	56.0	56.0	56.0	9.0	65.0
Total Split (%)	8.9%	51.9%	51.9%	43.0%	43.0%	43.0%	41.5%	41.5%	41.5%	6.7%	48.1%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	0.0	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?							Yes	Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.26	0.30	0.12	0.37	0.34	0.03	0.82	0.36	0.13	0.08	0.20
Control Delay	13.1	14.3	3.1	29.7	22.5	0.1	70.6	43.3	3.4	27.6	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.1	14.3	3.1	29.7	22.5	0.1	70.6	43.3	3.4	27.6	16.3
Queue Length 50th (m)	6.8	23.2	0.0	11.1	29.9	0.0	34.7	21.5	0.0	2.8	5.7
Queue Length 95th (m)	14.2	34.4	5.6	25.8	44.3	0.0	47.7	29.9	2.9	5.8	9.7
Internal Link Dist (m)		1348.2			329.1			492.7			373.4
Turn Bay Length (m)	125.0		110.0	75.0		100.0	75.0			75.0	
Base Capacity (vph)	436	2804	998	304	2460	756	425	680	620	347	1444
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.30	0.12	0.37	0.34	0.03	0.54	0.24	0.09	0.07	0.13

Intersection Summary

Cycle Length: 135
Actuated Cycle Length: 135
Offset: 16 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Splits and Phases: 3: Bramalea Road & Mayfield Road
















HCM Signalized Intersection Capacity Analysis

Existing Conditions

3: Bramalea Road & Mayfield Road

Weekday PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	834	116	113	846	22	231	163	57	26	97	95
Future Volume (vph)	111	834	116	113	846	22	231	163	57	26	97	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	7.1
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	0.95	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	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	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.93		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	4561	1551	1733	4812	1401	1767	1879	1568	1781	3240	
Flt Permitted	0.28	1.00	1.00	0.33	1.00	1.00	0.63	1.00	1.00	0.54	1.00	
Satd. Flow (perm)	516	4561	1551	594	4812	1401	1174	1879	1568	1013	3240	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	111	834	116	113	846	22	231	163	57	26	97	95
RTOR Reduction (vph)	0	0	46	0	0	11	0	0	43	0	68	0
Lane Group Flow (vph)	111	834	70	113	846	11	231	163	14	26	124	0
Confl. Peds. (#/hr)								7	7			
Heavy Vehicles (%)	1%	15%	3%	3%	9%	14%	1%	0%	0%	0%	1%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	81.8	81.8	81.8	67.8	67.8	67.8	32.3	32.3	32.3	38.9	38.9	
Effective Green, g (s)	81.8	81.8	81.8	67.8	67.8	67.8	32.3	32.3	32.3	38.9	38.9	
Actuated g/C Ratio	0.61	0.61	0.61	0.50	0.50	0.50	0.24	0.24	0.24	0.29	0.29	
Clearance Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	414	2763	939	298	2416	703	280	449	375	312	933	
v/s Ratio Prot	0.02	c0.18			0.18			0.09		0.00	c0.04	
v/s Ratio Perm	0.14		0.05	c0.19		0.01	c0.20		0.01	0.02		
v/c Ratio	0.27	0.30	0.07	0.38	0.35	0.02	0.82	0.36	0.04	0.08	0.13	
Uniform Delay, d1	11.6	12.8	11.0	20.7	20.3	16.9	48.7	42.8	39.4	34.9	35.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.3	0.2	3.6	0.4	0.0	17.6	0.5	0.0	0.1	0.1	
Delay (s)	12.4	13.1	11.1	24.3	20.7	16.9	66.3	43.3	39.4	35.0	35.6	
Level of Service	B	B	B	C	C	B	E	D	D	C	D	
Approach Delay (s)		12.8			21.0			54.6			35.6	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			24.6		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			135.0		Sum of lost time (s)					20.3		
Intersection Capacity Utilization			69.4%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												














APPENDIX C

Intersection Capacity Analysis –
Future Background Conditions

HCM Unsignalized Intersection Capacity Analysis 1: Dixie Road & Merchant Road























Future Background
Weekday AM Peak

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	17	49	611	536	2
Future Volume (Veh/h)	1	17	49	611	536	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	1	17	49	611	536	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	1245	536	538			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1245	536	538			
tC, single (s)	7.4	6.4	4.2			
tC, 2 stage (s)						
tF (s)	4.4	3.5	2.3			
p0 queue free %	99	97	95			
cM capacity (veh/h)	117	504	991			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	18	49	611	536	2	
Volume Left	1	49	0	0	0	
Volume Right	17	0	0	0	2	
cSH	426	991	1700	1700	1700	
Volume to Capacity	0.04	0.05	0.36	0.32	0.00	
Queue Length 95th (m)	0.6	0.7	0.0	0.0	0.0	
Control Delay (s)	13.8	8.8	0.0	0.0	0.0	
Lane LOS	B	A				
Approach Delay (s)	13.8	0.7		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			44.9%	ICU Level of Service	A	
Analysis Period (min)			15			

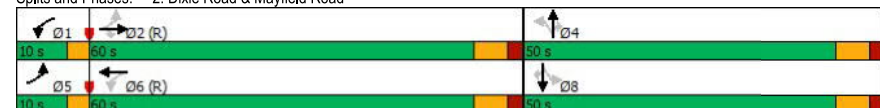
Queues

2: Dixie Road & Mayfield Road

Future Background
Weekday AM Peak

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	385	1399	364	60	589	121	207	31	27	172	329
Future Volume (vph)	385	1399	364	60	589	121	207	31	27	172	329
Lane Group Flow (vph)	385	1399	364	60	637	121	207	31	27	172	329
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		4		4	8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	47.9	47.9	47.9	47.9	47.9	47.9
Total Split (s)	10.0	60.0	60.0	10.0	60.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	8.3%	50.0%	50.0%	8.3%	50.0%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag						
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	0.61	0.46	0.33	0.21	0.30	0.66	0.67	0.10	0.21	0.52	0.65
Control Delay	11.1	14.2	2.3	8.9	19.7	61.4	55.4	2.1	43.0	48.7	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.1	14.2	2.3	8.9	19.7	61.4	55.4	2.1	43.0	48.7	13.0
Queue Length 50th (m)	16.6	37.3	0.0	2.0	19.0	15.8	27.2	0.0	3.2	21.9	3.9
Queue Length 95th (m)	31.9	53.9	8.2	5.4	25.7	25.9	38.8	1.1	7.8	32.1	19.1
Internal Link Dist (m)		1129.7			1348.2		456.4			472.6	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	628	3031	1088	280	2149	356	600	547	247	638	706
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.46	0.33	0.21	0.30	0.34	0.34	0.06	0.11	0.27	0.47
Intersection Summary											
Cycle Length: 120											
Actuated Cycle Length: 120											
Offset: 44 (37%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green											
Natural Cycle: 105											
Control Type: Actuated-Coordinated											

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis 2: Dixie Road & Mayfield Road

Future Background
Weekday AM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	385	1399	364	60	589	48	121	207	31	27	172	329
Future Volume (vph)	385	1399	364	60	589	48	121	207	31	27	172	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99	1.00	1.00	0.85	1.00	1.00	0.85	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95
Satd. Flow (prot)	1566	4902	1536	1653	4492	1716	1671	1413	1405	1779	1439	1439
Flt Permitted	0.36	1.00	1.00	0.18	1.00	0.55	1.00	1.00	0.46	1.00	1.00	1.00
Satd. Flow (perm)	598	4902	1536	314	4492	992	1671	1413	688	1779	1439	1439
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	385	1399	364	60	589	48	121	207	31	27	172	329
RTOR Reduction (vph)	0	0	141	0	7	0	0	0	25	0	0	241
Lane Group Flow (vph)	385	1399	223	60	630	0	121	207	6	27	172	88
Heavy Vehicles (%)	14%	7%	4%	8%	14%	33%	4%	15%	13%	27%	8%	11%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm	Perm
Protected Phases	5	2		1	6		4			8		8
Permitted Phases	2		2	6		4		4	8			8
Actuated Green, G (s)	83.9	73.6	73.6	64.5	57.2	22.3	22.3	22.3	22.3	22.3	22.3	22.3
Effective Green, g (s)	83.9	73.6	73.6	64.5	57.2	22.3	22.3	22.3	22.3	22.3	22.3	22.3
Actuated g/C Ratio	0.70	0.61	0.61	0.54	0.48	0.19	0.19	0.19	0.19	0.19	0.19	0.19
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	609	3006	942	250	2141	184	310	262	127	330	267	267
v/s Ratio Prot	c0.12	0.29		0.01	0.14		c0.12			0.10		
v/s Ratio Perm	c0.32		0.15	0.11		0.12		0.00	0.04		0.06	
v/c Ratio	0.63	0.47	0.24	0.24	0.29	0.66	0.67	0.02	0.21	0.52	0.33	0.33
Uniform Delay, d1	7.5	12.6	10.5	13.3	19.1	45.3	45.4	39.9	41.4	44.0	42.4	42.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	0.5	0.6	1.0	0.3	10.9	7.0	0.1	1.8	2.8	1.5	1.5
Delay (s)	10.5	13.1	11.1	14.4	19.5	56.2	52.4	40.0	43.2	46.9	43.9	43.9
Level of Service	B	B	B	B	B	E	D	D	D	D	D	D
Approach Delay (s)		12.3			19.0		52.6			44.8		
Approach LOS		B			B		D			D		

Intersection Summary

HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Bramalea Road & Mayfield Road

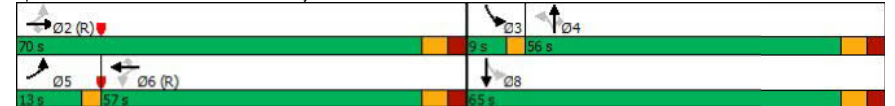
Future Background
Weekday AM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	204	1114	204	68	744	21	44	121	52	31	154
Future Volume (vph)	204	1114	204	68	744	21	44	121	52	31	154
Lane Group Flow (vph)	204	1114	204	68	744	21	44	121	52	31	247
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases	5	2			6			4		3	8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	5	2	2	6	6	6	4	4	4	3	8
Switch Phase											
Minimum Initial (s)	5.0	12.0	12.0	12.0	12.0	12.0	8.0	8.0	8.0	5.0	8.0
Minimum Split (s)	8.0	55.2	55.2	55.2	55.2	55.2	54.1	54.1	54.1	8.0	54.1
Total Split (s)	13.0	70.0	70.0	57.0	57.0	57.0	56.0	56.0	56.0	9.0	65.0
Total Split (%)	9.6%	51.9%	51.9%	42.2%	42.2%	42.2%	41.5%	41.5%	41.5%	6.7%	48.1%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	0.0	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.35	0.32	0.17	0.26	0.26	0.03	0.38	0.62	0.23	0.17	0.44
Control Delay	6.4	6.7	1.2	17.2	12.3	0.0	64.2	71.0	5.8	44.6	33.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.4	6.7	1.2	17.2	12.3	0.0	64.2	71.0	5.8	44.6	33.0
Queue Length 50th (m)	8.0	21.3	0.0	4.8	19.0	0.0	6.6	18.6	0.0	4.0	11.2
Queue Length 95th (m)	14.6	29.5	4.4	12.4	27.9	0.0	13.4	29.4	2.8	8.8	17.9
Internal Link Dist (m)		1348.2			329.1			492.7			373.4
Turn Bay Length (m)	125.0		110.0	75.0		100.0	75.0			75.0	
Base Capacity (vph)	591	3464	1204	260	2808	766	388	654	568	181	1470
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.32	0.17	0.26	0.26	0.03	0.11	0.19	0.09	0.17	0.17

Intersection Summary

Cycle Length: 135
Actuated Cycle Length: 135
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Splits and Phases: 3: Bramalea Road & Mayfield Road

























HCM Signalized Intersection Capacity Analysis

Future Background







3: Bramalea Road & Mayfield Road

Weekday AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	204	1114	204	68	744	21	44	121	52	31	154	93
Future Volume (vph)	204	1114	204	68	744	21	44	121	52	31	154	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	7.1
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	0.95	
Flrb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	4641	1544	1593	4407	1157	1700	1807	1426	1580	3302	
Flt Permitted	0.34	1.00	1.00	0.24	1.00	1.00	0.60	1.00	1.00	0.50	1.00	
Satd. Flow (perm)	629	4641	1544	408	4407	1157	1071	1807	1426	834	3302	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	204	1114	204	68	744	21	44	121	52	31	154	93
RTOR Reduction (vph)	0	0	53	0	0	8	0	0	46	0	78	0
Lane Group Flow (vph)	204	1114	151	68	744	13	44	121	6	31	169	0
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	1%	13%	2%	12%	19%	38%	5%	4%	12%	13%	2%	2%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	99.6	99.6	99.6	84.8	84.8	84.8	14.5	14.5	14.5	21.1	21.1	
Effective Green, g (s)	99.6	99.6	99.6	84.8	84.8	84.8	14.5	14.5	14.5	21.1	21.1	
Actuated g/C Ratio	0.74	0.74	0.74	0.63	0.63	0.63	0.11	0.11	0.11	0.16	0.16	
Clearance Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	563	3424	1139	256	2768	726	115	194	153	150	516	
v/s Ratio Prot	c0.03	0.24			0.17			c0.07		0.01	c0.05	
v/s Ratio Perm	c0.24		0.10	0.17		0.01	0.04		0.00	0.03		
v/c Ratio	0.36	0.33	0.13	0.27	0.27	0.02	0.38	0.62	0.04	0.21	0.33	
Uniform Delay, d1	5.4	6.1	5.1	11.2	11.2	9.4	56.1	57.6	54.0	49.1	50.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.3	0.2	2.5	0.2	0.0	2.1	6.1	0.1	0.7	0.4	
Delay (s)	6.2	6.4	5.4	13.7	11.5	9.5	58.2	63.8	54.1	49.8	51.0	
Level of Service	A	A	A	B	B	A	E	E	D	D	D	
Approach Delay (s)		6.2			11.6			60.3			50.9	
Approach LOS		A			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			16.3		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			135.0		Sum of lost time (s)					20.3		
Intersection Capacity Utilization			87.7%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis 1: Dixie Road & Merchant Road












Future Background
Weekday PM Peak

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	34	11	657	858	3
Future Volume (Veh/h)	4	34	11	657	858	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	34	11	657	858	3
Pedestrians	2					
Lane Width (m)	3.5					
Walking Speed (m/s)	1.2					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1539	860	863			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1539	860	863			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	97	91	99			
cM capacity (veh/h)	126	358	749			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	38	11	657	858	3	
Volume Left	4	11	0	0	0	
Volume Right	34	0	0	0	3	
cSH	300	749	1700	1700	1700	
Volume to Capacity	0.13	0.01	0.39	0.50	0.00	
Queue Length 95th (m)	1.9	0.2	0.0	0.0	0.0	
Control Delay (s)	18.7	9.9	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s)	18.7	0.2		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay		0.5				
Intersection Capacity Utilization		55.2%		ICU Level of Service	B	
Analysis Period (min)		15				

Queues

2: Dixie Road & Mayfield Road

Future Background
Weekday PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	364	970	186	43	1096	289	252	33	67	346	450
Future Volume (vph)	364	970	186	43	1096	289	252	33	67	346	450
Lane Group Flow (vph)	364	970	186	43	1122	289	252	33	67	346	450
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		4		4	8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	47.9	47.9	47.9	47.9	47.9	47.9
Total Split (s)	10.0	60.0	60.0	10.0	60.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	8.3%	50.0%	50.0%	8.3%	50.0%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag						
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	1.44	0.44	0.23	0.18	0.52	1.07	0.37	0.06	0.20	0.53	0.68
Control Delay	243.4	23.3	3.5	14.0	25.2	113.9	30.3	1.6	28.8	34.0	26.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	243.4	23.3	3.5	14.0	25.2	113.9	30.3	1.6	28.8	34.0	26.4
Queue Length 50th (m)	~46.4	33.9	0.0	2.6	40.4	~44.8	25.7	0.0	6.4	37.8	34.4
Queue Length 95th (m)	#82.5	41.1	7.4	5.8	48.3	#76.4	38.7	1.3	13.1	55.0	56.8
Internal Link Dist (m)		1129.7			1348.2		456.4			472.6	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	252	2189	819	239	2163	269	689	597	327	657	660
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.44	0.44	0.23	0.18	0.52	1.07	0.37	0.06	0.20	0.53	0.68

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 32 (27%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis 2: Dixie Road & Mayfield Road

Future Background
Weekday PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰		↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	364	970	186	43	1096	26	289	252	33	67	346	450
Future Volume (vph)	364	970	186	43	1096	26	289	252	33	67	346	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9		6.9	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1700	4768	1566	1342	4881		1750	1921	1551	1653	1830	1551
Flt Permitted	0.18	1.00	1.00	0.24	1.00		0.41	1.00	1.00	0.52	1.00	1.00
Satd. Flow (perm)	319	4768	1566	341	4881		750	1921	1551	912	1830	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	364	970	186	43	1096	26	289	252	33	67	346	450
RTOR Reduction (vph)	0	0	102	0	2	0	0	0	21	0	0	103
Lane Group Flow (vph)	364	970	84	43	1120	0	289	252	12	67	346	347
Heavy Vehicles (%)	5%	10%	2%	33%	7%	10%	2%	0%	3%	8%	5%	3%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	61.5	54.5	54.5	58.7	53.1		43.1	43.1	43.1	43.1	43.1	43.1
Effective Green, g (s)	61.5	54.5	54.5	58.7	53.1		43.1	43.1	43.1	43.1	43.1	43.1
Actuated g/C Ratio	0.51	0.45	0.45	0.49	0.44		0.36	0.36	0.36	0.36	0.36	0.36
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9		6.9	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	244	2165	711	213	2159		269	689	557	327	657	557
v/s Ratio Prot	c0.09	0.20		0.01	0.23			0.13			0.19	
v/s Ratio Perm	c0.68		0.05	0.09		c0.39		0.01	0.07		0.22	
v/c Ratio	1.49	0.45	0.12	0.20	0.52		1.07	0.37	0.02	0.20	0.53	0.62
Uniform Delay, d1	24.5	22.4	18.9	16.5	24.2		38.5	28.4	24.8	26.6	30.4	31.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	241.8	0.7	0.3	1.0	0.9		76.0	0.7	0.0	0.7	1.5	3.1
Delay (s)	266.3	23.1	19.2	17.4	25.1		114.5	29.1	24.9	27.2	31.8	34.8
Level of Service	F	C	B	B	C		F	C	C	C	C	C
Approach Delay (s)		80.9			24.8			71.8			33.0	
Approach LOS		F			C			E			C	

Intersection Summary

HCM 2000 Control Delay	53.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues

3: Bramalea Road & Mayfield Road

Future Background
Weekday PM Peak

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↰↰↰	↰	↰	↰↰↰		↰	↰	↰	↰	↰
Traffic Volume (vph)	111	948	116	113	937	22	231	179	57	26	107
Future Volume (vph)	111	948	116	113	937	22	231	179	57	26	107
Lane Group Flow (vph)	111	948	116	113	937	22	231	179	57	26	202
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases	5	2			6		6	4		4	8
Permitted Phases	2		2	6		6		4		4	8
Detector Phase	5	2	2	6	6	6	4	4	4	3	8
Switch Phase											
Minimum Initial (s)	5.0	12.0	12.0	12.0	12.0	12.0	8.0	8.0	8.0	5.0	8.0
Minimum Split (s)	8.0	55.2	55.2	55.2	55.2	55.2	54.1	54.1	54.1	8.0	54.1
Total Split (s)	12.0	70.0	70.0	58.0	58.0	58.0	56.0	56.0	56.0	9.0	65.0
Total Split (%)	8.9%	51.9%	51.9%	43.0%	43.0%	43.0%	41.5%	41.5%	41.5%	6.7%	48.1%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	0.0	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.28	0.34	0.12	0.42	0.38	0.03	0.82	0.39	0.13	0.08	0.21
Control Delay	13.7	15.0	3.1	32.3	23.1	0.1	70.0	43.7	3.3	27.3	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	15.0	3.1	32.3	23.1	0.1	70.0	43.7	3.3	27.3	17.1
Queue Length 50th (m)	6.8	27.3	0.0	11.5	34.1	0.0	34.7	23.8	0.0	2.8	6.3
Queue Length 95th (m)	14.5	40.6	5.7	27.4	49.6	0.0	47.3	32.4	2.9	5.7	10.3
Internal Link Dist (m)		1348.2			329.1			492.7			373.4
Turn Bay Length (m)	125.0		110.0	75.0		100.0	75.0			75.0	
Base Capacity (vph)	398	2791	994	269	2453	754	421	680	620	336	1449
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.34	0.12	0.42	0.38	0.03	0.55	0.26	0.09	0.08	0.14

Intersection Summary

Cycle Length: 135
Actuated Cycle Length: 135
Offset: 16 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated

Splits and Phases: 3: Bramalea Road & Mayfield Road



























HCM Signalized Intersection Capacity Analysis

3: Bramalea Road & Mayfield Road

Future Background

Weekday PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	948	116	113	937	22	231	179	57	26	107	95
Future Volume (vph)	111	948	116	113	937	22	231	179	57	26	107	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	7.1
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	0.95	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	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	1.00	0.85	1.00	1.00	0.85	1.00	0.85	1.00	0.93		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	4561	1551	1733	4812	1401	1767	1879	1568	1781	3255	
Flt Permitted	0.24	1.00	1.00	0.29	1.00	1.00	0.62	1.00	1.00	0.51	1.00	
Satd. Flow (perm)	455	4561	1551	528	4812	1401	1163	1879	1568	965	3255	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	111	948	116	113	937	22	231	179	57	26	107	95
RTOR Reduction (vph)	0	0	46	0	0	11	0	0	43	0	67	0
Lane Group Flow (vph)	111	948	70	113	937	11	231	179	14	26	135	0
Confl. Peds. (#/hr)								7	7			
Heavy Vehicles (%)	1%	15%	3%	3%	9%	14%	1%	0%	0%	0%	1%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	81.4	81.4	81.4	67.6	67.6	67.6	32.7	32.7	32.7	39.3	39.3	
Effective Green, g (s)	81.4	81.4	81.4	67.6	67.6	67.6	32.7	32.7	32.7	39.3	39.3	
Actuated g/C Ratio	0.60	0.60	0.60	0.50	0.50	0.50	0.24	0.24	0.24	0.29	0.29	
Clearance Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	379	2750	935	264	2409	701	281	455	379	302	947	
v/s Ratio Prot	0.02	c0.21			0.19			0.10		0.00	c0.04	
v/s Ratio Perm	0.15		0.05	c0.21		0.01	c0.20		0.01	0.02		
v/c Ratio	0.29	0.34	0.07	0.43	0.39	0.02	0.82	0.39	0.04	0.09	0.14	
Uniform Delay, d1	12.0	13.4	11.1	21.4	20.9	17.0	48.4	42.8	39.1	34.6	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.3	0.2	5.0	0.5	0.0	17.3	0.6	0.0	0.1	0.1	
Delay (s)	12.9	13.8	11.3	26.4	21.4	17.0	65.7	43.4	39.1	34.7	35.5	
Level of Service	B	B	B	C	C	B	E	D	D	C	D	
Approach Delay (s)		13.4			21.8			53.9			35.4	
Approach LOS		B			C			D			D	
Intersection Summary												
HCM 2000 Control Delay			24.6		HCM 2000 Level of Service					C		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			135.0		Sum of lost time (s)					20.3		
Intersection Capacity Utilization			71.6%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												



APPENDIX D

Intersection Capacity Analysis Results –
Future Background Conditions (Optimized)

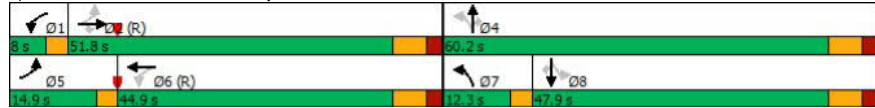
Queues
2: Dixie Road & Mayfield Road

Future Background (optimized)
Weekday PM Peak

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	364	970	186	43	1096	289	252	33	67	346	450
Future Volume (vph)	364	970	186	43	1096	289	252	33	67	346	450
Lane Group Flow (vph)	364	970	186	43	1122	289	252	33	67	346	450
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6	7	4			8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	7	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	8.0	47.9	47.9	47.9	47.9	47.9
Total Split (s)	14.9	51.8	51.8	8.0	44.9	12.3	60.2	60.2	47.9	47.9	47.9
Total Split (%)	12.4%	43.2%	43.2%	6.7%	37.4%	10.3%	50.2%	50.2%	39.9%	39.9%	39.9%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	3.0	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	Lag	Lag	
Lead-Lag Optimize?							Yes	Yes	Yes		
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	0.98	0.46	0.23	0.19	0.72	0.94	0.35	0.05	0.24	0.70	0.79
Control Delay	71.9	26.1	4.3	18.0	39.5	66.7	27.6	0.2	34.0	46.8	31.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.9	26.1	4.3	18.0	39.5	66.7	27.6	0.2	34.0	46.8	31.8
Queue Length 50th (m)	38.9	36.4	0.0	2.7	50.5	28.1	24.9	0.0	7.3	43.3	32.8
Queue Length 95th (m)	#92.5	46.7	8.5	7.1	60.3	#45.6	33.2	0.0	13.2	56.6	51.6
Internal Link Dist (m)		1129.7			1348.2		456.4			472.6	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	373	2103	794	226	1548	308	853	738	358	625	664
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.98	0.46	0.23	0.19	0.72	0.94	0.30	0.04	0.19	0.55	0.68

Intersection Summary											
Cycle Length: 120											
Actuated Cycle Length: 120											
Offset: 32 (27%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green											
Natural Cycle: 120											
Control Type: Actuated-Coordinated											
# 95th percentile volume exceeds capacity, queue may be longer.											
Queue shown is maximum after two cycles.											

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis
2: Dixie Road & Mayfield Road

Future Background (optimized)
Weekday PM Peak

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	364	970	186	43	1096	26	289	252	33	67	346	450
Future Volume (vph)	364	970	186	43	1096	26	289	252	33	67	346	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9		3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1700	4768	1566	1342	4881		1750	1921	1551	1653	1830	1551
Flt Permitted	0.12	1.00	1.00	0.28	1.00		0.29	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	218	4768	1566	400	4881		529	1921	1551	1049	1830	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	364	970	186	43	1096	26	289	252	33	67	346	450
RTOR Reduction (vph)	0	0	105	0	2	0	0	0	21	0	0	150
Lane Group Flow (vph)	364	970	81	43	1120	0	289	252	12	67	346	300
Heavy Vehicles (%)	5%	10%	2%	33%	7%	10%	2%	0%	3%	8%	5%	3%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4			8	
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	61.6	52.3	52.3	44.3	38.0		44.6	44.6	44.6	32.3	32.3	32.3
Effective Green, g (s)	61.6	52.3	52.3	44.3	38.0		44.6	44.6	44.6	32.3	32.3	32.3
Actuated g/C Ratio	0.51	0.44	0.44	0.37	0.32		0.37	0.37	0.37	0.27	0.27	0.27
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	366	2078	682	197	1545		291	713	576	282	492	417
v/s Ratio Prot	c0.17	0.20		0.01	0.23		c0.08	0.13			0.19	
v/s Ratio Perm	c0.34		0.05	0.07			c0.29		0.01	0.06		0.19
v/c Ratio	0.99	0.47	0.12	0.22	0.72		0.99	0.35	0.02	0.24	0.70	0.72
Uniform Delay, d1	33.5	24.0	20.1	24.7	36.4		36.3	27.3	23.9	34.2	39.5	39.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	45.5	0.8	0.4	1.2	3.0		50.8	0.6	0.0	0.9	5.7	7.2
Delay (s)	79.0	24.7	20.5	25.8	39.4		87.1	27.9	23.9	35.1	45.2	47.0
Level of Service	E	C	C	C	D		F	C	C	D	D	D
Approach Delay (s)		37.2			38.9			57.5			45.3	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	42.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



APPENDIX E

Detailed TTS Data

Incoming AM

Fri Dec 11 2020 16:55:15 GMT-0500 (Eastern Standard Time) - Run Time: 2467ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of origin - gta06_orig

Column: 2006 GTA zone of destination - gta06_dest

Filters:

Start time of trip - start_time In 600-900

and

Trip purpose - trip_purp In 1

and

Primary travel mode of trip - mode_prime In d, m

and

2006 GTA zone of destination - gta06_dest In 3012,3013,3014,3015,3016,3191

Trip 2016

Table:

From	To					Sum	%	PD	21185		21211	Notes	
	3013	3014	3015	3016	3191				Gateway	Gateway2			
72	0	0	0	0	43	43	0.9%	1	Mayfield EB	Mayfield EB			410
124	0	0	0	0	12	12	0.2%	2	Mayfield EB	Mayfield EB			410
150	0	19	0	0	0	19	0.4%	3	Mayfield EB	Mayfield EB			410
160	0	0	0	0	21	21	0.4%	3	Mayfield EB	Mayfield EB			410
163	0	0	0	0	34	34	0.7%	3	Mayfield EB	Mayfield EB			410
173	0	0	0	0	24	24	0.5%	3	Mayfield EB	Mayfield EB			410
178	0	0	0	0	23	23	0.5%	3	Mayfield EB	Mayfield EB			410
194	0	0	0	0	11	11	0.2%	4	Mayfield EB	Mayfield EB			410
222	0	0	0	0	12	12	0.2%	4	Mayfield EB	Mayfield EB			410
223	0	0	0	0	17	17	0.4%	5	Mayfield EB	Mayfield EB			410
255	0	0	0	0	13	13	0.3%	6	Mayfield EB	Mayfield EB			410
261	0	0	0	0	15	15	0.3%	6	Mayfield EB	Mayfield EB			410
294	0	17	0	0	0	17	0.4%	7	Mayfield EB	Mayfield EB			410
295	0	0	0	0	6	6	0.1%	7	Mayfield EB	Mayfield EB			410
326	0	0	0	0	13	13	0.3%	8	Mayfield EB	Mayfield EB			410
365	0	0	0	0	52	52	1.1%	9	Mayfield EB	Mayfield EB			410
366	0	0	20	0	0	20	0.4%	9	Mayfield EB	Mayfield EB			410
371	0	0	0	0	17	17	0.4%	9	Mayfield EB	Mayfield EB			410
376	0	0	0	0	25	25	0.5%	9	Mayfield EB	Mayfield EB			410
382	0	0	0	0	20	20	0.4%	9	Mayfield EB	Mayfield EB			410
384	0	0	0	0	10	10	0.2%	10	Mayfield EB	Mayfield EB			410
385	0	0	0	0	8	8	0.2%	10	Mayfield EB	Mayfield EB			410
396	0	0	0	0	8	8	0.2%	10	Mayfield EB	Mayfield EB			410
413	0	0	0	0	18	18	0.4%	10	Mayfield EB	Mayfield EB			410
443	0	0	0	0	17	17	0.4%	11	Mayfield EB	Mayfield EB			410
459	0	0	0	0	27	27	0.6%	11	Mayfield EB	Mayfield EB			410
568	0	0	0	0	16	16	0.3%	15	Mayfield EB	Mayfield EB			410
1063	0	0	0	7	0	7	0.1%	21	Mayfield EB	Mayfield EB			410
1180	0	0	0	0	21	21	0.4%	23	Mayfield EB	Mayfield EB			410
2258	0	0	0	0	18	18	0.4%	29	Mayfield EB	Mayfield EB			410
2402	55	0	0	0	0	55	1.1%	31	Mayfield EB	Mayfield EB			410
2427	0	0	0	0	16	16	0.3%	31	Mayfield EB	Mayfield EB			410
2434	0	0	0	0	45	45	0.9%	31	Mayfield EB	Mayfield EB			410
2868	0	0	0	0	27	27	0.6%	25	Mayfield EB	Mayfield EB			410
3008	0	26	0	0	0	26	0.5%	34	Mayfield EB	Old School EB	very close to sites		
3010	0	37	0	0	16	53	1.1%	34	Mayfield EB	Old School EB	very close to sites		
3011	0	4	0	0	0	4	0.1%	34	Mayfield EB	Mayfield EB	very close to sites		
3338	0	0	0	0	39	39	0.8%	35	Mayfield EB	Mayfield EB			410
3351	0	0	0	0	53	53	1.1%	35	Mayfield EB	Mayfield EB			410
3352	0	0	0	0	50	50	1.0%	35	Mayfield EB	Mayfield EB			410

3360	0	4	0	0	7	11	0.2%	35	Mayfield EB	Mayfield EB	410
3362	0	0	0	0	12	12	0.2%	35	Mayfield EB	Mayfield EB	410
3364	0	0	0	0	85	85	1.8%	35	Mayfield EB	Mayfield EB	410
3367	0	0	0	0	42	42	0.9%	35	Mayfield EB	Mayfield EB	410
3375	0	0	0	0	41	41	0.9%	35	Mayfield EB	Mayfield EB	from SW on Mayfield/Old School
3417	13	0	0	0	0	13	0.3%	35	Mayfield EB	Mayfield EB	410
3432	0	0	10	0	0	10	0.2%	35	Mayfield EB	Mayfield EB	from SW on Mayfield/Old School
3434	14	0	0	29	51	94	1.9%	35	Mayfield EB	Mayfield EB	from SW on Mayfield/Old School
3456	0	0	0	0	14	14	0.3%	35	Mayfield EB	Mayfield EB	from SW on Mayfield/Old School
3460	24	0	0	0	0	24	0.5%	35	Mayfield EB	Mayfield EB	from SW on Mayfield
3466	0	0	0	0	18	18	0.4%	35	Mayfield EB	Mayfield EB	from SW on Mayfield
3485	0	0	0	0	36	36	0.7%	35	Mayfield EB	Mayfield EB	410
3486	0	0	24	0	0	24	0.5%	35	Mayfield EB	Mayfield EB	410
3515	0	0	0	0	23	23	0.5%	35	Mayfield EB	Mayfield EB	410
3602	0	0	0	0	14	14	0.3%	36	Mayfield EB	Mayfield EB	410
3603	0	0	0	0	18	18	0.4%	36	Mayfield EB	Mayfield EB	410
3606	0	0	0	0	6	6	0.1%	36	Mayfield EB	Mayfield EB	410
3607	0	0	0	0	27	27	0.6%	36	Mayfield EB	Mayfield EB	410
3615	0	0	0	0	18	18	0.4%	36	Mayfield EB	Mayfield EB	410
3617	0	0	0	0	14	14	0.3%	36	Mayfield EB	Mayfield EB	410
3629	0	0	0	0	58	58	1.2%	36	Mayfield EB	Mayfield EB	410
3638	0	0	0	0	7	7	0.1%	36	Mayfield EB	Mayfield EB	410
3644	0	0	0	0	10	10	0.2%	36	Mayfield EB	Mayfield EB	410
3645	0	0	0	0	22	22	0.5%	36	Mayfield EB	Mayfield EB	410
3664	0	0	0	48	0	48	1.0%	36	Mayfield EB	Mayfield EB	410
3671	0	0	0	0	19	19	0.4%	36	Mayfield EB	Mayfield EB	410
3681	0	0	0	0	12	12	0.2%	36	Mayfield EB	Mayfield EB	410
3686	0	0	0	0	28	28	0.6%	36	Mayfield EB	Mayfield EB	410
3688	0	0	0	0	8	8	0.2%	36	Mayfield EB	Mayfield EB	410
3714	0	0	0	0	15	15	0.3%	36	Mayfield EB	Mayfield EB	410
3877	0	0	0	0	41	41	0.9%	36	Mayfield EB	Mayfield EB	410
4084	0	0	0	0	32	32	0.7%	40	Mayfield EB	Mayfield EB	410
4110	0	0	0	0	69	69	1.4%	38	Mayfield EB	Mayfield EB	410
4119	0	0	27	0	0	27	0.6%	38	Mayfield EB	Mayfield EB	410
4123	0	0	0	0	23	23	0.5%	38	Mayfield EB	Mayfield EB	410
4159	0	0	0	0	55	55	1.1%	37	Mayfield EB	Old School EB	from SW on Mayfield/Old School
4160	0	0	0	0	15	15	0.3%	37	Mayfield EB	Old School EB	from SW on Mayfield/Old School
4162	0	0	0	26	0	26	0.5%	37	Mayfield EB	Old School EB	from SW on Mayfield/Old School
4164	0	47	0	0	0	0	1.0%	37	Mayfield EB	Old School EB	from SW on Mayfield/Old School

Outgoing AM

Fri Dec 11 2020 17:01:04 GMT-0500 (Eastern Standard Time) - Run Time: 2545ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06_dest

Column: 2006 GTA zone of origin - gta06_orig

Filters:

Start time of trip - start_time In 600-900

and

Trip purpose - trip_purp In 1

and

Primary travel mode of trip - mode_prime In D, M

and

2006 GTA zone of origin - gta06_orig In 3012,3013,3014,3015,3016,3191

Trip 2016

Table:

To	From			Sum	%	PD	21185		21211		Notes
	3012	3015	3191				Gateway	Gateway			
421	0	30	0	30	11.2%	10	Mayfield WB	Mayfield WB			to 410
2070	0	30	0	30	11.2%	33	Dixie SB	Dixie SB			to NE on Dixie
3005	19	0	0	19	7.1%	34	Mayfield WB	Mayfield WB			to SW on Mayfield/Old School
3192	0	14	0	14	5.2%	34	Dixie NB	Dixie NB			to NW on Dixie
3376	0	26	0	26	9.7%	35	Mayfield WB	Mayfield WB			to SW on Mayfield
3448	16	0	0	16	6.0%	35	Mayfield EB	Mayfield EB			to NE on Dixie/Mayfield
3816	0	35	0	35	13.1%	36	Mayfield WB	Mayfield WB			to 410
8663	0	0	48	48	17.9%	84	Dixie NB	Dixie NB			to NW on Dixie
8904	0	50	0	50	18.7%	147	Mayfield WB	Mayfield WB			to 410



APPENDIX F

Intersection Capacity Analysis –
Future Total Conditions

Queues
1: Dixie Road & Merchant Road/West Access 3

Future Total Conditions
AM Peak Hour

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	1	0	17	0	49	640	56	559	2
Future Volume (vph)	1	0	17	0	49	640	56	559	2
Lane Group Flow (vph)	0	18	0	108	49	712	224	559	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9
Total Split (s)	45.0	45.0	45.0	45.0	75.0	75.0	75.0	75.0	75.0
Total Split (%)	37.5%	37.5%	37.5%	37.5%	62.5%	62.5%	62.5%	62.5%	62.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0		0.0		0.0		0.0	
Total Lost Time (s)		6.9		6.9		6.9		6.9	
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio	0.11	0.11	0.58	0.09	0.55	0.46	0.42	0.00	
Control Delay	6.6		39.7	4.4	7.7	9.0	6.0	0.0	
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	6.6		39.7	4.4	7.7	9.0	6.0	0.0	
Queue Length 50th (m)	0.0		7.7	1.2	27.3	7.8	18.5	0.0	
Queue Length 95th (m)	0.0		1.7	3.6	51.9	3.2	34.5	0.0	
Internal Link Dist (m)	280.5		194.8		216.9		214.8		
Turn Bay Length (m)				60.0		60.0		60.0	
Base Capacity (vph)	502		568	550	1284	487	1335	808	
Starvation Cap Reductn	0		0	0	0	0	0	0	
Spillback Cap Reductn	0		0	0	0	0	0	0	
Storage Cap Reductn	0		0	0	0	0	0	0	
Reduced v/c Ratio	0.04		0.19	0.09	0.55	0.46	0.42	0.00	
Intersection Summary									
Cycle Length: 120									
Actuated Cycle Length: 99.3									
Natural Cycle: 110									
Control Type: Semi Act-Uncoord									

Splits and Phases: 1: Dixie Road & Merchant Road/West Access 3

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HCM Signalized Intersection Capacity Analysis
1: Dixie Road & Merchant Road/West Access 3

Future Total Conditions
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	17	17	0	10	49	640	18	56	559	2
Future Volume (vph)	1	0	17	17	0	10	49	640	18	56	559	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		6.9			6.9		6.9	6.9		6.9	6.9	6.9
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.87			0.95		1.00	0.98		1.00	1.00	0.85
Flt Protected		1.00			0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1275			1730		1623	1708		1785	1779	1065
Flt Permitted		0.98			0.80		0.43	1.00		0.35	1.00	1.00
Satd. Flow (perm)		1252			1424		733	1708		649	1779	1065
Peak-hour factor, PHF	1.00	0.25	1.00	0.25	0.25	0.25	1.00	1.00	0.25	0.25	1.00	1.00
Adj. Flow (vph)	1	0	17	68	0	40	49	640	72	224	559	2
RTOR Reduction (vph)	0	16	0	0	31	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	2	0	0	77	0	49	710	0	224	559	2
Heavy Vehicles (%)	100%	0%	24%	0%	0%	0%	10%	12%	0%	0%	8%	50%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		10.9			10.9		74.6	74.6		74.6	74.6	74.6
Effective Green, g (s)		10.9			10.9		74.6	74.6		74.6	74.6	74.6
Actuated g/C Ratio		0.11			0.11		0.75	0.75		0.75	0.75	0.75
Clearance Time (s)		6.9			6.9		6.9	6.9		6.9	6.9	6.9
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		137			156		550	1283		487	1336	800
v/s Ratio Prot							c0.42			0.31		
v/s Ratio Perm		0.00			c0.05		0.07			0.35		0.00
v/c Ratio		0.01			0.49		0.09	0.55		0.46	0.42	0.00
Uniform Delay, d1		39.4			41.6		3.3	5.3		4.7	4.5	3.1
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.0			2.4		0.3	1.7		3.1	1.0	0.0
Delay (s)		39.5			44.0		3.6	7.0		7.8	5.4	3.1
Level of Service		D			D		A	A		A	A	A
Approach Delay (s)		39.5			44.0			6.8			6.1	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay		9.2										
HCM 2000 Volume to Capacity ratio		0.55										
Actuated Cycle Length (s)		99.3										
Intersection Capacity Utilization		66.3%										
Analysis Period (min)		15										
c Critical Lane Group												

Queues

2: Dixie Road & Mayfield Road

Future Total Conditions

AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	442	1474	364	64	620	121	222	54	27	176	358
Future Volume (vph)	442	1474	364	64	620	121	222	54	27	176	358
Lane Group Flow (vph)	442	1474	364	64	668	121	222	54	27	176	358
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		4			8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	4	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	47.9	47.9	47.9	47.9	47.9	47.9
Total Split (s)	10.0	60.0	60.0	10.0	60.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	8.3%	50.0%	50.0%	8.3%	50.0%	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	6.9	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag						
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	0.71	0.50	0.34	0.25	0.33	0.62	0.67	0.16	0.21	0.50	0.70
Control Delay	16.0	15.6	2.5	10.1	21.8	56.7	54.2	8.0	41.5	46.8	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.0	15.6	2.5	10.1	21.8	56.7	54.2	8.0	41.5	46.8	18.0
Queue Length 50th (m)	20.9	41.2	0.0	2.3	21.3	15.7	29.1	0.0	3.2	22.2	9.4
Queue Length 95th (m)	#51.0	60.4	8.6	5.8	26.4	25.3	40.5	4.8	7.6	32.0	26.7
Internal Link Dist (m)		1129.7			571.8		456.4			231.7	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	626	2969	1073	261	1996	357	600	547	237	638	696
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.50	0.34	0.25	0.33	0.34	0.37	0.10	0.11	0.28	0.51

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 44 (37%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 105

Control Type: Actuated-Coordinated

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis

2: Dixie Road & Mayfield Road

Future Total Conditions

AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩		↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	442	1474	364	64	620	48	121	222	54	27	176	358
Future Volume (vph)	442	1474	364	64	620	48	121	222	54	27	176	358
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9		6.9	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1566	4902	1536	1653	4497		1716	1671	1413	1405	1779	1439
Flt Permitted	0.34	1.00	1.00	0.17	1.00		0.55	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	562	4902	1536	290	4497		993	1671	1413	660	1779	1439
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	442	1474	364	64	620	48	121	222	54	27	176	358
RTOR Reduction (vph)	0	0	145	0	7	0	0	0	43	0	0	225
Lane Group Flow (vph)	442	1474	219	64	661	0	121	222	11	27	176	133
Heavy Vehicles (%)	14%	7%	4%	8%	14%	33%	4%	15%	13%	27%	8%	11%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		4		4	8		8
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	82.5	72.1	72.1	60.5	53.1		23.7	23.7	23.7	23.7	23.7	23.7
Effective Green, g (s)	82.5	72.1	72.1	60.5	53.1		23.7	23.7	23.7	23.7	23.7	23.7
Actuated g/C Ratio	0.69	0.60	0.60	0.50	0.44		0.20	0.20	0.20	0.20	0.20	0.20
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9		6.9	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	607	2945	922	230	1989		196	330	279	130	351	284
v/s Ratio Prot	c0.16	0.30		0.02	0.15		c0.13				0.10	
v/s Ratio Perm	c0.34		0.14	0.12			0.12		0.01	0.04		0.09
v/c Ratio	0.73	0.50	0.24	0.28	0.33		0.62	0.67	0.04	0.21	0.50	0.47
Uniform Delay, d1	8.8	13.7	11.1	15.3	21.9		44.0	44.6	38.9	40.3	42.9	42.6
Progression Factor	1.00	1.00	1.00	1.02	0.99		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.3	0.6	0.6	1.3	0.4		8.1	6.9	0.1	1.7	2.3	2.6
Delay (s)	14.1	14.3	11.8	17.1	22.1		52.1	51.5	39.1	42.0	45.2	45.1
Level of Service	B	B	B	B	C		D	D	D	D	D	D
Approach Delay (s)		13.8			21.6			50.0			45.0	
Approach LOS		B			C			D			D	

Intersection Summary

HCM 2000 Control Delay 23.3 HCM 2000 Level of Service C

HCM 2000 Volume to Capacity ratio 0.73

Actuated Cycle Length (s) 120.0 Sum of lost time (s) 16.8

Intersection Capacity Utilization 76.5% ICU Level of Service D

Analysis Period (min) 15

c Critical Lane Group

Queues
3: Bramalea Road & Mayfield Road

Future Total Conditions
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩	↩	↩	↩	↩	↩	↩↩
Traffic Volume (vph)	204	1117	204	68	770	21	44	121	52	31	154
Future Volume (vph)	204	1117	204	68	770	21	44	121	52	31	154
Lane Group Flow (vph)	204	1117	204	68	770	21	44	121	52	31	247
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases	5	2			6			4		3	8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	5	2	2	6	6	6	4	4	4	3	8
Switch Phase											
Minimum Initial (s)	5.0	12.0	12.0	12.0	12.0	12.0	8.0	8.0	8.0	5.0	8.0
Minimum Split (s)	8.0	55.2	55.2	55.2	55.2	55.2	54.1	54.1	54.1	8.0	54.1
Total Split (s)	13.0	70.0	70.0	57.0	57.0	57.0	56.0	56.0	56.0	9.0	65.0
Total Split (%)	9.6%	51.9%	51.9%	42.2%	42.2%	42.2%	41.5%	41.5%	41.5%	6.7%	48.1%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	0.0	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?											
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.35	0.32	0.17	0.26	0.27	0.03	0.38	0.62	0.23	0.17	0.44
Control Delay	6.5	6.7	1.2	17.2	12.4	0.0	64.2	71.0	5.8	44.6	33.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	6.7	1.2	17.2	12.4	0.0	64.2	71.0	5.8	44.6	33.0
Queue Length 50th (m)	8.0	21.3	0.0	4.8	19.8	0.0	6.6	18.6	0.0	4.0	11.2
Queue Length 95th (m)	14.6	29.6	4.4	12.4	29.1	0.0	13.4	29.4	2.8	8.8	17.9
Internal Link Dist (m)		752.4			329.1			492.7			373.4
Turn Bay Length (m)	125.0		110.0	75.0		100.0	75.0			75.0	
Base Capacity (vph)	577	3464	1204	260	2808	766	388	654	568	181	1470
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.32	0.17	0.26	0.27	0.03	0.11	0.19	0.09	0.17	0.17

Intersection Summary

Cycle Length: 135

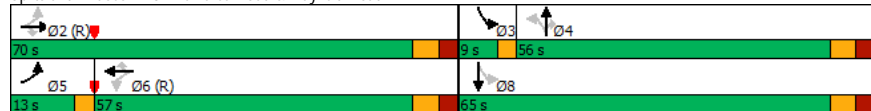
Actuated Cycle Length: 135

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Splits and Phases: 3: Bramalea Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis
3: Bramalea Road & Mayfield Road

Future Total Conditions
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩	↩	↩	↩	↩	↩	↩↩	↩
Traffic Volume (vph)	204	1117	204	68	770	21	44	121	52	31	154	93
Future Volume (vph)	204	1117	204	68	770	21	44	121	52	31	154	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	4641	1544	1593	4407	1157	1700	1807	1426	1580	3302	
Flt Permitted	0.33	1.00	1.00	0.24	1.00	1.00	0.60	1.00	1.00	0.50	1.00	
Satd. Flow (perm)	610	4641	1544	407	4407	1157	1071	1807	1426	834	3302	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Adj. Flow (vph)	204	1117	204	68	770	21	44	121	52	31	154	93
RTOR Reduction (vph)	0	0	53	0	0	8	0	0	46	0	78	0
Lane Group Flow (vph)	204	1117	151	68	770	13	44	121	6	31	169	0
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	1%	13%	2%	12%	19%	38%	5%	4%	12%	13%	2%	2%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	99.6	99.6	99.6	84.8	84.8	84.8	14.5	14.5	14.5	21.1	21.1	
Effective Green, g (s)	99.6	99.6	99.6	84.8	84.8	84.8	14.5	14.5	14.5	21.1	21.1	
Actuated g/C Ratio	0.74	0.74	0.74	0.63	0.63	0.63	0.11	0.11	0.11	0.16	0.16	
Clearance Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	551	3424	1139	255	2768	726	115	194	153	150	516	
v/s Ratio Prot	c0.03	0.24			0.17			c0.07		0.01	c0.05	
v/s Ratio Perm	c0.24		0.10	0.17		0.01	0.04		0.00	0.03		
v/c Ratio	0.37	0.33	0.13	0.27	0.28	0.02	0.38	0.62	0.04	0.21	0.33	
Uniform Delay, d1	5.4	6.1	5.1	11.2	11.3	9.4	56.1	57.6	54.0	49.1	50.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.3	0.2	2.5	0.3	0.0	2.1	6.1	0.1	0.7	0.4	
Delay (s)	6.3	6.4	5.4	13.8	11.6	9.5	58.2	63.8	54.1	49.8	51.0	
Level of Service	A	A	A	B	B	A	E	E	D	D	D	
Approach Delay (s)		6.2			11.7			60.3			50.9	
Approach LOS		A			B			E			D	

Intersection Summary

HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	20.3
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Queues

4: Russell Creek Drive/South Access & Mayfield Road

Future Total Conditions

AM Peak Hour

	EBL	EBT	WBT	SBL	SBT	Ø8
Lane Configurations	↔	↔↔↔	↔↔		↔	
Traffic Volume (vph)	98	1457	881	2	0	
Future Volume (vph)	98	1457	881	2	0	
Lane Group Flow (vph)	98	1457	907	0	37	
Turn Type	Perm	NA	NA	Perm	NA	
Protected Phases		2	6		4	8
Permitted Phases	2			4		
Detector Phase	2	2	6	4	4	
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	8.0	8.0	8.0
Minimum Split (s)	47.9	47.9	44.9	47.9	47.9	47.9
Total Split (s)	72.0	72.0	72.0	48.0	48.0	48.0
Total Split (%)	60.0%	60.0%	60.0%	40.0%	40.0%	40%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.9	6.9	6.9		6.9	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	None	None	None
v/c Ratio	0.19	0.31	0.28		0.25	
Control Delay	0.8	0.2	2.3		21.8	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	0.8	0.2	2.3		21.8	
Queue Length 50th (m)	0.1	0.4	12.5		0.3	
Queue Length 95th (m)	0.2	0.6	18.1		6.4	
Internal Link Dist (m)		571.8	752.4		168.0	
Turn Bay Length (m)	100.0					
Base Capacity (vph)	522	4643	3219		573	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.19	0.31	0.28		0.06	

Intersection Summary

Cycle Length: 120

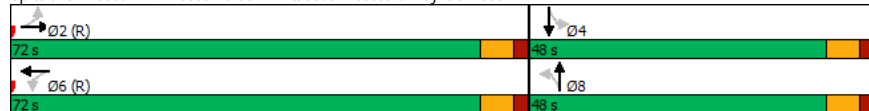
Actuated Cycle Length: 120

Offset: 83 (69%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Splits and Phases: 4: Russell Creek Drive/South Access & Mayfield Road



HCM Signalized Intersection Capacity Analysis

4: Russell Creek Drive/South Access & Mayfield Road

Future Total Conditions

AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔		↔	↔↔			↔			↔	↔
Traffic Volume (vph)	98	1457	0	0	881	26	0	0	0	2	0	35
Future Volume (vph)	98	1457	0	0	881	26	0	0	0	2	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.9	6.9			6.9						6.9	
Lane Util. Factor	1.00	0.91			0.95						1.00	
Frt	1.00	1.00			1.00						0.87	
Flt Protected	0.95	1.00			1.00						1.00	
Satd. Flow (prot)	1785	5245			3634						1635	
Flt Permitted	0.31	1.00			1.00						0.98	
Satd. Flow (perm)	590	5245			3634						1606	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	98	1457	0	0	881	26	0	0	0	2	0	35
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	33	0
Lane Group Flow (vph)	98	1457	0	0	906	0	0	0	0	0	4	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	100.7	100.7			100.7						5.5	
Effective Green, g (s)	100.7	100.7			100.7						5.5	
Actuated g/C Ratio	0.84	0.84			0.84						0.05	
Clearance Time (s)	6.9	6.9			6.9						6.9	
Vehicle Extension (s)	5.0	5.0			5.0						5.0	
Lane Grp Cap (vph)	495	4401			3049						73	
v/s Ratio Prot		c0.28			0.25							
v/s Ratio Perm	0.17										c0.00	
v/c Ratio	0.20	0.33			0.30						0.05	
Uniform Delay, d1	1.9	2.1			2.1						54.7	
Progression Factor	0.03	0.03			1.00						1.00	
Incremental Delay, d2	0.8	0.2			0.2						0.6	
Delay (s)	0.9	0.2			2.3						55.3	
Level of Service	A	A			A						E	
Approach Delay (s)		0.3			2.3			0.0			55.3	
Approach LOS		A			A			A			E	

Intersection Summary

HCM 2000 Control Delay	1.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis 5: Dixie Road & West Access 1

Future Total Conditions
AM Peak Hour

	←	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖		↑		↘	↓
Traffic Volume (veh/h)	6	2	626	0	13	611
Future Volume (Veh/h)	6	2	626	0	13	611
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	6	2	626	0	13	611
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			373			
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	1263	626			626	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1223	477			477	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	96	100			99	
cM capacity (veh/h)	169	506			936	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	8	626	624			
Volume Left	6	0	13			
Volume Right	2	0	0			
cSH	202	1700	936			
Volume to Capacity	0.04	0.37	0.01			
Queue Length 95th (m)	0.6	0.0	0.2			
Control Delay (s)	23.5	0.0	0.4			
Lane LOS	C		A			
Approach Delay (s)	23.5	0.0	0.4			
Approach LOS	C					
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			52.6%	ICU Level of Service	A	
Analysis Period (min)			15			













HCM Unsignalized Intersection Capacity Analysis 6: Dixie Road & West Access 2

Future Total Conditions
AM Peak Hour

	←	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑			↓
Traffic Volume (veh/h)	0	1	625	26	0	617
Future Volume (Veh/h)	0	1	625	26	0	617
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1	625	26	0	617
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			239			
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	1255	638			651	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1207	468			483	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	171	501			910	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	1	651	617			
Volume Left	0	0	0			
Volume Right	1	26	0			
cSH	501	1700	1700			
Volume to Capacity	0.00	0.38	0.36			
Queue Length 95th (m)	0.0	0.0	0.0			
Control Delay (s)	12.2	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	12.2	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization			44.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
7: Dixie Road & West Access 4

Future Total Conditions
AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	9	3	684	28	16	552
Future Volume (Veh/h)	9	3	684	28	16	552
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	9	3	684	28	16	552
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			256		241	
pX, platoon unblocked	0.79	0.74			0.74	
vC, conflicting volume	1282	698			712	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	934	416			435	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	96	99			98	
cM capacity (veh/h)	231	474			840	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	12	712	568			
Volume Left	9	0	16			
Volume Right	3	28	0			
cSH	265	1700	840			
Volume to Capacity	0.05	0.42	0.02			
Queue Length 95th (m)	0.6	0.0	0.3			
Control Delay (s)	19.2	0.0	0.5			
Lane LOS	C		A			
Approach Delay (s)	19.2	0.0	0.5			
Approach LOS	C					
Intersection Summary						
Average Delay		0.4				
Intersection Capacity Utilization		51.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Queues
1: Dixie Road & Merchant Road/West Access 3

Future Total Conditions
PM Peak Hour

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	4	0	22	0	11	690	10	885	3
Future Volume (vph)	4	0	22	0	11	690	10	885	3
Lane Group Flow (vph)	0	38	0	328	11	786	40	885	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm
Protected Phases		4		8		2		6	
Permitted Phases	4		8		2		6		6
Detector Phase	4	4	8	8	2	2	6	6	6
Switch Phase									
Minimum Initial (s)	8.0	8.0	8.0	8.0	12.0	12.0	12.0	12.0	12.0
Minimum Split (s)	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9	44.9
Total Split (s)	45.0	45.0	45.0	45.0	75.0	75.0	75.0	75.0	75.0
Total Split (%)	37.5%	37.5%	37.5%	37.5%	62.5%	62.5%	62.5%	62.5%	62.5%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)		0.0		0.0		0.0		0.0	
Total Lost Time (s)		6.9		6.9		6.9		6.9	
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio	0.11			0.83	0.05	0.65	0.12	0.73	0.00
Control Delay	12.1			42.1	9.0	14.7	9.4	17.6	0.0
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.1			42.1	9.0	14.7	9.4	17.6	0.0
Queue Length 50th (m)	0.3			24.1	0.4	48.0	1.5	60.6	0.0
Queue Length 95th (m)	0.0			0.4	2.1	96.9	1.3	122.9	0.0
Internal Link Dist (m)	280.5			194.8		216.9		214.8	
Turn Bay Length (m)					60.0		60.0		60.0
Base Capacity (vph)	606			641	239	1208	329	1208	1051
Starvation Cap Reductn	0			0	0	0	0	0	0
Spillback Cap Reductn	0			0	0	0	0	0	0
Storage Cap Reductn	0			0	0	0	0	0	0
Reduced v/c Ratio	0.06			0.51	0.05	0.65	0.12	0.73	0.00
Intersection Summary									
Cycle Length: 120									
Actuated Cycle Length: 102.6									
Natural Cycle: 100									
Control Type: Semi Act-Uncoord									

Splits and Phases: 1: Dixie Road & Merchant Road/West Access 3

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HCM Signalized Intersection Capacity Analysis
1: Dixie Road & Merchant Road/West Access 3

Future Total Conditions
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	0	34	22	0	60	11	690	24	10	885	3
Future Volume (vph)	4	0	34	22	0	60	11	690	24	10	885	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		6.9			6.9		6.9	6.9		6.9	6.9	6.9
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frbp, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt		0.88			0.90		1.00	0.98		1.00	1.00	0.85
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1643			1671		1637	1807		1785	1812	1561
Flt Permitted		0.95			0.90		0.21	1.00		0.26	1.00	1.00
Satd. Flow (perm)		1568			1517		358	1807		494	1812	1561
Peak-hour factor, PHF	1.00	0.25	1.00	0.25	0.25	1.00	1.00	0.25	1.00	0.25	1.00	1.00
Adj. Flow (vph)	4	0	34	88	0	240	11	690	96	40	885	3
RTOR Reduction (vph)	0	28	0	0	96	0	0	3	0	0	0	1
Lane Group Flow (vph)	0	10	0	0	232	0	11	783	0	40	885	2
Confl. Peds. (#/hr)							2					2
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	9%	5%	0%	0%	6%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		20.3			20.3		68.4	68.4		68.4	68.4	68.4
Effective Green, g (s)		20.3			20.3		68.4	68.4		68.4	68.4	68.4
Actuated g/C Ratio		0.20			0.20		0.67	0.67		0.67	0.67	0.67
Clearance Time (s)		6.9			6.9		6.9	6.9		6.9	6.9	6.9
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		310			300		238	1205		329	1209	1041
v/s Ratio Prot								0.43			c0.49	
v/s Ratio Perm		0.01			c0.15		0.03			0.08		0.00
v/c Ratio		0.03			0.77		0.05	0.65		0.12	0.73	0.00
Uniform Delay, d1		33.2			38.9		5.9	10.0		6.2	11.1	5.7
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.0			11.7		0.4	2.7		0.8	3.9	0.0
Delay (s)		33.2			50.6		6.2	12.7		6.9	15.0	5.7
Level of Service		C			D		A	B		A	B	A
Approach Delay (s)		33.2			50.6			12.6			14.6	
Approach LOS		C			D			B			B	
Intersection Summary												
HCM 2000 Control Delay		19.9										B
HCM 2000 Volume to Capacity ratio		0.74										
Actuated Cycle Length (s)		102.5						Sum of lost time (s)		13.8		
Intersection Capacity Utilization		67.9%						ICU Level of Service		C		
Analysis Period (min)		15										
c Critical Lane Group												

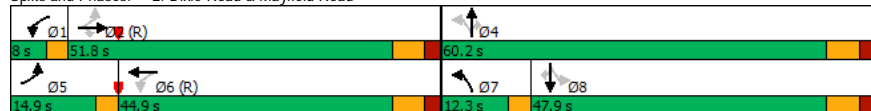
Queues
2: Dixie Road & Mayfield Road

Future Total Conditions
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	410	1008	186	68	1175	289	255	38	67	362	510
Future Volume (vph)	410	1008	186	68	1175	289	255	38	67	362	510
Lane Group Flow (vph)	410	1008	186	68	1201	289	255	38	67	362	510
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6	7	4			8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	7	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	8.0	47.9	47.9	47.9	47.9	47.9
Total Split (s)	14.9	51.8	51.8	8.0	44.9	12.3	60.2	47.9	47.9	47.9	47.9
Total Split (%)	12.4%	43.2%	43.2%	6.7%	37.4%	10.3%	50.2%	39.9%	39.9%	39.9%	39.9%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	3.0	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	Lag	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	1.25	0.49	0.24	0.32	0.78	0.91	0.34	0.06	0.22	0.69	0.86
Control Delay	166.6	27.5	4.3	31.7	52.6	58.5	26.0	0.2	32.2	44.4	38.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	166.6	27.5	4.3	31.7	52.6	58.5	26.0	0.2	32.2	44.4	38.8
Queue Length 50th (m)	-66.5	40.4	0.0	5.5	59.0	26.4	23.9	0.0	6.9	43.6	41.8
Queue Length 95th (m)	#111.9	48.7	8.5	14.4	74.4	#45.4	33.5	0.0	13.2	59.4	65.6
Internal Link Dist (m)		1129.7			571.8		456.4			231.7	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	328	2040	776	215	1548	318	853	738	357	625	664
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.25	0.49	0.24	0.32	0.78	0.91	0.30	0.05	0.19	0.58	0.77

Intersection Summary											
Cycle Length: 120											
Actuated Cycle Length: 120											
Offset: 32 (27%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green											
Natural Cycle: 130											
Control Type: Actuated-Coordinated											
~ Volume exceeds capacity, queue is theoretically infinite.											
Queue shown is maximum after two cycles.											
# 95th percentile volume exceeds capacity, queue may be longer.											
Queue shown is maximum after two cycles.											

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis
2: Dixie Road & Mayfield Road

Future Total Conditions
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔	↔	↔	↔↔↔		↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	410	1008	186	68	1175	26	289	255	38	67	362	510
Future Volume (vph)	410	1008	186	68	1175	26	289	255	38	67	362	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9		3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1700	4768	1566	1342	4883		1750	1921	1551	1653	1830	1551
Flt Permitted	0.10	1.00	1.00	0.27	1.00		0.29	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	178	4768	1566	384	4883		532	1921	1551	1046	1830	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	410	1008	186	68	1175	26	289	255	38	67	362	510
RTOR Reduction (vph)	0	0	107	0	2	0	0	0	23	0	0	145
Lane Group Flow (vph)	410	1008	79	68	1199	0	289	255	15	67	362	365
Heavy Vehicles (%)	5%	10%	2%	33%	7%	10%	2%	0%	3%	8%	5%	3%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4		8		8
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	59.4	50.7	50.7	43.7	38.0		46.8	46.8	46.8	34.5	34.5	34.5
Effective Green, g (s)	59.4	50.7	50.7	43.7	38.0		46.8	46.8	46.8	34.5	34.5	34.5
Actuated g/C Ratio	0.49	0.42	0.42	0.36	0.32		0.39	0.39	0.39	0.29	0.29	0.29
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	321	2014	661	185	1546		301	749	604	300	526	445
v/s Ratio Prot	c0.20	0.21		0.02	0.25		c0.07	0.13			0.20	
v/s Ratio Perm	c0.43		0.05	0.12			c0.30		0.01	0.06		0.24
v/c Ratio	1.28	0.50	0.12	0.37	0.78		0.96	0.34	0.02	0.22	0.69	0.82
Uniform Delay, d1	35.8	25.4	21.1	25.6	37.1		34.5	25.7	22.5	32.5	38.0	39.8
Progression Factor	1.00	1.00	1.00	1.56	1.31		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	146.7	0.9	0.4	2.4	3.6		41.6	0.6	0.0	0.8	4.8	12.6
Delay (s)	182.5	26.3	21.4	42.3	52.4		76.2	26.3	22.6	33.3	42.8	52.4
Level of Service	F	C	C	D	D		E	C	C	C	D	D
Approach Delay (s)		65.6			51.8			50.8			47.3	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	55.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Queues
3: Bramalea Road & Mayfield Road

Future Total Conditions
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩	↩	↩	↩	↩	↩	↩↩
Traffic Volume (vph)	111	975	116	113	940	22	231	179	57	26	107
Future Volume (vph)	111	975	116	113	940	22	231	179	57	26	107
Lane Group Flow (vph)	111	975	116	113	940	22	231	179	57	26	202
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases	5	2			6			4		3	8
Permitted Phases	2		2	6		6	4		4	8	
Detector Phase	5	2	2	6	6	6	4	4	4	3	8
Switch Phase											
Minimum Initial (s)	5.0	12.0	12.0	12.0	12.0	12.0	8.0	8.0	8.0	5.0	8.0
Minimum Split (s)	8.0	55.2	55.2	55.2	55.2	55.2	54.1	54.1	54.1	8.0	54.1
Total Split (s)	12.0	70.0	70.0	58.0	58.0	58.0	56.0	56.0	56.0	9.0	65.0
Total Split (%)	8.9%	51.9%	51.9%	43.0%	43.0%	43.0%	41.5%	41.5%	41.5%	6.7%	48.1%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0
All-Red Time (s)	0.0	3.2	3.2	3.2	3.2	3.2	3.1	3.1	3.1	0.0	3.1
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag	Lag	Lead	
Lead-Lag Optimize?							Yes	Yes	Yes		
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	C-Max	None	None	None	None	None
v/c Ratio	0.28	0.35	0.12	0.43	0.38	0.03	0.82	0.39	0.13	0.08	0.21
Control Delay	13.7	15.1	3.1	33.0	23.1	0.1	70.0	43.7	3.3	27.3	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.7	15.1	3.1	33.0	23.1	0.1	70.0	43.7	3.3	27.3	17.1
Queue Length 50th (m)	6.8	28.4	0.0	11.6	34.2	0.0	34.7	23.8	0.0	2.8	6.3
Queue Length 95th (m)	14.5	41.9	5.7	27.8	49.8	0.0	47.3	32.4	2.9	5.7	10.3
Internal Link Dist (m)		752.4			329.1			492.7			373.4
Turn Bay Length (m)	125.0		110.0	75.0		100.0	75.0			75.0	
Base Capacity (vph)	397	2791	994	262	2453	754	421	680	620	336	1449
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.35	0.12	0.43	0.38	0.03	0.55	0.26	0.09	0.08	0.14

Intersection Summary

Cycle Length: 135

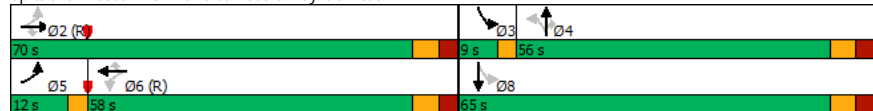
Actuated Cycle Length: 135

Offset: 16 (12%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 130

Control Type: Actuated-Coordinated

Splits and Phases: 3: Bramalea Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis
3: Bramalea Road & Mayfield Road

Future Total Conditions
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩	↩	↩	↩	↩	↩	↩↩	↩
Traffic Volume (vph)	111	975	116	113	940	22	231	179	57	26	107	95
Future Volume (vph)	111	975	116	113	940	22	231	179	57	26	107	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	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	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1767	4561	1551	1733	4812	1401	1767	1879	1568	1781	3255	
Flt Permitted	0.24	1.00	1.00	0.28	1.00	1.00	0.62	1.00	1.00	0.51	1.00	
Satd. Flow (perm)	453	4561	1551	514	4812	1401	1163	1879	1568	965	3255	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	111	975	116	113	940	22	231	179	57	26	107	95
RTOR Reduction (vph)	0	0	46	0	0	11	0	0	43	0	67	0
Lane Group Flow (vph)	111	975	70	113	940	11	231	179	14	26	135	0
Confl. Peds. (#/hr)							7	7				
Heavy Vehicles (%)	1%	15%	3%	3%	9%	14%	1%	0%	0%	0%	1%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2		2	6		6	4		4	8		
Actuated Green, G (s)	81.4	81.4	81.4	67.6	67.6	67.6	32.7	32.7	32.7	39.3	39.3	
Effective Green, g (s)	81.4	81.4	81.4	67.6	67.6	67.6	32.7	32.7	32.7	39.3	39.3	
Actuated g/C Ratio	0.60	0.60	0.60	0.50	0.50	0.50	0.24	0.24	0.24	0.29	0.29	
Clearance Time (s)	3.0	7.2	7.2	7.2	7.2	7.2	7.1	7.1	7.1	3.0	7.1	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	378	2750	935	257	2409	701	281	455	379	302	947	
v/s Ratio Prot	0.02	c0.21			0.20			0.10		0.00	c0.04	
v/s Ratio Perm	0.15		0.05	c0.22		0.01	c0.20		0.01	0.02		
v/c Ratio	0.29	0.35	0.07	0.44	0.39	0.02	0.82	0.39	0.04	0.09	0.14	
Uniform Delay, d1	12.0	13.5	11.1	21.6	20.9	17.0	48.4	42.8	39.1	34.6	35.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.4	0.2	5.4	0.5	0.0	17.3	0.6	0.0	0.1	0.1	
Delay (s)	12.9	13.9	11.3	27.0	21.4	17.0	65.7	43.4	39.1	34.7	35.5	
Level of Service	B	B	B	C	C	B	E	D	D	C	D	
Approach Delay (s)		13.6			21.9		53.9				35.4	
Approach LOS		B			C		D				D	

Intersection Summary

HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	20.3
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues

4: Russell Creek Drive/South Access & Mayfield Road

Future Total Conditions

PM Peak Hour

	EBL	EBT	WBT	SBL	SBT	Ø8
Lane Configurations	↔	↔↔↔	↔↔		↔	
Traffic Volume (vph)	43	1070	1263	27	0	
Future Volume (vph)	43	1070	1263	27	0	
Lane Group Flow (vph)	43	1070	1266	0	131	
Turn Type	Perm	NA	NA	Perm	NA	
Protected Phases		2	6		4	8
Permitted Phases	2			4		
Detector Phase	2	2	6	4	4	
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	8.0	8.0	8.0
Minimum Split (s)	44.9	44.9	44.9	47.9	47.9	47.9
Total Split (s)	71.0	71.0	71.0	49.0	49.0	49.0
Total Split (%)	59.2%	59.2%	59.2%	40.8%	40.8%	41%
Yellow Time (s)	4.6	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	2.3	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	
Total Lost Time (s)	6.9	6.9	6.9		6.9	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	C-Max	None	None	None
v/c Ratio	0.15	0.27	0.45		0.59	
Control Delay	1.4	0.9	5.9		43.0	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	1.4	0.9	5.9		43.0	
Queue Length 50th (m)	0.1	1.0	27.7		11.4	
Queue Length 95th (m)	m0.3	1.4	43.0		22.2	
Internal Link Dist (m)		571.8	752.4		168.0	
Turn Bay Length (m)	100.0					
Base Capacity (vph)	284	4030	2804		575	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.15	0.27	0.45		0.23	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 95

Control Type: Actuated-Coordinated

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

Splits and Phases: 4: Russell Creek Drive/South Access & Mayfield Road

↔ Ø2 (R)	↔ Ø4
71 s	49 s
↔ Ø6 (R)	↔ Ø8
71 s	49 s

03-10-2021

Synchro 11 Report
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HCM Signalized Intersection Capacity Analysis

4: Russell Creek Drive/South Access & Mayfield Road

Future Total Conditions

PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔↔↔		↔	↔↔			↔			↔	
Traffic Volume (vph)	43	1070	0	0	1263	3	0	0	0	27	0	104
Future Volume (vph)	43	1070	0	0	1263	3	0	0	0	27	0	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Total Lost time (s)	6.9	6.9			6.9							6.9
Lane Util. Factor	1.00	0.91			0.95							1.00
Frt	1.00	1.00			1.00							0.89
Flt Protected	0.95	1.00			1.00							0.99
Satd. Flow (prot)	1785	5245			3649							1660
Flt Permitted	0.20	1.00			1.00							0.93
Satd. Flow (perm)	370	5245			3649							1557
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	1070	0	0	1263	3	0	0	0	27	0	104
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	43	1070	0	0	1266	0	0	0	0	0	91	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA					Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	92.2	92.2			92.2						14.0	
Effective Green, g (s)	92.2	92.2			92.2						14.0	
Actuated g/C Ratio	0.77	0.77			0.77						0.12	
Clearance Time (s)	6.9	6.9			6.9						6.9	
Vehicle Extension (s)	5.0	5.0			5.0						5.0	
Lane Grp Cap (vph)	284	4029			2803						181	
v/s Ratio Prot		0.20			c0.35							
v/s Ratio Perm	0.12										c0.06	
v/c Ratio	0.15	0.27			0.45						0.50	
Uniform Delay, d1	3.6	4.0			4.9						49.7	
Progression Factor	0.07	0.18			1.00						1.00	
Incremental Delay, d2	1.0	0.1			0.5						4.6	
Delay (s)	1.3	0.9			5.5						54.3	
Level of Service	A	A			A						D	
Approach Delay (s)		0.9			5.5			0.0			54.3	
Approach LOS		A			A			A			D	

Intersection Summary

HCM 2000 Control Delay	6.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.8
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

03-10-2021

Synchro 11 Report
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HCM Unsignalized Intersection Capacity Analysis
5: Dixie Road & West Access 1

Future Total Conditions
PM Peak Hour

	←	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖		↑		↘	↗
Traffic Volume (veh/h)	24	10	742	0	3	874
Future Volume (Veh/h)	24	10	742	0	3	874
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	24	10	742	0	3	874
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			373			
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	1622	742			742	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1645	600			600	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	74	98			100	
cM capacity (veh/h)	93	425			831	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	34	742	877			
Volume Left	24	0	3			
Volume Right	10	0	0			
cSH	121	1700	831			
Volume to Capacity	0.28	0.44	0.00			
Queue Length 95th (m)	4.8	0.0	0.0			
Control Delay (s)	46.2	0.0	0.1			
Lane LOS	E		A			
Approach Delay (s)	46.2	0.0	0.1			
Approach LOS	E					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization		58.4%		ICU Level of Service	B	
Analysis Period (min)		15				













HCM Unsignalized Intersection Capacity Analysis
6: Dixie Road & West Access 2

Future Total Conditions
PM Peak Hour

	←	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↖	↑			↗
Traffic Volume (veh/h)	0	4	738	16	0	898
Future Volume (Veh/h)	0	4	738	16	0	898
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	4	738	16	0	898
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			239			
pX, platoon unblocked	0.80	0.80			0.80	
vC, conflicting volume	1644	746			754	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1680	556			566	
IC, single (s)	6.4	6.2			4.1	
IC, 2 stage (s)						
IF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	84	427			811	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	4	754	898			
Volume Left	0	0	0			
Volume Right	4	16	0			
cSH	427	1700	1700			
Volume to Capacity	0.01	0.44	0.53			
Queue Length 95th (m)	0.1	0.0	0.0			
Control Delay (s)	13.5	0.0	0.0			
Lane LOS	B					
Approach Delay (s)	13.5	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			0.0			
Intersection Capacity Utilization		50.6%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis
7: Dixie Road & West Access 4



















Future Total Conditions
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	30	17	682	9	3	909
Future Volume (Veh/h)	30	17	682	9	3	909
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	17	682	9	3	909
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			256			241
pX, platoon unblocked	0.79	0.73			0.73	
vC, conflicting volume	1602	686			691	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	872	393			399	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	96			100	
cM capacity (veh/h)	254	485			860	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	47	691	912			
Volume Left	30	0	3			
Volume Right	17	9	0			
cSH	307	1700	860			
Volume to Capacity	0.15	0.41	0.00			
Queue Length 95th (m)	2.4	0.0	0.0			
Control Delay (s)	18.8	0.0	0.1			
Lane LOS	C		A			
Approach Delay (s)	18.8	0.0	0.1			
Approach LOS	C					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization		60.2%		ICU Level of Service	B	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
1: Dixie Road & Merchant Road/West Access 3

Future Total Conditions (Unsignalized West Access #3)




















AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	0	17	17	0	10	49	641	18	56	558	2
Future Volume (Veh/h)	1	0	17	17	0	10	49	641	18	56	558	2
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	0.25	1.00	0.25	0.25	0.25	1.00	1.00	0.25	0.25	1.00	1.00
Hourly flow rate (vph)	1	0	17	68	0	40	49	641	72	224	558	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	1785	1817	558	1798	1783	677	560			713		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1785	1817	558	1798	1783	677	560			713		
IC, single (s)	8.1	6.5	6.4	7.1	6.5	6.2	4.2			4.1		
IC, 2 stage (s)												
IF (s)	4.4	4.0	3.5	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	96	100	97	0	100	91	95			75		
cM capacity (veh/h)	26	56	489	47	59	456	972			896		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3					
Volume Total	18	108	49	713	224	558	2					
Volume Left	1	68	49	0	224	0	0					
Volume Right	17	40	0	72	0	0	2					
cSH	245	71	972	1700	896	1700	1700					
Volume to Capacity	0.07	1.53	0.05	0.42	0.25	0.33	0.00					
Queue Length 95th (m)	1.1	41.0	0.7	0.0	4.4	0.0	0.0					
Control Delay (s)	20.9	397.8	8.9	0.0	10.4	0.0	0.0					
Lane LOS	C	F	A		B							
Approach Delay (s)	20.9	397.8	0.6		3.0							
Approach LOS	C	F										
Intersection Summary												
Average Delay	27.6											
Intersection Capacity Utilization	56.4%			ICU Level of Service				B				
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
1: Dixie Road & Merchant Road/West Access 3

Future Total Conditions (Unsignalized West Access #3)

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	34	22	0	60	11	690	24	10	885	3
Future Volume (Veh/h)	4	0	34	22	0	60	11	690	24	10	885	3
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	0.25	1.00	0.25	0.25	0.25	1.00	1.00	0.25	0.25	1.00	1.00
Hourly flow rate (vph)	4	0	34	88	0	240	11	690	96	40	885	3
Pedestrians	2											
Lane Width (m)	3.5											
Walking Speed (m/s)	1.2											
Percent Blockage	0											
Right turn flare (veh)												
Median type	None								None			
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1919	1775	887	1759	1730	738	890				786	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1919	1775	887	1759	1730	738	890				786	
IC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.2				4.1	
IC, 2 stage (s)												
IF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.3				2.2	
p0 queue free %	81	100	90	0	100	43	98				95	
cM capacity (veh/h)	21	78	345	57	84	421	732				842	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3					
Volume Total	38	328	11	786	40	885	3					
Volume Left	4	88	11	0	40	0	0					
Volume Right	34	240	0	96	0	0	3					
cSH	132	156	732	1700	842	1700	1700					
Volume to Capacity	0.29	2.10	0.02	0.46	0.05	0.52	0.00					
Queue Length 95th (m)	5.0	117.9	0.2	0.0	0.7	0.0	0.0					
Control Delay (s)	43.0	565.4	10.0	0.0	9.5	0.0	0.0					
Lane LOS	E	F	A		A							
Approach Delay (s)	43.0	565.4	0.1		0.4							
Approach LOS	E	F										
Intersection Summary												
Average Delay	89.7											
Intersection Capacity Utilization	63.0%			ICU Level of Service				B				
Analysis Period (min)	15											



APPENDIX G

Intersection Capacity Analysis Results –
Future Total Conditions (Optimized)

Queues
2: Dixie Road & Mayfield Road

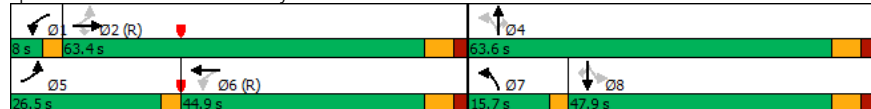
Future Total (Optimized)
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩	↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	410	1008	186	68	1175	289	255	38	67	362	510
Future Volume (vph)	410	1008	186	68	1175	289	255	38	67	362	510
Lane Group Flow (vph)	410	1008	186	68	1201	289	255	38	67	362	510
Turn Type	pm+pt	NA	Perm	pm+pt	NA	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6	7	4			8	
Permitted Phases	2		2	6		4		4	8		8
Detector Phase	5	2	2	1	6	7	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0	5.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	8.0	44.9	44.9	8.0	44.9	8.0	47.9	47.9	47.9	47.9	47.9
Total Split (s)	26.5	63.4	63.4	8.0	44.9	15.7	63.6	63.6	47.9	47.9	47.9
Total Split (%)	19.6%	47.0%	47.0%	5.9%	33.3%	11.6%	47.1%	47.1%	35.5%	35.5%	35.5%
Yellow Time (s)	3.0	4.6	4.6	3.0	4.6	3.0	4.6	4.6	4.6	4.6	4.6
All-Red Time (s)	0.0	2.3	2.3	0.0	2.3	0.0	2.3	2.3	2.3	2.3	2.3
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	6.9	6.9	3.0	6.9	3.0	6.9	6.9	6.9	6.9	6.9
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lead		Lag	Lag	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	
Recall Mode	None	C-Max	C-Max	None	C-Max	None	None	None	None	None	None
v/c Ratio	0.97	0.46	0.23	0.35	0.87	0.94	0.35	0.06	0.24	0.75	0.78
Control Delay	75.4	27.2	3.9	25.5	54.2	69.8	30.6	0.2	39.8	55.7	22.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.4	27.2	3.9	25.5	54.2	69.8	30.6	0.2	39.8	55.7	22.8
Queue Length 50th (m)	-55.8	42.4	0.0	5.0	66.2	31.5	28.2	0.0	8.3	52.1	25.3
Queue Length 95th (m)	#104.7	50.3	8.3	10.3	77.2	#55.8	39.0	0.1	15.3	70.0	49.7
Internal Link Dist (m)		1129.7			571.8		456.4			231.7	
Turn Bay Length (m)	140.0		75.0	105.0		75.0		45.0	35.0		135.0
Base Capacity (vph)	423	2184	818	192	1376	306	806	697	317	555	708
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.97	0.46	0.23	0.35	0.87	0.94	0.32	0.05	0.21	0.65	0.72

Intersection Summary

Cycle Length: 135
Actuated Cycle Length: 135
Offset: 32 (24%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Dixie Road & Mayfield Road



HCM Signalized Intersection Capacity Analysis
2: Dixie Road & Mayfield Road

Future Total (Optimized)
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↩	↩↩↩	↩	↩	↩↩↩		↩	↩	↩	↩	↩	↩
Traffic Volume (vph)	410	1008	186	68	1175	26	289	255	38	67	362	510
Future Volume (vph)	410	1008	186	68	1175	26	289	255	38	67	362	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	3.0	6.9	6.9	3.0	6.9		3.0	6.9	6.9	6.9	6.9	6.9
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1700	4768	1566	1342	4883		1750	1921	1551	1653	1830	1551
Flt Permitted	0.10	1.00	1.00	0.27	1.00		0.25	1.00	1.00	0.60	1.00	1.00
Satd. Flow (perm)	175	4768	1566	384	4883		453	1921	1551	1046	1830	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	410	1008	186	68	1175	26	289	255	38	67	362	510
RTOR Reduction (vph)	0	0	102	0	1	0	0	0	24	0	0	251
Lane Group Flow (vph)	410	1008	84	68	1200	0	289	255	14	67	362	259
Heavy Vehicles (%)	5%	10%	2%	33%	7%	10%	2%	0%	3%	8%	5%	3%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6		7	4		8		8
Permitted Phases	2		2	6			4		4	8		8
Actuated Green, G (s)	70.0	61.2	61.2	43.8	38.0		51.2	51.2	51.2	35.5	35.5	35.5
Effective Green, g (s)	70.0	61.2	61.2	43.8	38.0		51.2	51.2	51.2	35.5	35.5	35.5
Actuated g/C Ratio	0.52	0.45	0.45	0.32	0.28		0.38	0.38	0.38	0.26	0.26	0.26
Clearance Time (s)	3.0	6.9	6.9	3.0	6.9		3.0	6.9	6.9	6.9	6.9	6.9
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	418	2161	709	165	1374		293	728	588	275	481	407
v/s Ratio Prot	c0.21	0.21		0.02	0.25		c0.09	0.13			0.20	
v/s Ratio Perm	c0.30		0.05	0.12			c0.28		0.01	0.06		0.17
v/c Ratio	0.98	0.47	0.12	0.41	0.87		0.99	0.35	0.02	0.24	0.75	0.64
Uniform Delay, d1	41.6	25.6	21.3	32.4	46.2		38.1	30.0	26.3	39.2	45.7	44.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	39.1	0.7	0.3	3.5	7.9		48.7	0.6	0.0	1.0	7.8	4.5
Delay (s)	80.6	26.3	21.7	35.9	54.1		86.8	30.6	26.3	40.1	53.5	48.5
Level of Service	F	C	C	D	D		F	C	C	D	D	D
Approach Delay (s)		39.7			53.1			58.2			49.8	
Approach LOS		D			D			E			D	

Intersection Summary

HCM 2000 Control Delay 48.2 HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio 1.03
Actuated Cycle Length (s) 135.0 Sum of lost time (s) 19.8
Intersection Capacity Utilization 99.2% ICU Level of Service F
Analysis Period (min) 15

c Critical Lane Group



APPENDIX H

Signal Warrant Analysis Results

West Access 3

Table 21 - Justification 7 - Projected Volumes

Justification	Description	Minimum Requirement 1 Lane Highways		Minimum Requirement 2 or more lanes		Compliance		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire %
1. 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			
2. 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%.

** Note: For analysis using AHV, a 20% increase over the required volumes for an existing intersection.

Table 21 - Justification 7 - Projected Volumes (Expanded as per Table 22)

Justification	Description	Minimum Requirement 1 Lane Highways		Minimum Requirement 2 or more lanes		FT 2026 Volumes		Compliance	
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	amPHV	pmPHV	AHV ²	Entire %
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	576	864	720	1080	1369	1743	778	100%
	B. Vehicle volume, along minor streets (average hour)	144	204	144	204	45	120	41	29%
2. Delay to Cross Traffic	A. Vehicle volume, along major streets (average hour)	576	864	720	1080	1324	1623	737	100%
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	60	90	144	204	18	26	11	18%

²AHV = (amPHV+pmPHV)/4

Justification 7 (Projected Volumes)		Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular	A Total Volume (Average Hour)	100%		
	B Crossing Volume (Average Hour)	29%		X
2. Delay to Cross	A Main Road (Average Hour)	100%		
	B Crossing Road (Average Hour)	18%		X

South Access

Table 21 - Justification 7 - Projected Volumes

Justification	Description	Minimum Requirement 1 Lane Highways		Minimum Requirement 2 or more lanes		Compliance		
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	Sectional		Entire %
1. 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			
2. 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%.

** Note: For analysis using AHV, a 20% increase over the required volumes for an existing intersection.

Table 21 - Justification 7 - Projected Volumes (Expanded as per Table 22)

Justification	Description	Minimum Requirement 1 Lane Highways		Minimum Requirement 2 or more lanes		FT 2026 Volumes		Compliance	
		Free Flow	Restricted Flow	Free Flow	Restricted Flow	amPHV	pmPHV	AHV ²	Entire %
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	576	864	720	1080	2499	2510	1252	100%
	B. Vehicle volume, along minor streets (average hour)	144	204	144	204	37	132	42	29%
2. Delay to Cross Traffic	A. Vehicle volume, along major streets (average hour)	576	864	720	1080	2462	2379	1210	100%
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	60	90	144	204	2	27	7	12%

²AHV = (amPHV+pmPHV)/4

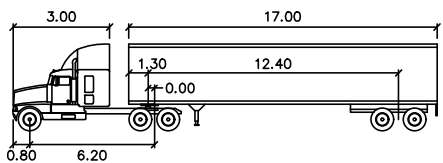
Justification 7 (Projected Volumes)			Compliance	Signal Justified?	
				YES	NO
1. Minimum Vehicular	A	Total Volume (Average Hour)	100%		
	B	Crossing Volume (Average Hour)	29%		X
2. Delay to Cross	A	Main Road (Average Hour)	100%		
	B	Crossing Road (Average Hour)	12%		X



APPENDIX I

Functional Review Drawings

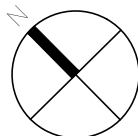
DRAWN BY: K.L. PLOT DATE: March 09, 2021



WB-20

	meters	
Tractor Width	: 2.60	Lock to Lock Time : 6.0
Trailer Width	: 2.60	Steering Angle : 28.2
Tractor Track	: 2.60	Articulating Angle : 70.0
Trailer Track	: 2.60	

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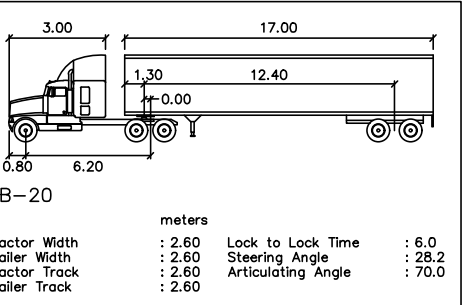
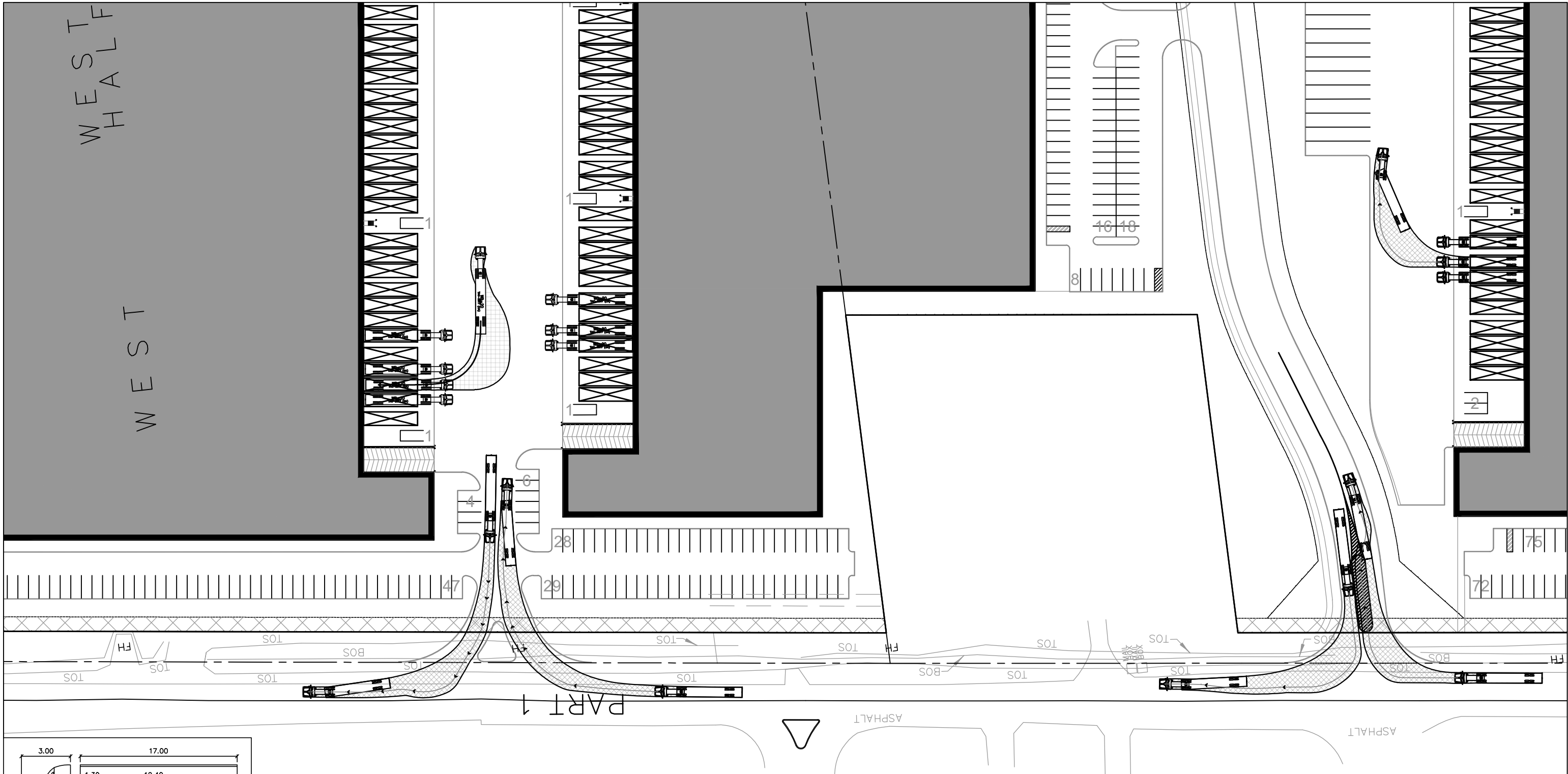


Project No.
21185
Date
MAR 11, 2021

12035 DIXIE ROAD
CALEDON ONTARIO
30 0 30 60 90m
1:3000

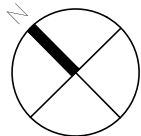
FUNCTIONAL REVIEW
WB-20 TRUCK PATHS

Drawing No.
001



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Date
MAR 11, 2021

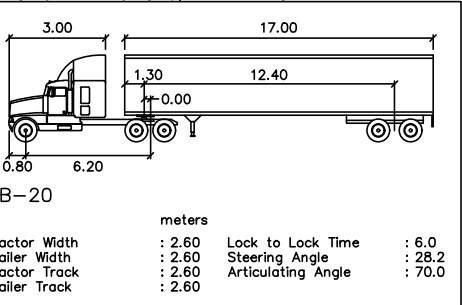
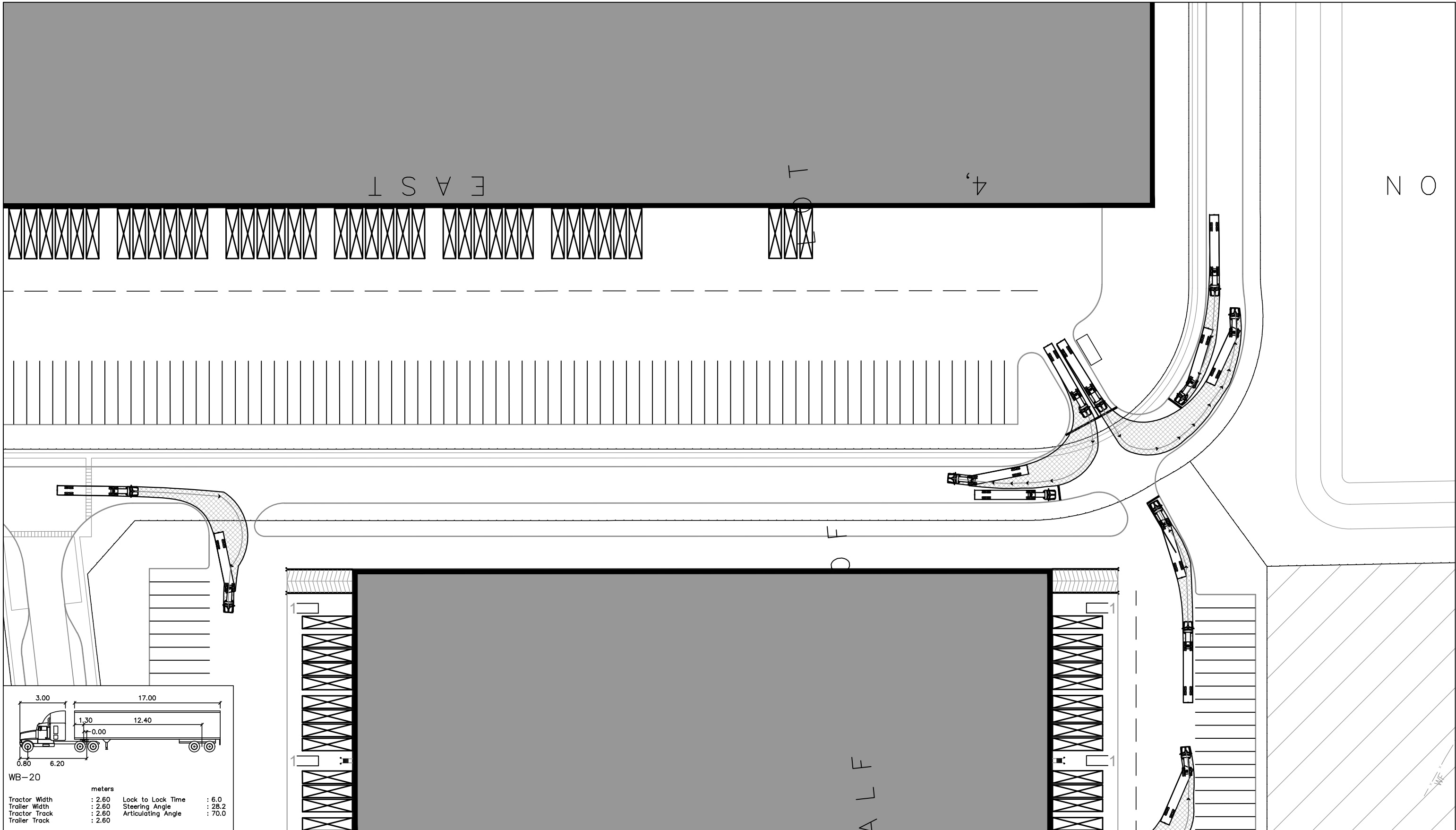
Y ANGLE
SSION 4
D STREET

12035 DIXIE ROAD
CALEDON ONTARIO

10 0 10 20 30m
1:1000

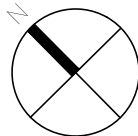
FUNCTIONAL REVIEW
DIXIE ROAD ACCESS DESIGN

Drawing No.
002



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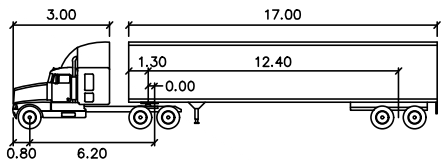
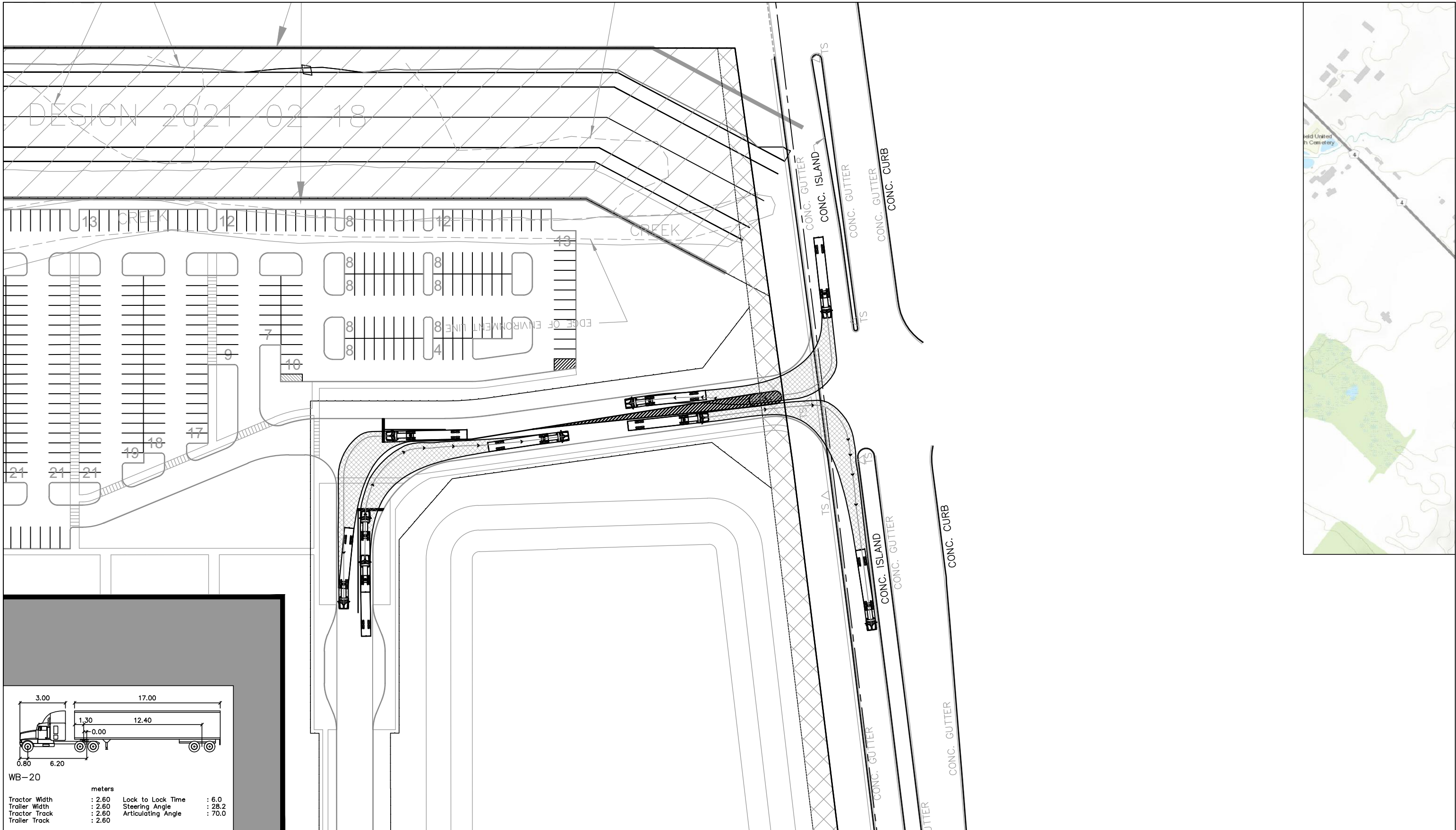
12035 DIXIE ROAD
CALEDON ONTARIO

10 0 10 20 30m
1:1000

FUNCTIONAL REVIEW
INTERNAL NETWORK

Drawing No.
003

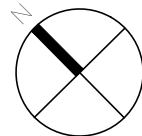
DRAWN BY: K.L. PLOT DATE: March 09, 2021



WB-20

meters			
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 28.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

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12035 DIXIE ROAD
CALEDON ONTARIO
10 0 10 20 30m
1:1000

FUNCTIONAL REVIEW
MAYFIELD ROAD ACCESS

Drawing No.
004

