407 Bayfield St
City of Barrie

Traffic Brief for
Tanbay Holding Inc.

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Legal Notification

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Executive Summary

This report summarizes the traffic brief prepared for the proposed drug store development located at 407 Bayfield Street in the City of Barrie [City], County of Simcoe [County]. The report assesses the impact of traffic related to the development on the adjacent roadway and provides recommendations to accommodate this traffic in a safe and efficient manner.

The proposed development includes the renovation of existing building to include an 836 m^2 (9,000ft^2) building to be used as a Rexall Drug Store.

The proposed development will maintain use of the existing full-movement signalized driveway onto Bayfield Street [Main Access].

The scope of this analysis includes a review of the following intersections:

- Bayfield Street / Mall Access & Heather Street.

Conclusions

1. The proposed development is expected to generate a total of 26 AM and 76 PM peak hour trips.
2. Background traffic and pedestrian counts were obtained at the intersection of Bayfield Street / Mall Access & Heather Street conducted on Tuesday December 11, 2018
3. A comparative review of the trip generation for the existing and proposed development uses was undertaken;
4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area street and intersection.
5. An intersection operation analysis was completed under total (2022) traffic volumes with the proposed development operational at the study area intersections. No improvements are recommended within the study area with respect to intersection operations.
6. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

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1 Introduction

1.1 Background

Tanbay Holding Inc. [The Developer] is proposing a drug store development located at 407 Bayfield Street in the City of Barrie.

The proposed development includes the renovation of existing building to include an 836 m^2 (9,000ft^2) building to be used as a Rexall Drug Store.

The proposed development will maintain use of the existing full-movement signalized driveway onto Bayfield Street [Main Access].

The Developer has retained **JD Northcote Engineering Inc.** [JD Engineering] to prepare this traffic brief in support of the proposed development.

1.2 Study Area

Figure 1 shows the location of the subject site and study area intersections in relation to the surrounding area. The Site Plan is provided in **Appendix A**.

The subject site is bound by the Mall Access to the north, parking areas to the east and west, and existing commercial lands to the south.

Through consultation with the City, the following intersections are included in the Traffic Brief:

- Bayfield Street / Mall Access & Heather Street.

Figure 1 – Proposed Site Location and Study Area

1.3 Study Scope and Objectives

The purpose of this study is to identify the potential impacts to traffic flow at the site access and on the surrounding roadway network. The study analysis includes the following tasks:

- Consult with the City to address any traffic-related issues or concerns they have with the proposed development;
- Determine existing traffic volumes and circulation patterns;
- Estimate future traffic volumes if the proposed development was not constructed, including the impact of additional proposed developments in the area;
- Estimate the amount of traffic that would be generated by the proposed development and assign to the roadway network;
- Undertake a comparative analysis of the trip generation of existing and proposed development uses;
- Complete LOS analysis of horizon year (with the proposed development) traffic conditions and identify additional operational deficiencies;

- Identify improvement options to address operational deficiencies;
- Complete a review of the queuing at the Main Access and comment on the impact on traffic generated by the Subject Site.
- Document findings and recommendations in a final report.

1.4 Horizon Year and Analysis Periods

Traffic scenarios for the build-out year (2022) was selected for analysis of traffic operations in the study area. The weekday morning [AM] and weekday afternoon [PM] peak hours have been selected as the analysis periods for this study.

2 Information Gathering

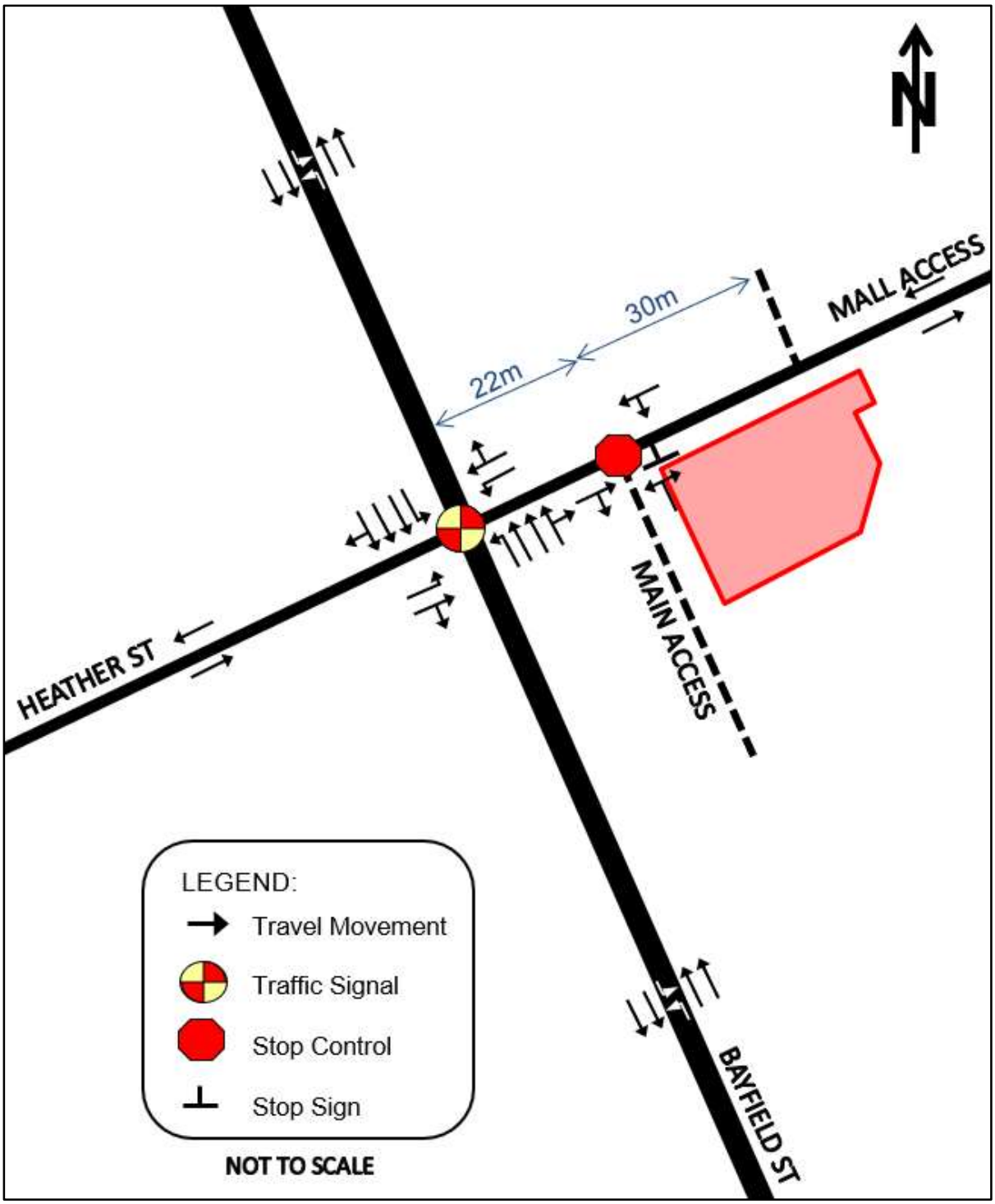
2.1 Street and Intersection Characteristics

Bayfield Street is a seven-lane arterial road with an urban cross-section and sidewalk on both sides of the road, within the study area. The posted speed limit on Bayfield Street is 50km/h within the study area. Bayfield Street is under the jurisdiction of the City.

Heather Street is a two-lane local road with an urban cross-section and a sidewalk on both sides of the road, within the study area. The unposted (assumed) speed limit on Heather Street is 50km/h within the study area. Heather Street is under the jurisdiction of the City.

The existing intersection spacing and lane configuration within the study area is illustrated in **Figure 2**.

Figure 2 – Existing (2021) Intersection Spacing and Lane Configuration with in Study Area



2.2 Local Transportation Infrastructure Improvements

Based on the City's Transportation Master Plan [TMP] (April 2019), there are no significant infrastructure improvements anticipated to be completed within the study area.

The existing 7-lane cross-section for Bayfield Street adjacent to the subject site will remain unchanged within the horizon years used in this analysis.

2.3 Transit Access

Barrie Transit currently provides three transit routes in the study area.

The No. 1A-1B (Georgian Mall / Welham) bus route provides service from Georgian Mall to the City's downtown core and south limits of the City. The No. 1A-1B bus route operates between 05:10 – 23:35 on weekdays with daytime service every 30 minutes, between 07:05 – 23:35 on Saturday with daytime service every 30 minutes and between 09:05 – 21:05 on Sunday with peak hour service every 30 minutes.

The No. 4A-4B (East Bayfield / South GO) bus route provides service from Georgian Mall to the City's downtown core and southeast limits of the City. The No. 4A-4B bus route operates between 05:45 – 22:15 on weekdays with daytime service every 30 minutes, between 07:00 – 22:30 on Saturday with daytime service every 30 minutes and between 08:30 – 21:30 on Sunday with daytime service every hour.

The No. 100 Red/Blue Express route provides service from Georgian Mall to the City's downtown core and northeast limits of the City. The No.100 bus route operates between 07:08 – 22:23 on weekdays with daytime service every 22 minutes. On Saturdays, the route operates between 07:53 – 21:38 and provides daytime service every 45 minutes. On Sunday the route operates between 09:23 – 21:38 and provides service every 45 minutes.

The closest bus stop for the No. 1A-1B and 4A-4B routes is located directly adjacent the subject site, at the southeast corner of the Bayfield Street / Mall Access & Heather Street intersection.

The closest bus stop for the No. 100 Red/Blue Express route is located at the Bayfield Street / Livingstone Street intersection.

2.4 Other Developments within the Study Area

Based on a review of the City's Active Developments Applications Map, there are no adjacent developments in the area that will impact the traffic generation within the study area.

Nevertheless, the impact for development growth within and external to the study area has been inherently considered by utilizing the City's EMME models for future traffic projections (which consider development traffic volumes throughout the City).

2.5 Background Traffic Growth

As mentioned, the impact of development growth has been considered by utilizing the City's EMME models for future traffic projections. **Table 1** summaries the average annual traffic growth on Bayfield Street in the study area based on the EMME data and the assumed/applied growth rates for analyses in this report.

Table 1 – Average Annual Traffic Growth Rate (EMME Data)

Road	Average Annual Traffic Growth Rate (EMME Data)	Average Annual Traffic Growth Rate Applied in Analysis Modeling
Bayfield Street	1.2%	2.0%

As indicated, and inflated growth rate of 2.0% has been utilized for Bayfield Street to ensure a conservative approach and account for the impact by the planned local development.

2.6 Traffic Counts

Detailed turning movement traffic and pedestrian counts were obtained at the intersection of Bayfield Street / Heather Street & Mall Access. **Table 2** summarizes the traffic count data.

Table 2 – Traffic Count Data

Intersection (N-S Street / E-W Street)	Count Date	AM Peak Hour	PM Peak Hour	Source
Bayfield Street / Heather Street & Mall Access	Tuesday December 11, 2018	08:00 – 09:00	13:315 – 16:15	City

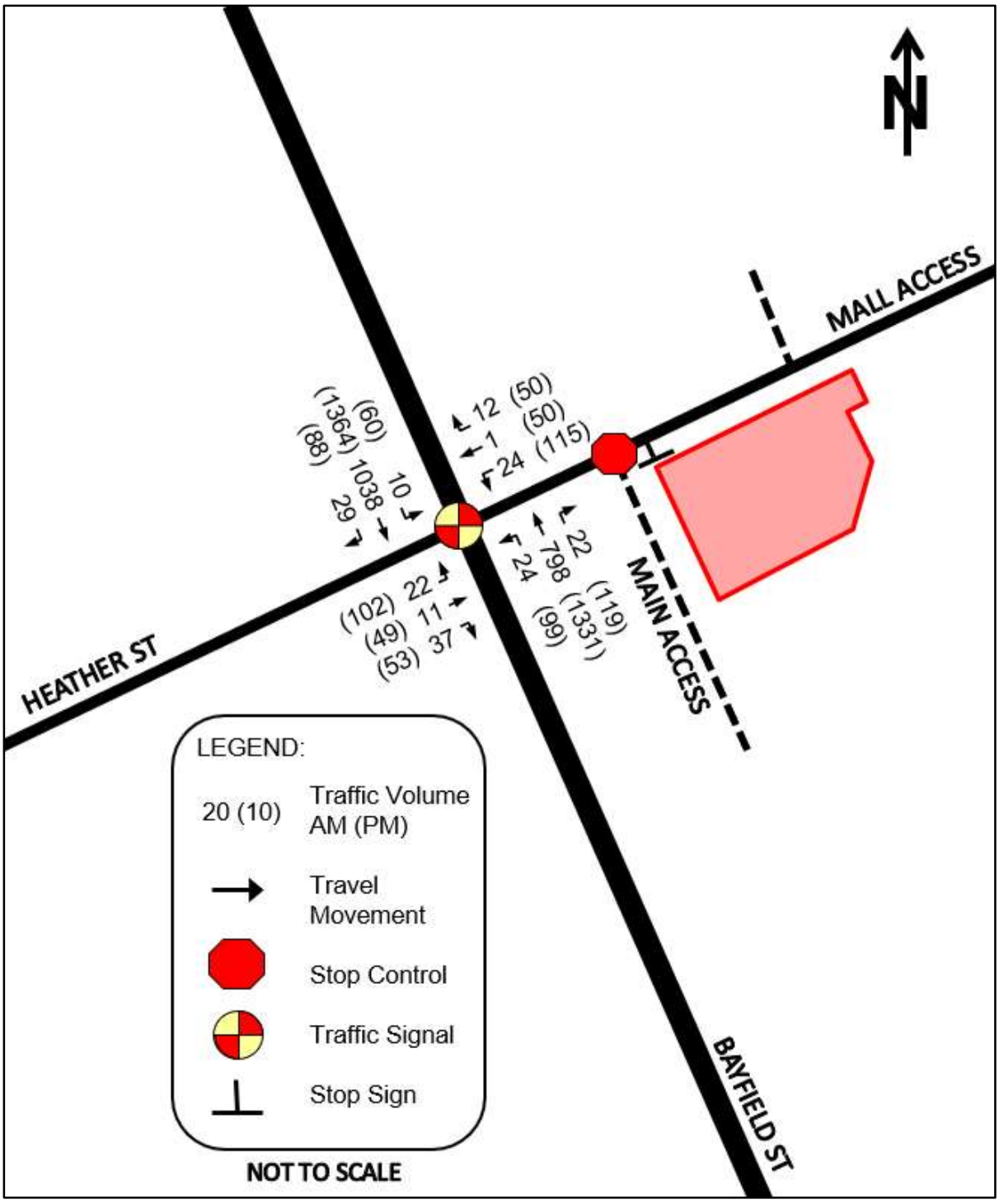
Detailed traffic count data can be found in **Appendix B**. Heavy vehicle percentages from the traffic count data have also been included in the Synchro analysis.

2.7 Existing Traffic Volumes

The 2021 existing AM and PM peak hour traffic volumes through the study area have been established based on the conducted traffic counts, adjusted to reflect the annual background growth rates noted in Section 2.5.

The existing (2021) AM and PM peak hour traffic volumes are illustrated in **Figure 3**.

Figure 3 – Existing (2021) Traffic Volumes

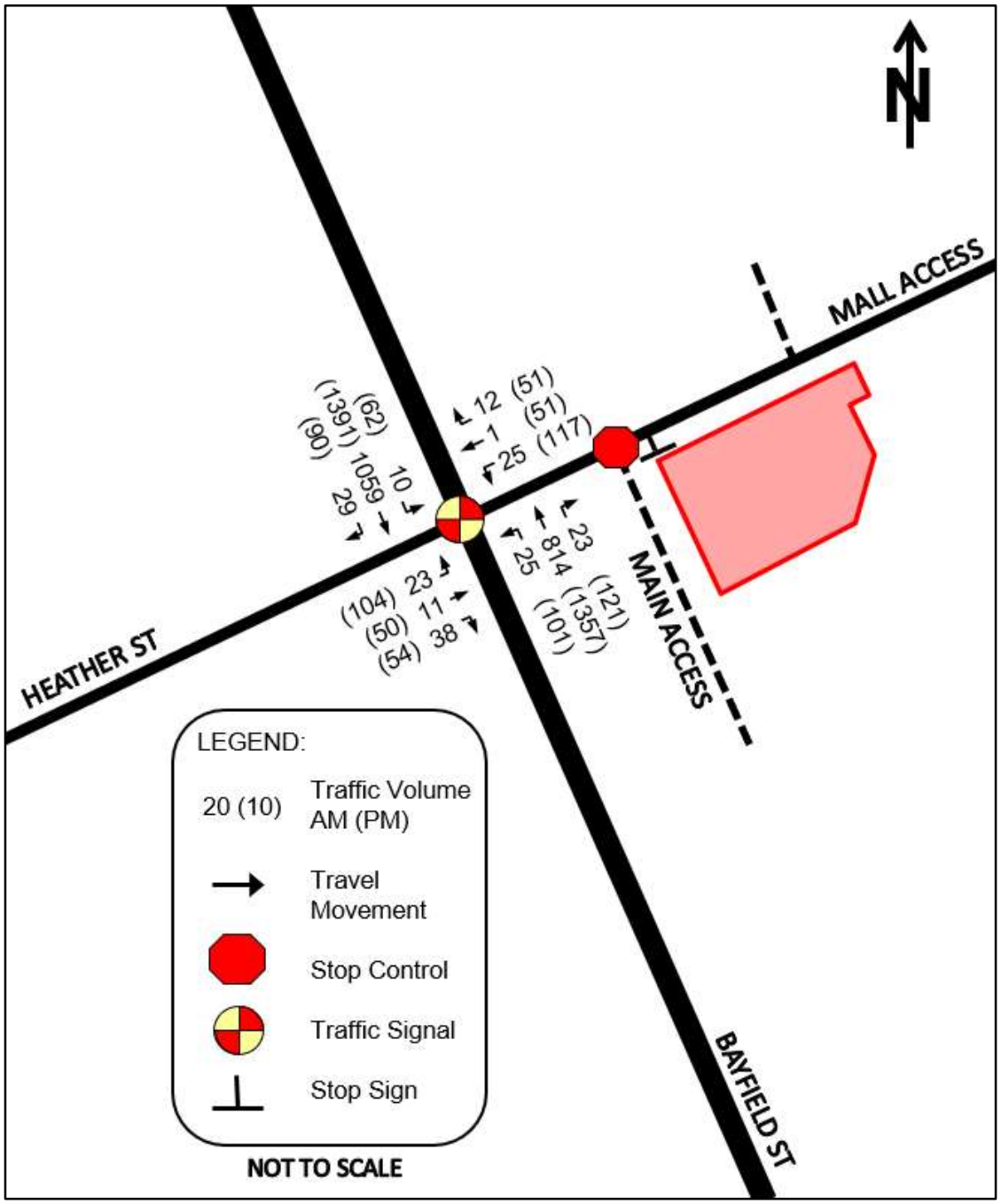


2.8 Horizon Year Traffic Volumes

The background (2022) horizon year traffic volumes without the proposed development were estimated using the inflated background growth rate discussed in Section 2.5 (which was chosen to consider the affect of local development traffic).

The background (2022) horizon year traffic volumes are illustrated in **Figure 4**.

Figure 4 – Background (2022) Traffic Volumes



3 Proposed Development

3.1 Traffic Generation Review

A review of the anticipated traffic generation for both the existing and proposed land uses was undertaken for the subject site. The traffic generations have been based on the ITE Trip Generation Manual. The following ITE land uses have been applied to estimate the traffic generation of the existing and proposed land uses:

- ITE land use 880 (Pharmacy/Drug Store without Drive-Thru); and
- ITE land use 932 (High Turnover (Sit Down) Restaurant).

The AM and PM peak hour traffic generation for the land uses do not exactly align with the AM and PM peak hour in the traffic counts; consequently, we have applied the peak hour of adjacent street traffic values provided in the ITE Trip Generation Manual. **Table 3** summarizes the utilized trips generation rates and equations.

Table 3 – ITE Traffic Generation Rates

Land Use	Trip Basis	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
High Turnover (Sit Down) Restaurant ITE Land Use: 932	rate (1000ft^2)	5.47	4.47	9.94	6.06	3.71	9.77
Pharmacy/Drug Store without Drive-Thru ITE Land Use: 880	rate (1000ft^2)	1.91	1.03	2.94	4.17	4.34	8.51

The estimated trip generation of the proposed development is illustrated below in **Table 4**.

Table 4 – Estimated Traffic Generation Review

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Existing (Restaurant)	6,313 ft^2	34	28	62	38	23	61
Proposed (Rexall Pharmacy)	9,000 ft^2	17	9	26	37	39	76
Net Trips		**-17**	**-19**	**-36**	**-1**	**16**	**15**

As indicated, the proposed development will result in an overall net decrease of 36 trips during the AM peak hour and an overall increase of 15 trips during the PM peak hour.

3.2 Traffic Assignment

For the purposes of this study, it has been assumed that all traffic generated by the proposed development will be new traffic and would not be in the study area if the development was not constructed. Recognizing that existing property was not be operational during the 2018 conducted traffic counts, the removal of the restaurant trips was not applied. Rather, the proposed Pharmacy trips were considered in their entirety.

The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. The traffic distribution for the development has been estimated based on the existing directional distribution of traffic at the study intersection.

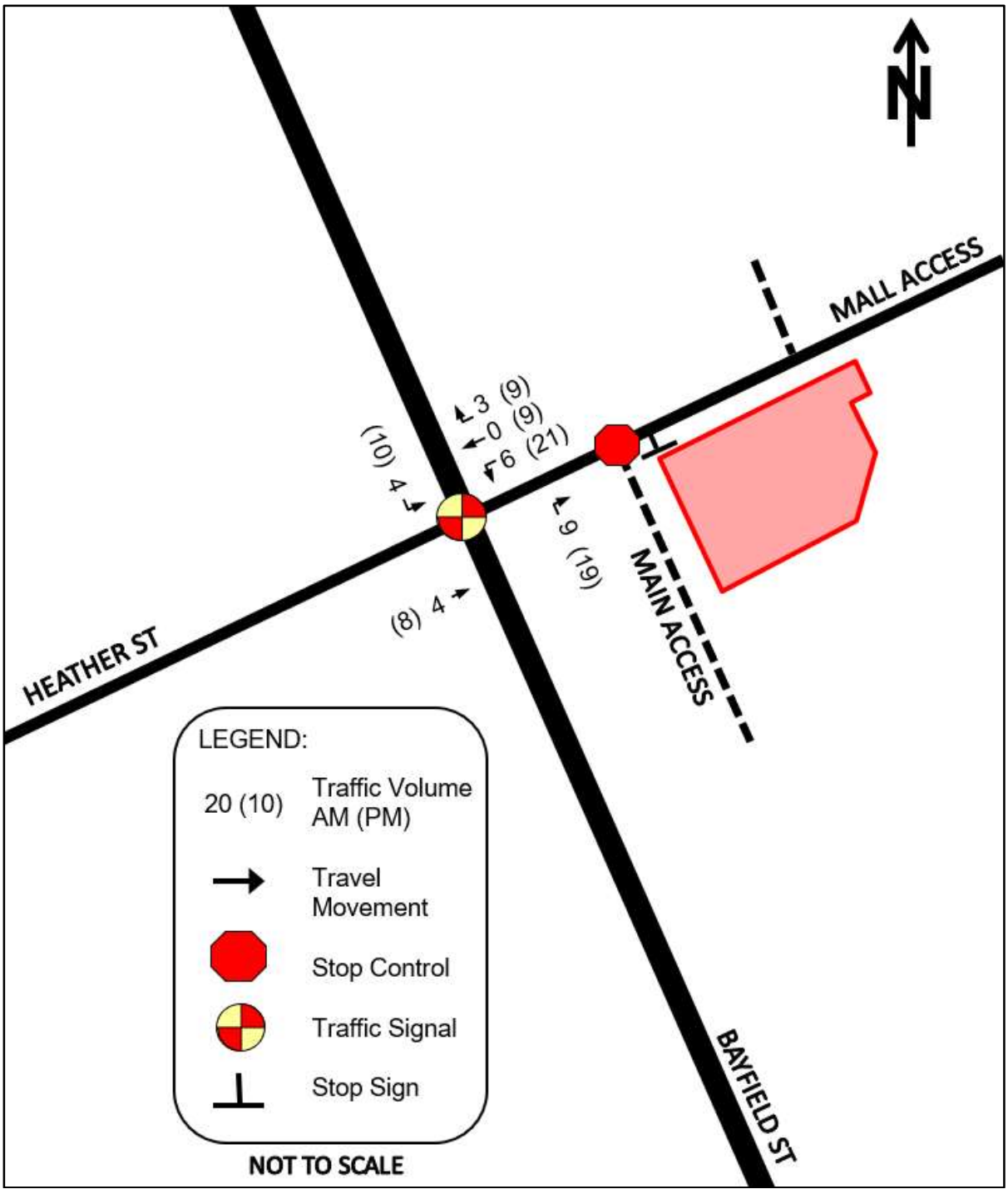
The distribution of trips is illustrated in **Table 5** using the methodology outlined above.

Table 5 – Proposed Development Traffic Distribution

Travel Direction (to / from)	Percent of Total Traffic Generation			
	AM Peak Hour		PM Peak Hour	
	IN	OUT	IN	OUT
North via Bayfield Street	23%	31%	27%	23%
South via Bayfield Street	53%	66%	52%	53%
West via Heather Street	25%	3%	21%	23%
TOTAL	**100%**	**100%**	**100%**	**100%**

The site traffic assignment for the proposed development during the AM and PM peak hour is illustrated in **Figure 5**. It is noted that all traffic is expected to utilize the Main Access driveway from the study intersection.

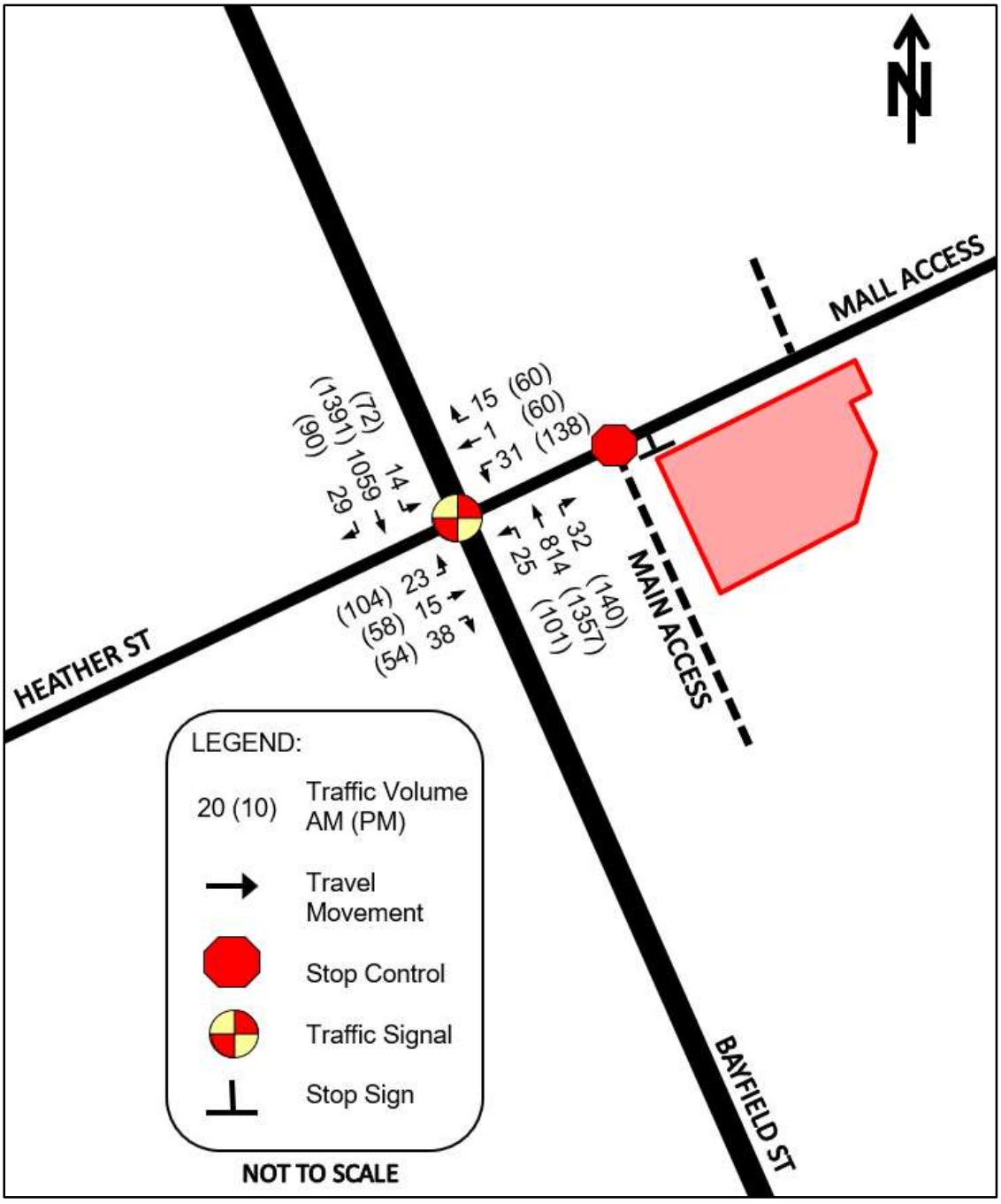
Figure 5 – Site Traffic Assignment



3.3 Total Horizon Year Traffic Volumes with the Proposed Development

For the total (2022) horizon year traffic volumes, the proposed development traffic was added to the background (2022) traffic volumes. The resulting total (2022) horizon year traffic volume for the AM and PM peak hour are illustrated in **Figure 6**.

Figure 6 – Total (2022) Traffic Volumes



4 Traffic Operations

4.1 Introduction

Future horizon traffic operations within the study area were evaluated using the future traffic volumes with the existing road configuration and traffic control. The intersection performance was measured using the traffic analysis software, Synchro 10, a deterministic model that employs Highway Capacity Manual and Intersection Capacity Utilization methodologies for analyzing intersection operations. These procedures are accepted by provincial and municipal agencies throughout North America.

Synchro 10 enables the study area to be graphically defined in terms of streets and intersections, along with their geometric and traffic control characteristics. The user is able to evaluate both signalized and unsignalized intersections in relation to each other, thus not only providing level of service for the individual intersections, but also enabling an assessment of the impact the various intersections in a network have on each other in terms of spacing, traffic congestion, delay, and queuing.

Individual turning movements with a volume-to-capacity [V/C] ratio of 0.85 or greater are considered to be critical movements and have been highlighted in the LOS tables.

The intersection operations were also evaluated in terms of the LOS. LOS is a common measure of the quality of performance at an intersection and is defined in terms of vehicular delay. This delay includes deceleration delay, queue move-up time, stopped delay, and acceleration delay. LOS is expressed on a scale of A through F, where LOS A represents very little delay (i.e. less than 10 seconds per vehicle) and LOS F represents very high delay (i.e. greater than 50 seconds per vehicle for a stop sign controlled intersection and greater than 80 seconds per vehicle for a signalized intersection).

The LOS criteria for signalized and stop sign controlled intersections are shown in **Table 6**. A description of traffic performance characteristics is included for each LOS.

Table 6 – Level of Service Criteria for Intersections

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	Stop Controlled Intersections
A	Very low delay; most vehicles do not stop (**Excellent**)	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop (**Very Good**)	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping **(Good**)	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (**Satisfactory**)	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of **acceptable** delay	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (**Unacceptable**)	greater than 80.0	greater than 50.0

4.2 Total (2022) Intersection Operation

The results of the LOS analysis under total (2022) traffic volumes during the AM and PM peak hour can be found below in **Table 7**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix C**.

Table 7 – Total (2022) LOS

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Storage	Model				Storage	Model
Bayfield Street / Heather Street & Mall Access (signalized)	0.37	10.3	B	-	-	0.61	21.3	C	-	-
EBL	0.17	29.6	C	25	7	0.51	47.1	D	25	40
EBTR	0.20	32.1	C	-	-	0.55	56.8	E	-	-
WBL	0.26	27.0	C	20	8	0.66	52.4	D	20	50
WBTR	0.03	29.3	C	8	4	0.61	59.4	E	8	44
NBL	0.09	5.8	A	60	4	0.55	15.7	B	60	23
NBTR	0.32	8.1	A	-	-	0.54	15.6	B	-	-
SBL	0.04	6.5	A	95	3	0.40	11.2	B	95	12
SBTR	0.40	9.3	A	-	-	0.60	17.0	B	-	-

The results of the LOS analysis indicate that the study intersection will operate within the typical design limits noted in Section 4.1.

The anticipated queue for eastbound left turn movement is longer than the available storage length during the PM peak hour. Given the satisfactory operations and excess capacity for the movement, the anticipated queuing is not a traffic safety issue.

The anticipated queue for westbound movements is longer than the current storage length for the existing pavement markings and is expected to temporarily block the egress movement from the Main Access, during the PM peak hour.

In order to evaluate the effect of the queuing, a SimTraffic analysis was completed. Simulations included a seed time of 10 minutes and subsequent run time of 60 minutes, repeated 5 times to develop an average outcome. In review of the SimTraffic simulations, the westbound queue is expected to clear over the full cycle length, giving motorists exiting the Main Access an opportunity to enter the intersection. Furthermore, motorists have the opportunity to divert around the back of the building and join the back of the queue.

There are no other issues with the anticipated queues in the study area.

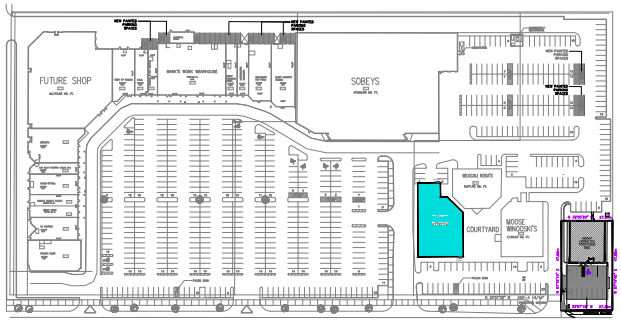
No improvements are recommended within the study area.

5 Summary

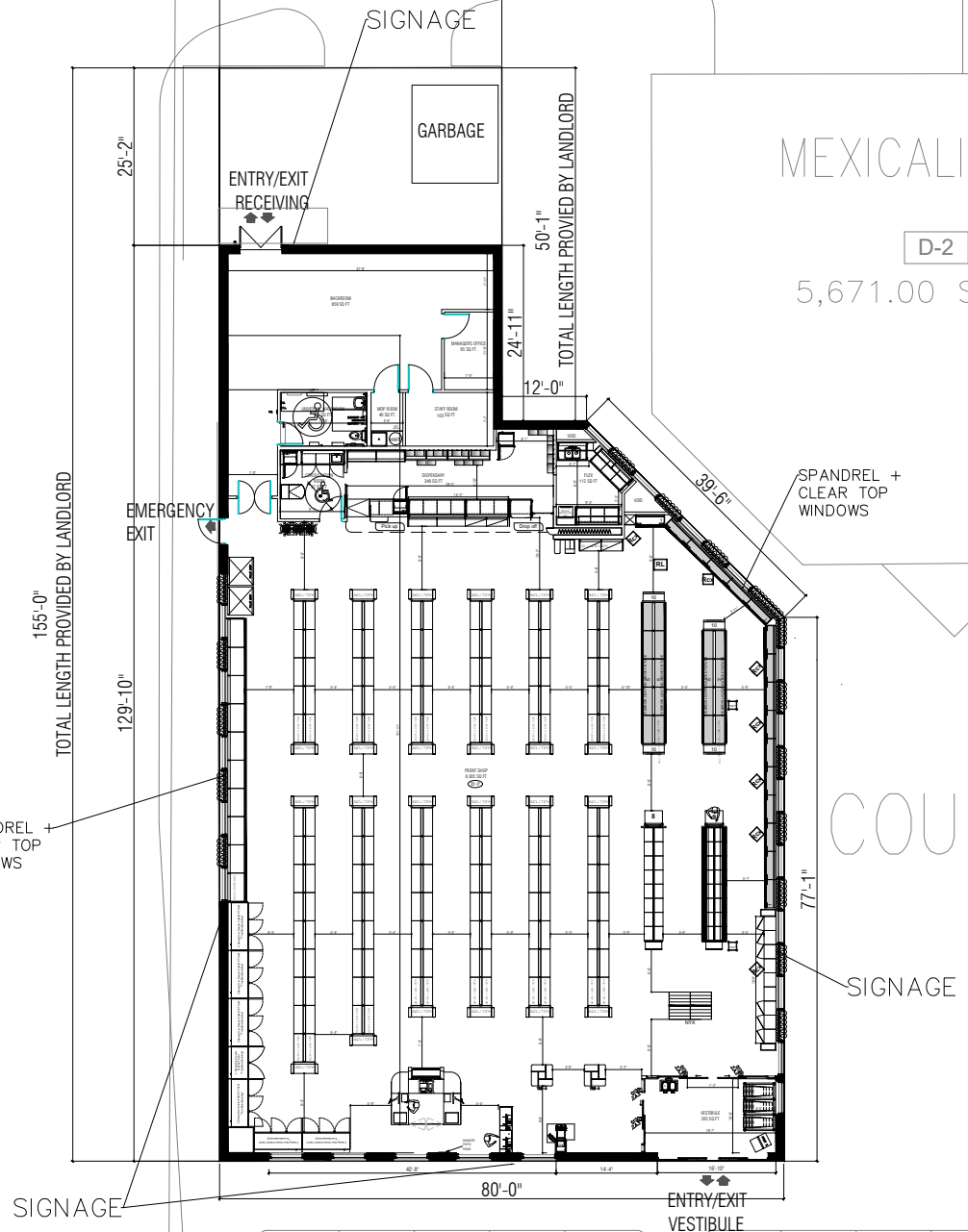
Tanbay Holding Inc. retained **JD Engineering** to prepare this traffic brief in support of the proposed drug store development in the City of Barrie. The proposed Site Plan is shown in **Appendix A**. This chapter summarizes the conclusions and recommendations from the study.

1. The proposed development is expected to generate a total of 26 AM and 76 PM peak hour trips.
2. Background traffic and pedestrian counts were obtained at the intersection of Bayfield Street / Mall Access & Heather Street conducted on Tuesday December 11, 2018
3. A comparative review of the trip generation for the existing and proposed development uses was undertaken;
4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area street and intersection.
5. An intersection operation analysis was completed under total (2022) traffic volumes with the proposed development operational at the study area intersections. No improvements are recommended within the study area with respect to intersection operations.
6. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

Appendix A –
Site Plan



SPRINGWATER MARKETPLACE SITE PLAN



PROPOSED STORE AREA
SCALE ⅛" = 1'- 0"

AREA SUMMARY

LOCATION	SQ FT	%
SALES AREA	N/A	N/A
DISPENSARY	N/A	N/A
CONSULTATION ROOM	N/A	N/A
OFFICE/STAFF ROOM	N/A	N/A
RECEIVING/VESTIBULE	N/A	N/A
STOCKROOM	N/A	N/A
CPC STORAGE	N/A	N/A
MEDICAL CLINIC	N/A	N/A
TOTAL GROUND FLOOR	N/A	100%

VENDORS SUMMARY

FIXTURES:	STREATER
COSMETICS:	IMG
DISPENSARY:	VIC
CONSULTATION ROOM	VIC
INTERIOR SIGNAGE:	?
EXTERIOR SIGNAGE:	?
CHECKOUTS:	?
REFRIGERATION	?

RX TYPE		PROJECT TYPE	RL
SCRIPT COUNT	---- /WK		

Rexall

STORE #0000
BAYFIELD MALL

SPRINGWATER MARKETPLACE
411 Bayfield St.
BARRIE, ON
L4M 5E5

KEY PLAN

EXISTING AREA:	N/A SQ FT
PROPOSED AREA:	9,001 SQ FT
EXISTING PLF:	N/A PLF
PROPOSED PLF:	928 PLF
PLF DIFFERENCE:	N/A PLF

No.	Revision Date	Revision Description	By
02	14 DEC 20	FEASIBILITY PLAN WITHOUT CLINIC	MMG
01	01 DEC 20	FEASIBILITY PLAN	MMG

Store Planner: MMG | Construction PM: | Rexall Estate Dir: AS

SITE PLAN

Scale: AS NOTED | Created on: CREATIONDATE | Drawing No: FP2 | Revision: M0

Appendix B –
Traffic Count Data

TRANS-PLAN
transportation engineering

Turning Movement Count Diagram

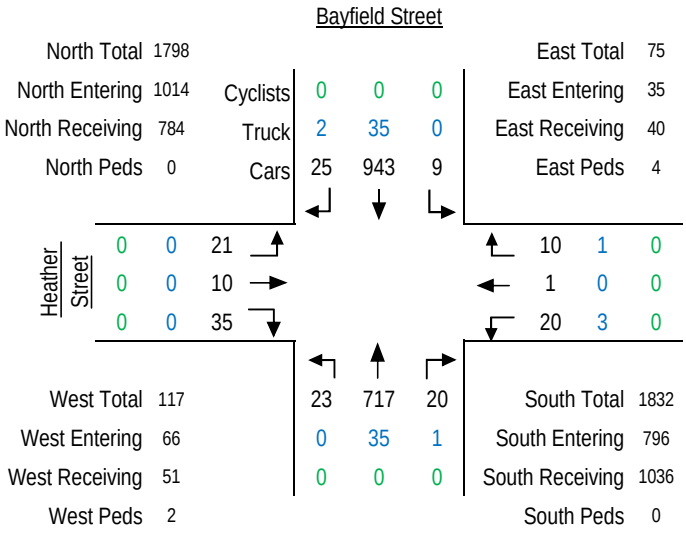
Intersection: Bayfield Street & Heather Street

Intersection ID:

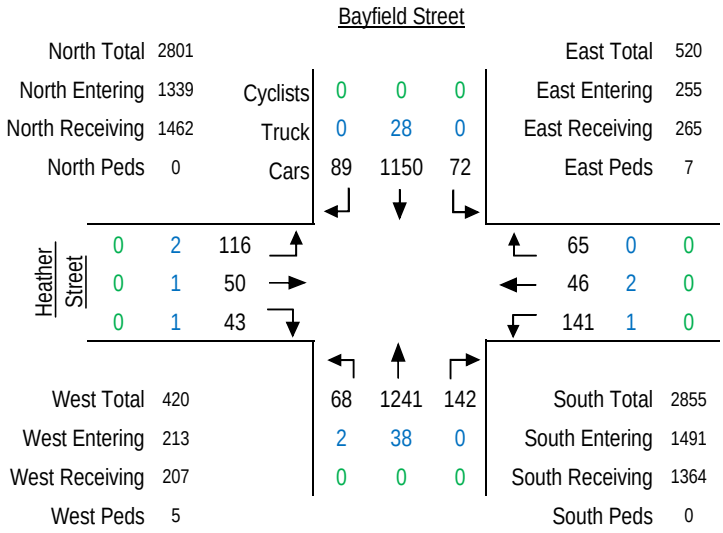
Municipality: Barrie, Ontario

Date: Tuesday December 11, 2018

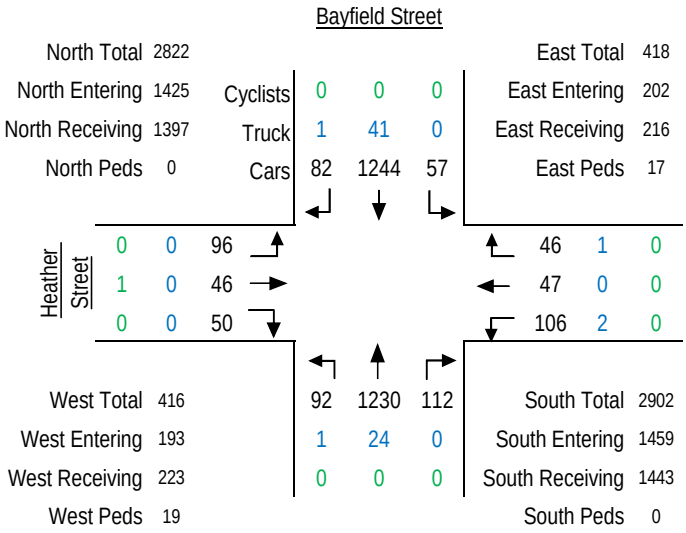
AM Peak Hour: 8:00 to 9:00



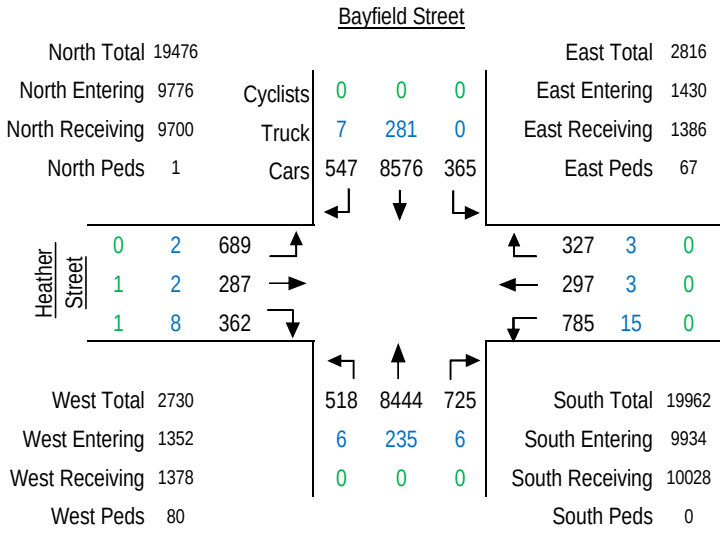
MD Peak Hour: 12:15 to 13:15



PM Peak Hour: 15:15 to 16:15



Total 8-Hour Count



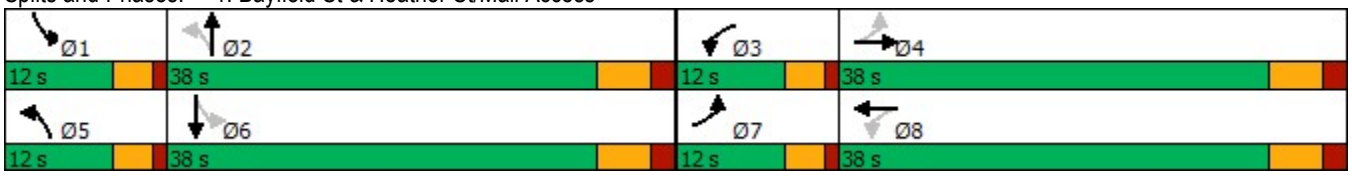
Appendix C –
Synchro Analysis Output –
Total Traffic Volumes

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	23	15	31	1	25	814	14	1059
Future Volume (vph)	23	15	31	1	25	814	14	1059
Lane Group Flow (vph)	29	67	49	26	27	909	15	1133
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	12.0	37.0	12.0	37.0	12.0	38.0	12.0	38.0
Total Split (s)	12.0	38.0	12.0	38.0	12.0	38.0	12.0	38.0
Total Split (%)	12.0%	38.0%	12.0%	38.0%	12.0%	38.0%	12.0%	38.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.09	0.30	0.17	0.10	0.06	0.26	0.03	0.33
Control Delay	19.0	17.8	19.9	15.0	6.6	8.1	6.5	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	17.8	19.9	15.0	6.6	8.1	6.5	10.2
Queue Length 50th (m)	2.2	2.0	3.8	0.2	1.3	20.2	0.7	26.7
Queue Length 95th (m)	7.3	10.5	8.4	3.8	4.3	41.9	2.9	54.6
Internal Link Dist (m)		105.5		61.1		166.7		132.3
Turn Bay Length (m)	25.0		20.0		60.0		95.0	
Base Capacity (vph)	364	913	313	820	477	3495	561	3387
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.07	0.16	0.03	0.06	0.26	0.03	0.33

Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 62.4
Natural Cycle: 100
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Bayfield St & Heather St/Mall Access



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	15	38	31	1	15	25	814	32	14	1059	29
Future Volume (vph)	23	15	38	31	1	15	25	814	32	14	1059	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1681		1615	1526		1825	4962		1788	5016	
Flt Permitted	0.83	1.00		0.61	1.00		0.21	1.00		0.30	1.00	
Satd. Flow (perm)	1570	1681		1030	1526		408	4962		568	5016	
Peak-hour factor, PHF	0.79	0.79	0.79	0.63	0.63	0.63	0.93	0.93	0.93	0.96	0.96	0.96
Adj. Flow (vph)	29	19	48	49	2	24	27	875	34	15	1103	30
RTOR Reduction (vph)	0	45	0	0	22	0	0	3	0	0	2	0
Lane Group Flow (vph)	29	22	0	49	4	0	27	906	0	15	1131	0
Confl. Peds. (#/hr)							2		4	4		2
Heavy Vehicles (%)	2%	2%	2%	13%	2%	9%	0%	5%	5%	2%	4%	7%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.2	4.8		10.8	6.6		43.2	41.0		40.8	39.8	
Effective Green, g (s)	7.2	4.8		10.8	6.6		43.2	41.0		40.8	39.8	
Actuated g/C Ratio	0.10	0.07		0.15	0.09		0.61	0.58		0.57	0.56	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	166	113		191	141		292	2865		343	2811	
v/s Ratio Prot	0.01	0.01		c0.02	0.00		c0.00	0.18		0.00	c0.23	
v/s Ratio Perm	0.01			c0.02			0.05			0.02		
v/c Ratio	0.17	0.20		0.26	0.03		0.09	0.32		0.04	0.40	
Uniform Delay, d1	29.1	31.3		26.3	29.3		5.7	7.8		6.5	8.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.9		0.7	0.1		0.1	0.3		0.1	0.4	
Delay (s)	29.6	32.1		27.1	29.4		5.8	8.0		6.5	9.3	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		31.4			27.9			8.0			9.2	
Approach LOS		C			C			A			A	

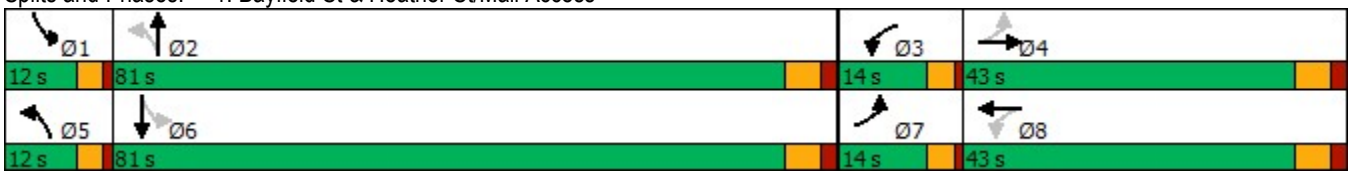
Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	71.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

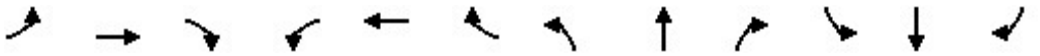
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	104	58	138	60	101	1357	72	1391
Future Volume (vph)	104	58	138	60	101	1357	72	1391
Lane Group Flow (vph)	121	126	166	144	110	1627	88	1806
Turn Type	pm+pt	NA	pm+pt	NA	pm+pt	NA	pm+pt	NA
Protected Phases	7	4	3	8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	14.0	43.0	14.0	43.0	12.0	81.0	12.0	81.0
Total Split (s)	14.0	43.0	14.0	43.0	12.0	81.0	12.0	81.0
Total Split (%)	9.3%	28.7%	9.3%	28.7%	8.0%	54.0%	8.0%	54.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	4.0	3.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	4.0	6.0	4.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes			Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.49	0.60	0.62	0.66	0.55	0.54	0.39	0.60
Control Delay	46.7	53.5	52.3	56.5	21.4	16.1	11.8	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.7	53.5	52.3	56.5	21.4	16.1	11.8	17.6
Queue Length 50th (m)	25.0	23.5	35.2	27.2	7.8	82.6	6.2	98.6
Queue Length 95th (m)	39.7	40.9	50.5	43.9	23.2	108.3	11.9	109.1
Internal Link Dist (m)		105.5		136.1		166.7		132.3
Turn Bay Length (m)	25.0		20.0		60.0		95.0	
Base Capacity (vph)	254	534	268	534	205	3021	236	2995
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.24	0.62	0.27	0.54	0.54	0.37	0.60

Intersection Summary
Cycle Length: 150
Actuated Cycle Length: 126.2
Natural Cycle: 150
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Bayfield St & Heather St/Mall Access





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	58	51	138	60	60	101	1357	140	72	1391	90
Future Volume (vph)	104	58	51	138	60	60	101	1357	140	72	1391	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.91		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.93		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1751		1789	1742		1789	5040		1789	5030	
Flt Permitted	0.49	1.00		0.54	1.00		0.08	1.00		0.11	1.00	
Satd. Flow (perm)	927	1751		1014	1742		150	5040		201	5030	
Peak-hour factor, PHF	0.86	0.86	0.86	0.83	0.83	0.83	0.92	0.92	0.92	0.82	0.82	0.82
Adj. Flow (vph)	121	67	59	166	72	72	110	1475	152	88	1696	110
RTOR Reduction (vph)	0	25	0	0	29	0	0	6	0	0	4	0
Lane Group Flow (vph)	121	101	0	166	115	0	110	1621	0	88	1802	0
Confl. Peds. (#/hr)							19		17	17		19
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.1	13.4		23.7	13.7		83.3	75.6		82.3	75.1	
Effective Green, g (s)	23.1	13.4		23.7	13.7		83.3	75.6		82.3	75.1	
Actuated g/C Ratio	0.18	0.11		0.19	0.11		0.66	0.60		0.65	0.60	
Clearance Time (s)	4.0	6.0		4.0	6.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235	185		251	189		199	3019		221	2993	
v/s Ratio Prot	0.04	0.06		c0.05	0.07		c0.03	0.32		0.02	c0.36	
v/s Ratio Perm	0.05			c0.07			0.33			0.24		
v/c Ratio	0.51	0.55		0.66	0.61		0.55	0.54		0.40	0.60	
Uniform Delay, d1	45.2	53.5		46.0	53.7		12.4	15.0		10.1	16.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	3.3		6.4	5.7		3.3	0.7		1.2	0.9	
Delay (s)	47.1	56.8		52.4	59.4		15.7	15.6		11.2	17.0	
Level of Service	D	E		D	E		B	B		B	B	
Approach Delay (s)		52.1			55.7			15.6			16.8	
Approach LOS		D			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	126.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection: 1: Bayfield St & Heather St/Mall Access

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	T	TR	L	T	T	TR
Maximum Queue (m)	29.9	68.2	24.9	100.8	69.1	101.9	98.1	77.2	67.4	127.9	107.4	81.0
Average Queue (m)	20.3	25.6	20.9	44.3	21.1	63.9	52.5	33.1	14.8	72.4	58.0	31.4
95th Queue (m)	33.8	55.5	28.8	90.9	52.8	96.7	86.2	64.2	41.5	111.0	97.5	66.6
Link Distance (m)		111.5		141.3		180.6	180.6	180.6		144.3	144.3	144.3
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	25.0		20.0		60.0				95.0			
Storage Blk Time (%)	8	9	32	18		8			0	2		
Queuing Penalty (veh)	9	9	39	25		8			0	1		