Traffic+ Engineering Ltd.

Inspiration Group

Traffic Impact Study, Parking Reduction Justification, Swept Path Assessments, and Construction Management

Proposed Residential Development Essa Road, City of Barrie

Prepared by: Traffic+ Engineering Ltd.

Prepared for: Inspiration Group of Companies Ltd.

January 03, 2023

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Report

Date
January 03, 2023

Our Reference:
2022002

Client
Inspiration Group

Client Contact
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Re: Traffic Impact Study, Parking Reduction Justification, Swept Path Assessments, and Construction Management
Proposed Mixed-Use Residential Development
Essa Road, City of Barrie

EXECUTIVE SUMMARY

Content

Inspiration Group is submitting a Site Plan application for approval related to the proposed new mixed-use residential development to be built on an empty site located along Essa Road in the City of Barrie, Ontario. The site is approximately situated in the southeast quadrant of the intersection of Mapleton Avenue and Essa Road and opposite to the Barrie Smartcentres.

The proposed development will consist of a condominium building of eight (8) storeys with a total of 101 residential units and three (3) commercial units to be located at street level, which will be built on a vacant land with a total surface area of approximately 3,771.95 m² (40,600.93 ft²).

The purpose of this study is to determine the future traffic impacts of the proposed development on the surrounding road network and identify any improvements to accommodate this added traffic, if found necessary.

Findings

The key conclusions and findings of the review are outlined herein:

The findings and conclusions of our study are as follows:

- **Development:**

The proposed development will consist of a condominium building of eight (8) storeys with a total of 101 residential units and three (3) commercial units to be located at street level, which will be built on a vacant land with a total surface area of approximately 3,771.95 m² (40,600.93 ft²).

- **Existing Traffic Operations:**

A.M. peak:

Existing traffic operations during A.M. peak that both signalized intersections have no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS C and the volume over capacity ratios are well below capacity.

P.M. peak:

Existing traffic operations during P.M. peak that the two signalized intersections have no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS D and the volume over capacity ratios are well below capacity.

- **Future Background Traffic Operations:**

A.M. peak:

Under future background traffic conditions, traffic operations during A.M. peak the two signalized intersections are mostly expected to continue to operate with no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS C and the volume over capacity ratios are below capacity.

P.M. peak:

During P.M. peak, all intersections are expected to operate at levels of service ranging from LOS B to LOS D, with no critical movements or capacity constraints

The signalised intersections were not optimised and kept as the existing signal timing, and the cycle length remained the same as existing conditions.

- **Modal Split:**

Given that the trip generation was derived using ITE Trip Generation Manual (11th Edition), Volume 2, where the trip generation surveys were gathered in “Dense Multi-Use Urban and

Centre City Core", where multimodal transportation are existent. Therefore, no modal split reduction factor has been applied to the total trip generation given that the proposed development has easy access to a well-served transit system and amenities are within walking distance.

- **Trip Generation:**

The development is estimated to generate approximately 20 trips in the AM peak hour and 28 trips in the PM peak hour;

- **Future Total Traffic Operations:**

A.M. peak:

Under future total traffic conditions, traffic operations during A.M. peak at all signalized and unsignalized intersections are still expected to continue to operate with no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS A (excellent) to LOS C (good) and the volume over capacity ratios are below capacity.

P.M. peak:

During P.M. peak, all intersections are still expected to operate at levels of service ranging from LOS A to LOS D, with no critical movements or capacity constraints.

The signalised intersections were not optimised and kept as the existing signal timing, and the cycle length remained the same as existing conditions.

- **Parking Reduction Justification**

A parking justification assessment was undertaken by comparing the "*City of Barrie Comprehensive Zoning By-law 2009-141*" with other nearby municipalities' parking ratios, where it was found the following:

- City of Barrie parking ratio does not provide a specific parking ratio for visitors. Therefore, a reasonable number of visitors parking can be chosen by the developer; and
- There is no specific parking ratio per unit type (for bachelor unit, 1 bedroom unit, 2 bedrooms units, etc)

Therefore, proposed parking ratios were provided with in mind the location of the development being well served by transit and nearby numerous amenities, as well as an on-site bike storage room with a surface area equal to 772.0 ft^2, where they will justify such parking reduction.

Regarding the commercial parking reduction, from the City of Barrie parking by-law it is required to provide 18 parking spaces, whereas it is proposed 15 spaces, a 3 parking spaces reduction.

This reduction will not have any impacts on future businesses hence, the proposed 15 parking spaces will be more than sufficient.

- **Site Circulation Assessments**

The swept path assessments were undertaken for two types of garbage vehicles, one that the City of Barrie provided and the second with a more common garbage truck in use in different municipalities. It can be concluded, based on the assessments that the City of Barrie design truck can be accommodated on the site, however with more maneuvers to exit the staging area compared to the design truck than the second garbage truck.

- **Construction Management**

City of Barrie staff requested to undertake a high level construction staging plan to ensure a safe and efficient movements around the site for pedestrians, vehicular traffic and construction trucks around the site during construction.

Numerous items are listed in order to achieve the above conditions:

- All construction activities within the site, this is to include start-up and warm-up of construction equipment, will only happen between 07:00 AM and 7:00 PM on weekdays and Saturdays. No construction activities will occur outside the above-noted periods without an approval from the City
- Construction signage will be posted at the site access point and as required, notifying visitors that check-in at the site office is mandatory
- Signage that identify the area as a ‘construction site’,
- Signage showing that all visitors and construction employees are required be wear personal protection equipment (PPE) suitable for a construction zone
- Signage showing that access to the site is limited to authorized personnel only
- During the egress and ingress of delivery trucks and construction trucks, a flagman will be standing at the temporary access off of Essa Road to guide traffic and trucks, to ensure a safer vehicular flow.

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In summary, the proposed development is anticipated to have a very minimal impact on traffic operations within the study area.

We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

Mr. Nabil Ghariani, P.Eng., PTOE, M.S.C.E.
President and CEO

Traffic+ Engineering Ltd.

Table of Contents

Figures

Tables

Appendices

Appendix D: Future Background Traffic Operations – Synchro Output

Appendix E: Future Total Traffic Operations – Synchro Output

Appendix F: Truck Swept Path Design and Dimensions

Appendix G: Signage Plan

1.0 Introduction

1.1 Study Overview

Traffic+ Engineering Ltd. was retained by Inspiration Group of Companies Ltd. to undertake a Traffic Impact Study (TIS) in support of a site plan application for the proposed mixed-use residential development to be located along Essa Road in the City of Barrie.

The purpose of this study is to determine the impacts of the additional traffic generated from the proposed development on the surrounding road network and the improvements, if found necessary, to accommodate this future traffic. The scope of the study includes assessing the current traffic in the vicinity of the development, estimating background traffic growth in the area, estimating the additional traffic volumes that will be generated by the development, analysing the impacts of the added traffic and provide any recommendations on the remedial measures necessary to accommodate the future traffic in a satisfactory manner.

A new residential development is proposed along Essa Road that is bounded from the North by Mapleton Avenue and from the South by Coughlin Road in the City of Barrie. The proposed development will consist of a residential condominium building with a total of 101 residential units which will be built on a vacant land with a total surface area of approximately 3,771.95 m² (40,600.93 ft²).

1.2 Study Area and Proposed Site Plan

The approximate location of the subject site is illustrated in **Figure 1**. The community surrounding the subject site is comprised mostly of a low density residential areas with a Smartcentres located just west of the proposed development along Essa Road corridor. Based on the pre-consultation meeting with staff from City of Barrie, the following intersections have been identified as intersections that should be assessed in this traffic impact study:

- Essa Road and Mapleton Avenue (Signalised),
- Essa Road and Coughlin Road (Signalised), and
- Essa Road and Proposed Site Access Driveway (Unsignalised)

Figure 2 illustrates the existing lane configurations and traffic controls at the study area intersections.

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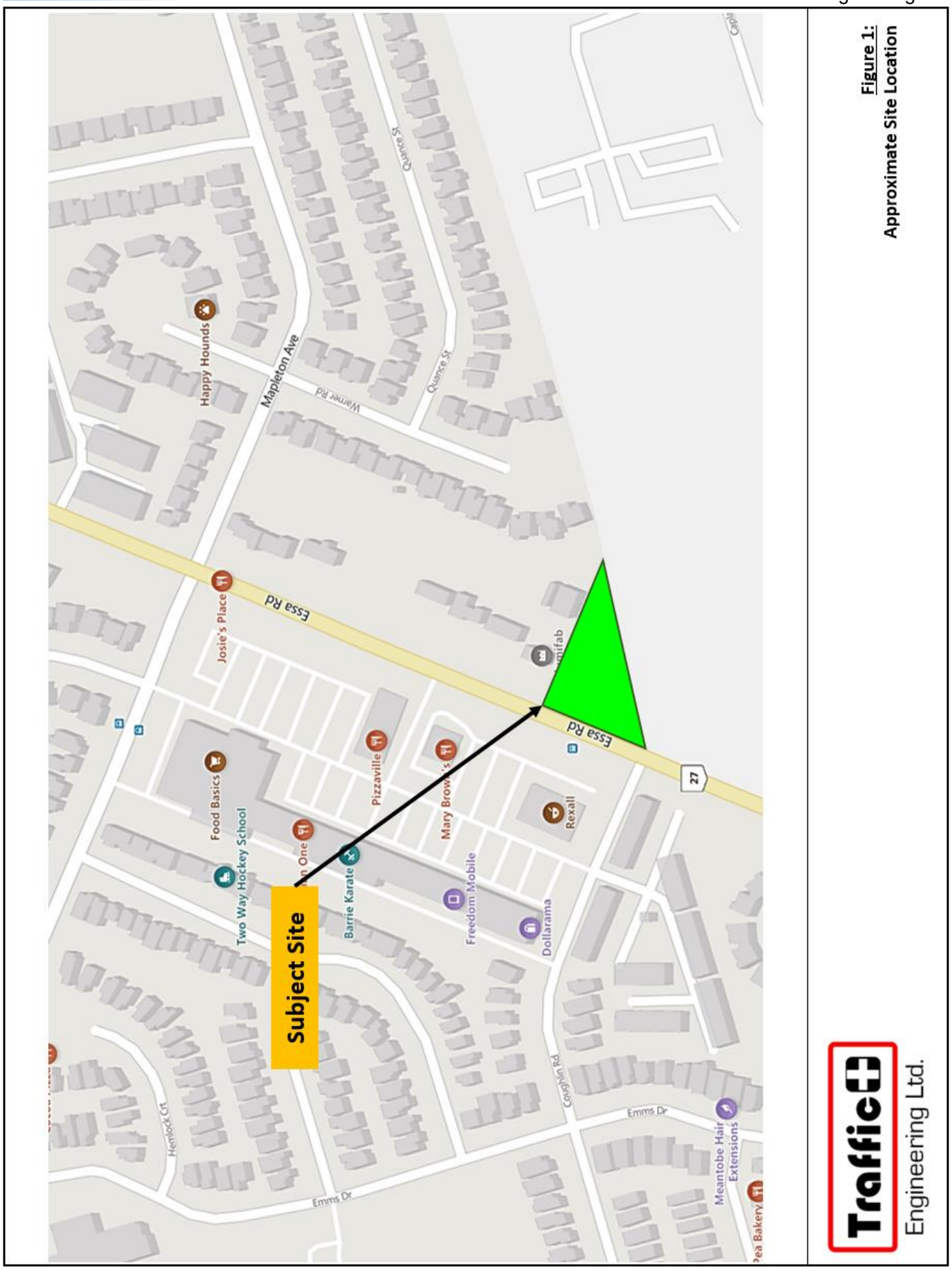

Figure 1:
Approximate Site Location

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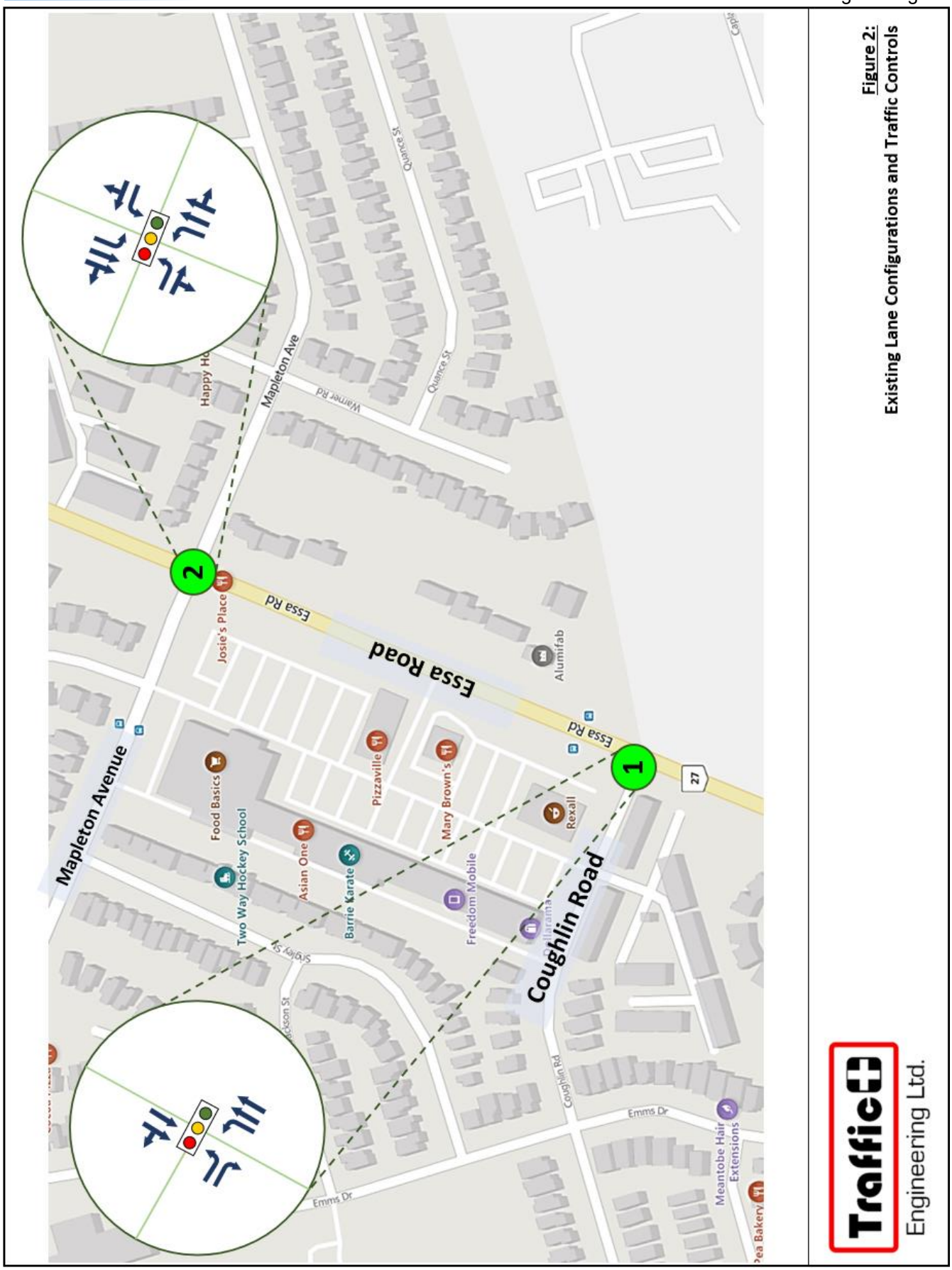

Figure 2:
Existing Lane Configurations and Traffic Controls

Traffic Engineering Ltd.

2.0 Existing Conditions

The subject property land is currently a vacant land with approximately 3929 m^2. The majority of the property is open field with some areas where woodlot is found. The site is located south of Mapleview Avenue, adjacent to existing residential detached homes and across from a commercial plaza. The lot spans approximately 80 m east along Essa Drive. The subject lot is bound by Essa Drive to the west and existing single detached homes to the north, and open field to the south, and east. The location of the site is reflected on the "Proposed Site Plan", prepared by Khalsa Design Inc., included as shown in **Figure 3-1** and **Figure 3-2**.

Appendix A shows the full scale architectural "Site Plan".

Site access will be accommodated by a single full movement driveway that will be located off Essa Road.

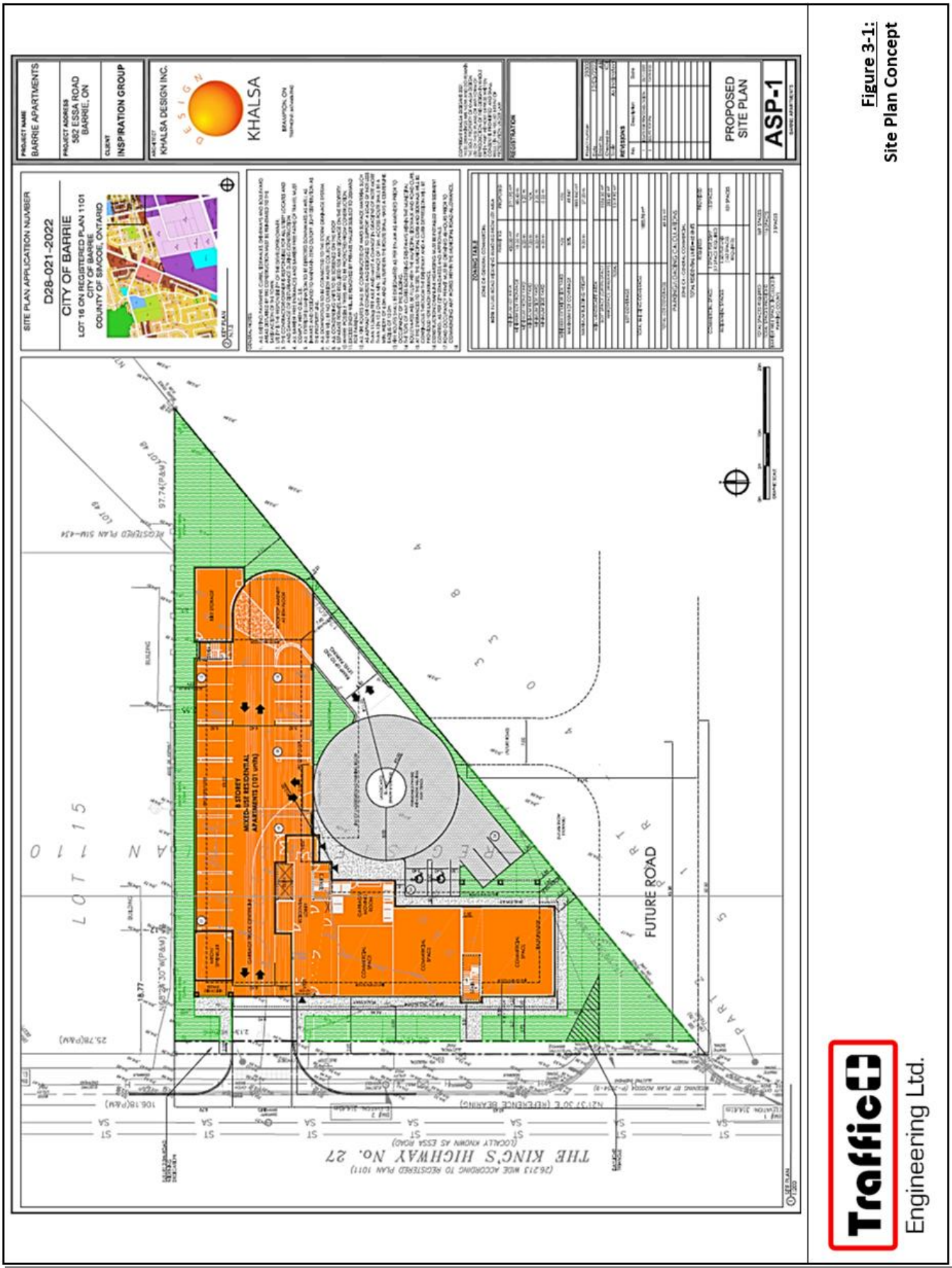

Figure 3-1:
Site Plan Concept

Figure 3-2:
Site Plan Concept

2.1 Nearby Amenities

The proposed residential development will be within walking distance from numerous amenities which are located in Smartcentres. These amenities consist of the following:

General Grocery Stores and Pharmacy:
- Food Basics
- Rexall Pharma Plus
- Dollarama
- PetValu

- Koodo / Telus
- Freedom Mobile

Numerous Restaurants:
- Kenzo Ramen
- Osmow's Grill
- Guac Mexi Grill
- Asian One
- Mary Browns
- Tim Hortons
- Pizzaville
- Stacked Pancake & Breakfast House

- Barrie Karate
- The Wine Shop
- Sunset Tan
- Tokyo Smoke
- KFF Gift Shop

Barbershops and Salons:
- Magicuts
- Style Encore
- Foxy's Gentlemen's Hair Salon
- Century Nails

- Academy for Math and English
- Barrie Public Library

Health Establishments:
- Holly Physiotherapy
- Essa Walk-In Clinic
- Mapleton Family Dental
- Optica Nova

- Easyfinancial
- uBreakiFix

The close proximity of the above listed amenities from the proposed development will significantly help reduce vehicular trips and Single Occupancy Vehicle trips which will entice residents to walk or carpool to get to the stores without adding any traffic onto Essa Road by using the direct access from the proposed development to Smartcentres, especially during peak hours.

Appendix B shows the detail site with the existing amenities.

2.2 Existing Road Network within the Study Area

The main roadways in the vicinity of the subject site which have been considered in assessing the traffic impacts of the proposed development are described as follows:

- **Essa Road:** is a north-south arterial as per the City of Barrie Road Classification System. It has four (4) lanes with dedicated left turn lanes and right turn lanes at the intersection on northbound and southbound approaches and on-street parking is not permitted at all time. Continuous sidewalks are found on both sides of the road within the vicinity of the development. The posted speed limit is 50 km/h in the vicinity of the proposed development, and 60 km/h just south of the development.

- **Mapleton Avenue:** is an east-west major collector as per the City of Barrie Road Classification System. It has two (2) lanes with dedicated left turn lanes at the intersection on eastbound and westbound approaches. Continuous sidewalks are found on both sides of the road within the vicinity of the development. Dedicated bicycle lanes on both sides of the street are found along the westbound corridor. On-street parking is not permitted at all time. The posted speed limit is 50 km/h in the vicinity of the proposed development.

- **Coughlin Road:** is an east-west local road as per the City of Barrie Road Classification System. It has two (2) lanes with dedicated left turn lanes at the intersection on northbound approach and on-street parking is not permitted at all time. Continuous sidewalks are found on both sides of the road within the vicinity of the development. The posted speed limit is 50 km/h in the vicinity of the proposed development.

2.3 Existing Transit Operations

The area within the proposed development is currently well serviced by transit. There are currently numerous local transit services provided by the Barrie Transit, as well as GO transit buses and trains operating in the immediate area of the development. Barrie Transit routes are illustrated in **Figure 4-1** and GO Train and Bus Transit Routes in **Figure 4-2**. The following are their described routes:

Route# 7A - 7B – Grove / Bear Creek: Is a local bus that runs from Georgina College located north of the City to Park Place in the south by passing through downtown core. The bus makes multiple stops which include Allendale Waterfront bus station which is also a GO Train / Bus stop station. This bus route has stops northbound and southbound near the subject site located in front of the proposed building. This route operates on 30 – minute headways throughout the business day and runs from 6:15 AM to 11:15 PM on weekdays. On Saturday this route operates on 30 – minute headway and runs from 7:15 AM to 11:15 PM. On Sunday this is route operates on 60 – minute headway and runs from 10:15 AM to 9:15 PM.

Route# 8A - 8B – RVH-Yonge / Crosstown Essa: : Is a local bus that runs from Georgina College located north of the City to Park Place in the south by passing through downtown core. The bus makes multiple stops which include Allendale Waterfront bus station which is also a GO Train / Bus stop station. This bus route has stops northbound and southbound near the subject site located in front of the proposed building. This route operates on 30 – minute headways throughout the business day and runs from 4:35 AM to 11:35 PM on weekdays. On Saturday this route operates on 30 – minute headway and runs from 7:05 AM to 11:35 PM. On Sunday this is route operates on 60 – minute headway and runs from 8:35 AM to 9:35 PM.

GO Train – Barrie Line: GO Train operates as an intercity service from Union Station in the City of Toronto, to Barrie Bus Terminal in the City of Barrie. This route operates on 30 – minute headways throughout the business day and runs from 4:28 AM to 10:12 PM on weekdays.

GO Bus – # 68: GO Bus operates as an intercity service from Union Station in the City of Toronto, to Barrie Bus Terminal in the City of Barrie, but most trips start from Allendale Waterfront bus station. This route operates on different headways during the day but it is mostly equal to 30 – minute headways during peak hour and every hour during the business day and runs from 4:11 AM to 10:00 PM on weekdays. On Saturday and Sunday, this route operates on approximately 60 – minute headway and runs from 6:16 AM to 10:20 PM.

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Figure 4-1:
Barrie Transit Routes
Source: Barrie Transit

Figure 4-2:
GO Train and Bus Transit Routes
Source: GO Transit (November 2022)

2.4 Active Transportation and Bike Storage

In addition to transit, there are currently dedicated sidewalks on each side of Essa Road from Mapleton Avenue from north to Coughlin Road, as well as along Mapleton Avenue.

Moreover, there are dedicated on-street bike lanes along Mapleton Avenue that allow cyclists to ride safely and entice residents use alternative modes of transportation.

Finally, the proposed mixed-use development will provide on-site bike storage with a surface area equal to 772.0 ft^2, for residents to store their bicycles. This storage space will entice / encourage residents to use alternative modes of transportation for their daily trips.

2.5 Existing Traffic Volumes

The existing traffic volumes on the adjacent road network were determined through peak hour turning movement counts provided by the City of Barrie as well as counts undertaken by Traffic+ Engineering Ltd. The traffic counts for the intersections in the study area are provided in **Appendix A** and summarized in **Table 1**. The obtained traffic counts were counted in 2022 which were increased using growth rates provided by City staff to reflect the existing traffic conditions. Volume balancing between the study area intersections was completed to ensure appropriate continuity of traffic volumes between intersections. The existing traffic volumes are illustrated in **Figure 5-1** and **Figure 5-2**.

Table 1: Traffic Count Data & Sources

Intersection Number	Intersection Description	Count Date	Source
1	Essa Road and Mapleton Avenue	May 2022	City of Barrie
2	Essa Road and Coughlin Road	Oct. 2022	Traffic+ Engineering Ltd.

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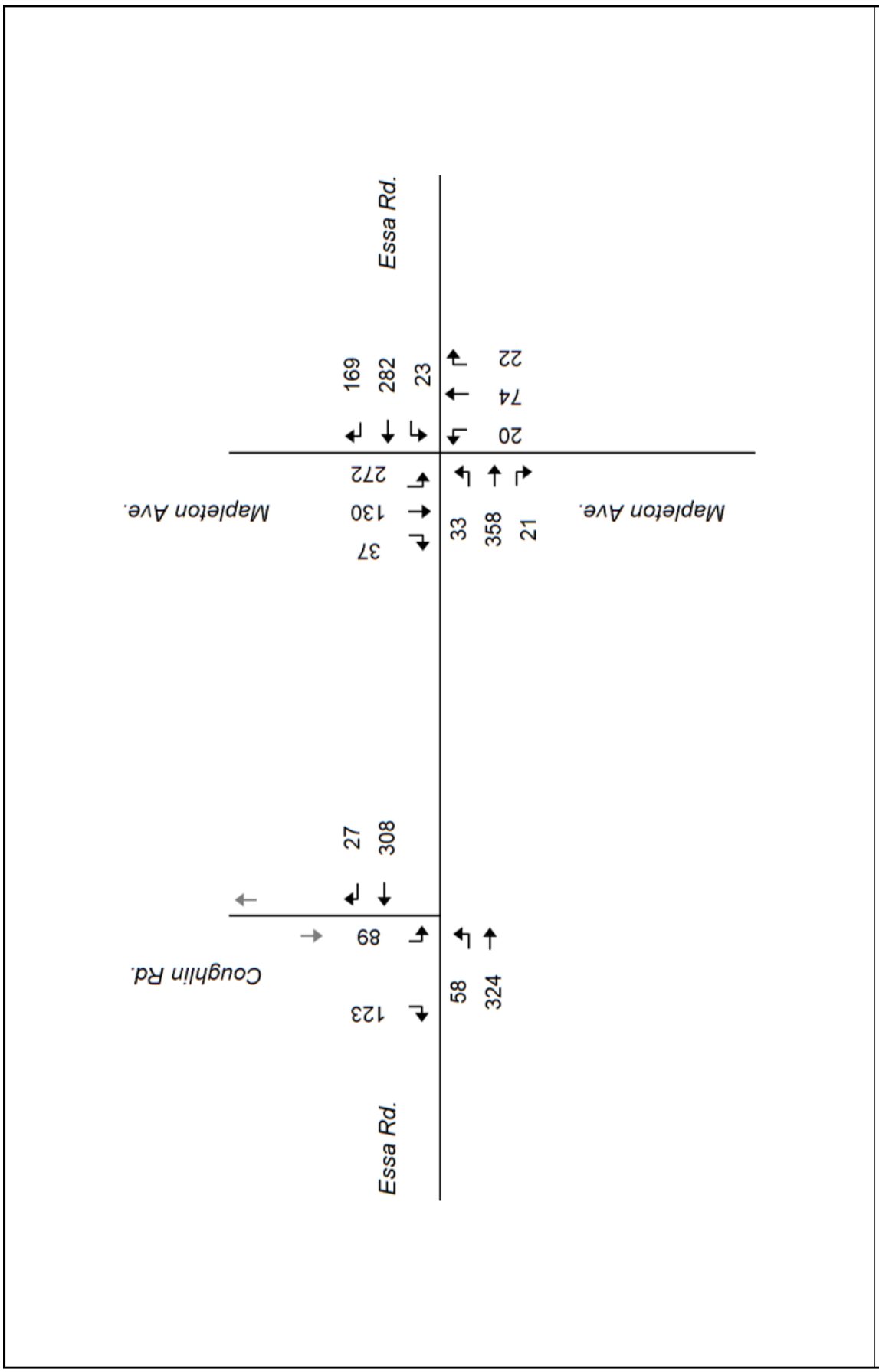

Figure 5-1: Existing Traffic volumes – AM Peak Hour

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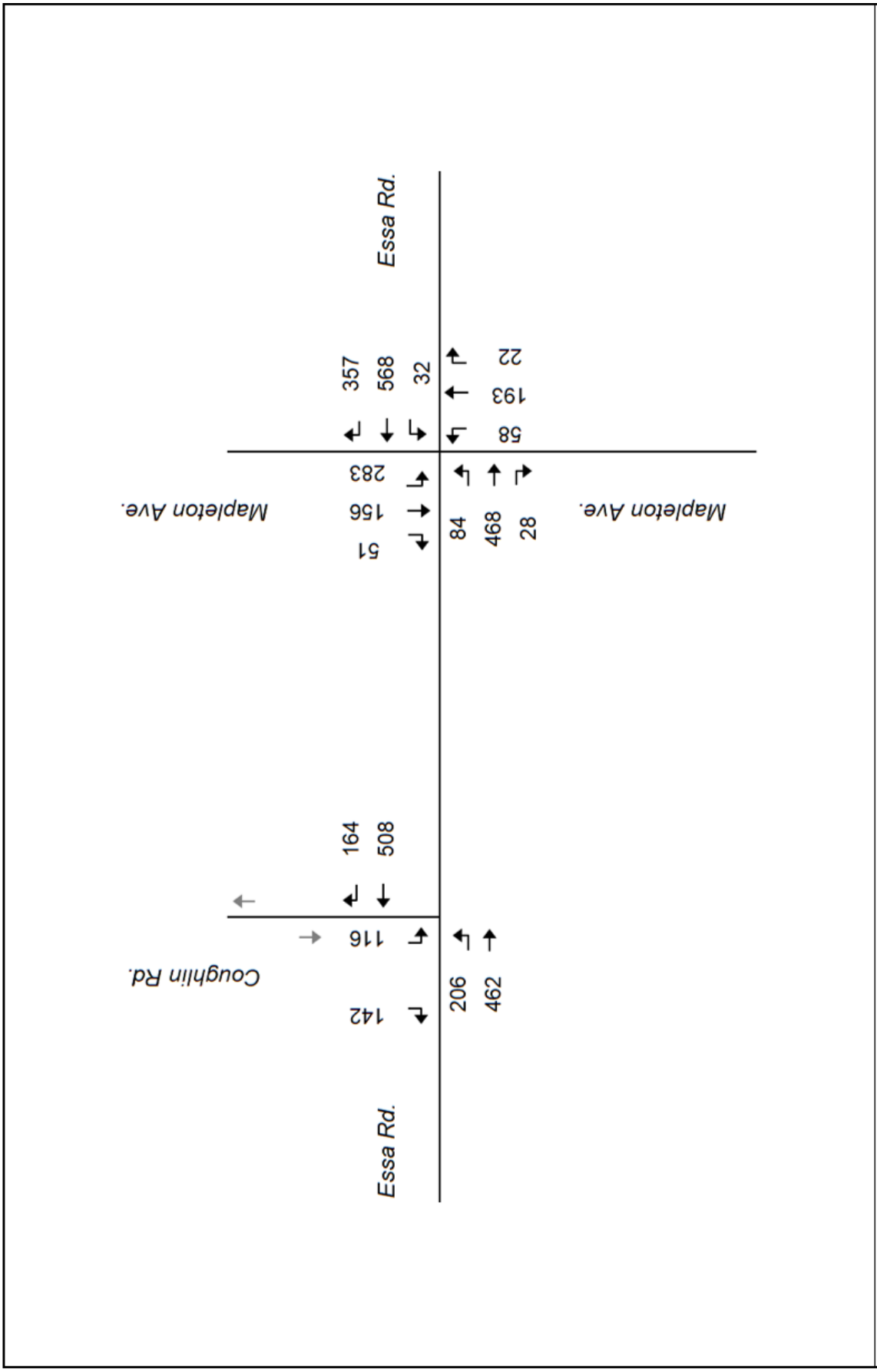

Figure 5-2:
Existing Traffic volumes – PM Peak Hour

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2.6 Existing Traffic Operations

The existing intersection operations were analyzed on the basis of the existing roadway A.M. and P.M. peak hour traffic volumes. The operations of the intersections in the study area were evaluated using the existing lane geometric configurations, traffic controls and the existing weekday A.M. and P.M. peak hour traffic volumes provided by the City of Barrie and by Traffic+ Engineering Ltd. The analysis was undertaken by using Synchro Traffic Software 9.1, which incorporates analysis of intersection capacity based on the approach outlined in the Highway Capacity Manual (HCM), Transportation Research Board.

Intersection level of service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The highest possible rating is LOS A, under which the average total delay is equal or less than 10 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections (50 seconds at unsignalized intersections), the movement is classified as LOS F and remedial measures are usually implemented, if they are feasible. The intersection analysis considered three separate measures of performance:

- The level of service (LOS) for each turning movement,
- The volume to capacity (v/c) ratio for each turning movement, and
- The 95th percentile queue length, obtained from Synchro output

The existing intersection operations are summarized in **Table 2** indicating the existing levels of service, volume to capacity ratios (v/c) and 95th percentile queues experienced within the study area, for the AM and PM peak hours.

Table 2: Existing Peak Hour Traffic Operations

Analysis Period	Intersection	Control Type	MOE	Directions / Movements / Approaches																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Essa Rd. / Mapleton Ave.	Signalized	LOS	C	B		B	C	C		C	B	C		C	B	B		B	C
			Delay	21.3	17.7		20.0	34.8	31.2		31.8	16.4	25.7		25.0	16.0	19.4		19.3	22.1
			V/C	0.46	0.21			0.07	0.20			0.09	0.32			0.06	0.38			0.46
			95th Queue	65.7	38.8			11.2	33.4			9.3	47.4			7.7	44.7			
	Essa Rd. / Coughlin Rd.	Signalized	LOS	C		A	B					A	A		A		B		B	B
			Delay	27.9		6.4	15.4					6.9	8.2		8.0		13.3		13.3	11.6
			V/C	0.20		0.26						0.10	0.17				0.21			0.26
			95th Queue	27.6		14.0						8.7	20.0				28.6			
PM Peak Hour	Essa Rd. / Mapleton Ave.	Signalized	LOS	C	B		C	D	D		D	C	C		C	B	C		C	C
			Delay	25.9	19.7		23.3	38.0	40.5		39.9	23.5	25.5		25.3	15.6	30.7		30.2	28.6
			V/C	0.61	0.28			0.21	0.49			0.46	0.40			0.09	0.77			0.77
			95th Queue	21.9	55.7			14.7	153.0			15.1	58.3			63.6	54.1			
	Essa Rd. / Coughlin Rd.	Signalized	LOS	C		A	B					B	A		A		B		B	B
			Delay	30.6		6.5	17.3					10.7	8.6		9.3		17.5		17.5	14.0
			V/C	0.27		0.29						0.47	0.23				0.46			0.47
			95th Queue	35.7		15.0						26.9	29.1				62.4			

Based on the above criteria and the entries in **Table 2**, it can be deduced from the results all intersections perform satisfactorily on an overall basis during both the A.M. and the P.M. peak hours, with satisfactory delays and volume/capacity ratios for all approaches. However, regarding the individual turning movements the following is noted:

A.M. peak:

Existing traffic operations during A.M. peak that both signalized intersections have no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS C and the volume over capacity ratios are well below capacity.

P.M. peak:

Existing traffic operations during P.M. peak that the two signalized intersections have no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS D and the volume over capacity ratios are well below capacity.

Detailed Synchro 9.1 output is provided in **Appendix C**.

3.0 Future Background Traffic Conditions

3.1 Study Timeframe

A five-year horizon period (Year 2027) has been requested by City staff to assess the traffic operations in the vicinity of the proposed development. This is typical for a traffic study of this nature as it assumes the site full build out and occupancy.

3.2 Planned Transportation Network Improvements

Based on communications with City staff, it was indicated that there are no major transportation network improvements in the vicinity of the proposed development within the five-year study horizon.

3.3 Future Through Traffic Growth

A 3.0 percent per annum growth rate was applied to the through traffic volumes along Essa Road, and a 1.0 percent per annum growth rate was applied to the through traffic volumes along Mapleton Avenue. It should be noted that these growth rates were provided by City staff to be used for this traffic impact study.

3.4 Future Background Traffic Volumes

The 2027 future background traffic volumes for the weekday A.M. and P.M. peak hours were derived by applying growth rates onto the existing traffic volumes. The resulting 2027 future background traffic volumes are illustrated in **Figure 8A** and **Figure 8B** for A.M. peak and P.M. peak hours respectively.

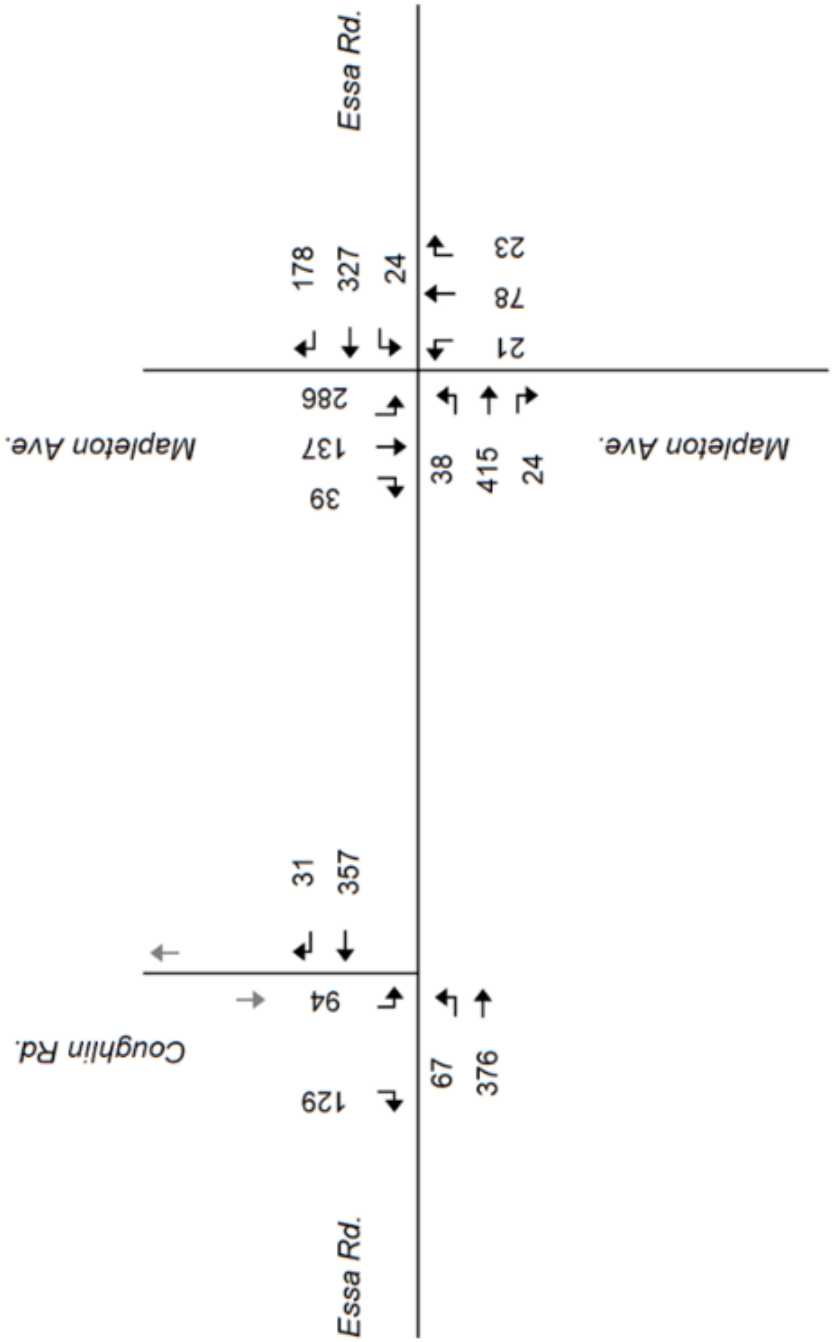


Figure 6-1: Future Background Traffic Volumes – A.M. Peak Hour (NTS)

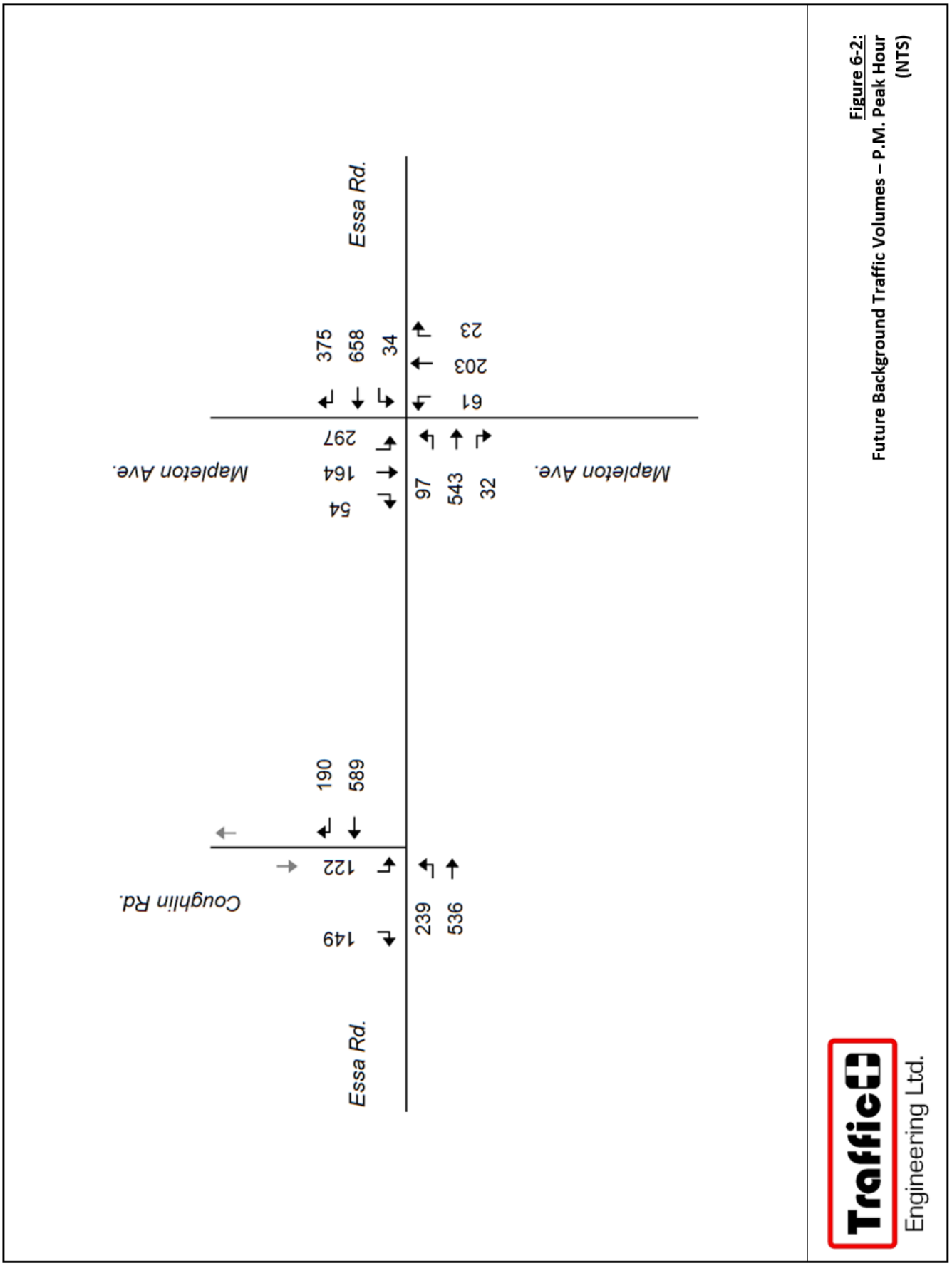


Figure 6-2:
Future Background Traffic Volumes – P.M. Peak Hour (NTS)

3.5 Future Background Intersection Traffic Operations

Intersections traffic operations under the future background traffic conditions were analyzed using the same analytical approach that was used for the existing traffic operations along with the background traffic forecast volumes as illustrated in **Figure 6-1** and **Figure 6-2**. For analysis purposes, the signal timing at the two intersections of Essa Road / Mapleton Avenue and Essa Road / Coughlin Road were not optimized and the existing cycle lengths were kept unchanged. The LOS results are summarized in **Table 3**.

Table 3: Future Background Peak Hour Traffic Operations – 2027 Horizon Year

Analysis Period	Intersection	Control Type	MOE	Directions / Movements / Approaches																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Essa Rd. / Mapleton Ave.	Signalized	LOS	C	B		C	C	C		C	B	C		C	B	C		C	C
			Delay	21.7	17.9		20.3	35.0	31.7		32.2	16.7	26.5		25.7	16.0	22.0		21.7	**23.3**
			V/C	0.48	0.22			0.07	0.22			0.12	0.37			0.07	0.43			**0.48**
			95th Queue	69.3	41.0			11.6	35.2			10.9	55.2			7.9	54.1			
	Essa Rd. / Coughlin Rd.	Signalized	LOS	C		A	B					A	A		A		B	B		**B**
			Delay	28.2		6.4	15.6					7.1	8.4		8.2		13.8	13.8		**11.8**
			V/C	0.21		0.27						0.12	0.19				0.24			**0.27**
			95th Queue	29.0		14.2						9.8	23.0				33.4			
PM Peak Hour	Essa Rd. / Mapleton Ave.	Signalized	LOS	C	C		C	D	D		D	C	C		C	B	D	D		**C**
			Delay	30.2	20.8		26.2	39.3	44.1		43.1	31.2	25.2		26.0	15.4	36.5	35.9		**32.1**
			V/C	0.70	0.31			0.25	0.58			0.59	0.43			0.10	0.86			**0.86**
			95th Queue	73.6	51.6			26.0	78.1			26.8	72.5			9.9	140.1			
	Essa Rd. / Coughlin Rd.	Signalized	LOS	C		A	B					B	A		B		B	B		**B**
			Delay	30.9		6.4	17.5					13.8	8.9		10.4		19.0	19.0		**15.1**
			V/C	0.29		0.31						0.60	0.27				0.53			**0.60**
			95th Queue	37.6		15.5						31.2	34.1				75.4			

As per **Table 3**, the signalized and unsignalized intersections at the boundary road network are expected to operate at overall levels of service ranging from LOS B to LOS D on the basis of the projected future background traffic volumes. Additionally, the signalised intersections were not optimised and kept as the existing signal timing, and the cycle length remained the same as existing conditions.

Regarding the individual turning movements the following is noted:

A.M. peak:

Under future background traffic conditions, traffic operations during A.M. peak the two signalized intersections are mostly expected to continue to operate with no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS C and the volume over capacity ratios are below capacity.

P.M. peak:

During P.M. peak, all intersections are expected to operate at levels of service ranging from LOS B to LOS D, with no critical movements or capacity constraints

Detailed Synchro 9.1 output is provided in **Appendix C**.

4.0 Proposed Development

4.1 Site Characteristics

The proposed development will consist of 101 mid-rise residential building with 3 commercial units located at street level, which will be built on a vacant land with a total surface area of approximately 3,771.95 m² (40,600.93 ft²).

4.2 Site Access

Access to the development is proposed via a new single full movement driveway. The proposed access will be located on Essa Road. The access driveway connection will also be used for garbage truck to the staging area. This access driveway to the subject site will operate under stop control at the egress approach.

4.3 Modal Split

Given that the trip generation was derived using ITE Trip Generation Manual (11th Edition), Volume 2, where the trip generation surveys were gathered in "Dense Multi-Use Urban and Centre City Core", where multimodal transportation are existent. Therefore, no modal split reduction factor has been applied to the total trip generation given that the proposed development has easy access to a well-served transit system and amenities are within walking distance.

4.4 Trip Generation

As noted, the proposed development is comprised of a mixed-use condominium building to be built on a site with a total surface area equal to approximately 3,771.95 m² (40,600.93 ft²). The site will consist of five condominium buildings with a total of 101 mid-rise residential units with three (3) commercial units located at street level.

The trip generation related to the proposed development was estimated using the trip generation rates provided in the ITE Trip Generation Manual (11th Edition) for the following land uses:

Land Use Category 231: Mid-Rise Residential with Ground-Floor Commercial

As indicated in **Section 4.3**, there was no adjustment to reflect the local modal split characteristics. Table 4 identifies the trip generation for the proposed development.

Table 4: Estimated Trip Generation Rates

	# of Units	Peak Periods	Average Rate	Total Trip	IN (Rate)	OUT (Rate)	IN Trips	OUT Trips
Mid-Rise Residential with Ground-Floor Commercial (231)	101	AM	0.20	20	0.39	0.61	8	12
		PM	0.28	28	0.44	0.56	12	16

4.5 Trip Distribution and Assignment

The distribution and assignment of the site-generated trips to the future site access and boundary road network, which are illustrated in **Figure 7-1** and **Figure 7-2**, were based on the local traffic volume patterns (mainly based on the intersection of Essa Road and Coughlin Road). The distribution percentage is summarized for each direction in **Table 5**.

Table 5: Estimated Trip Distribution.

Origin / Destination	Percentages
North via Essa Road	40%
South via Essa Road	60%
Total	**100%**

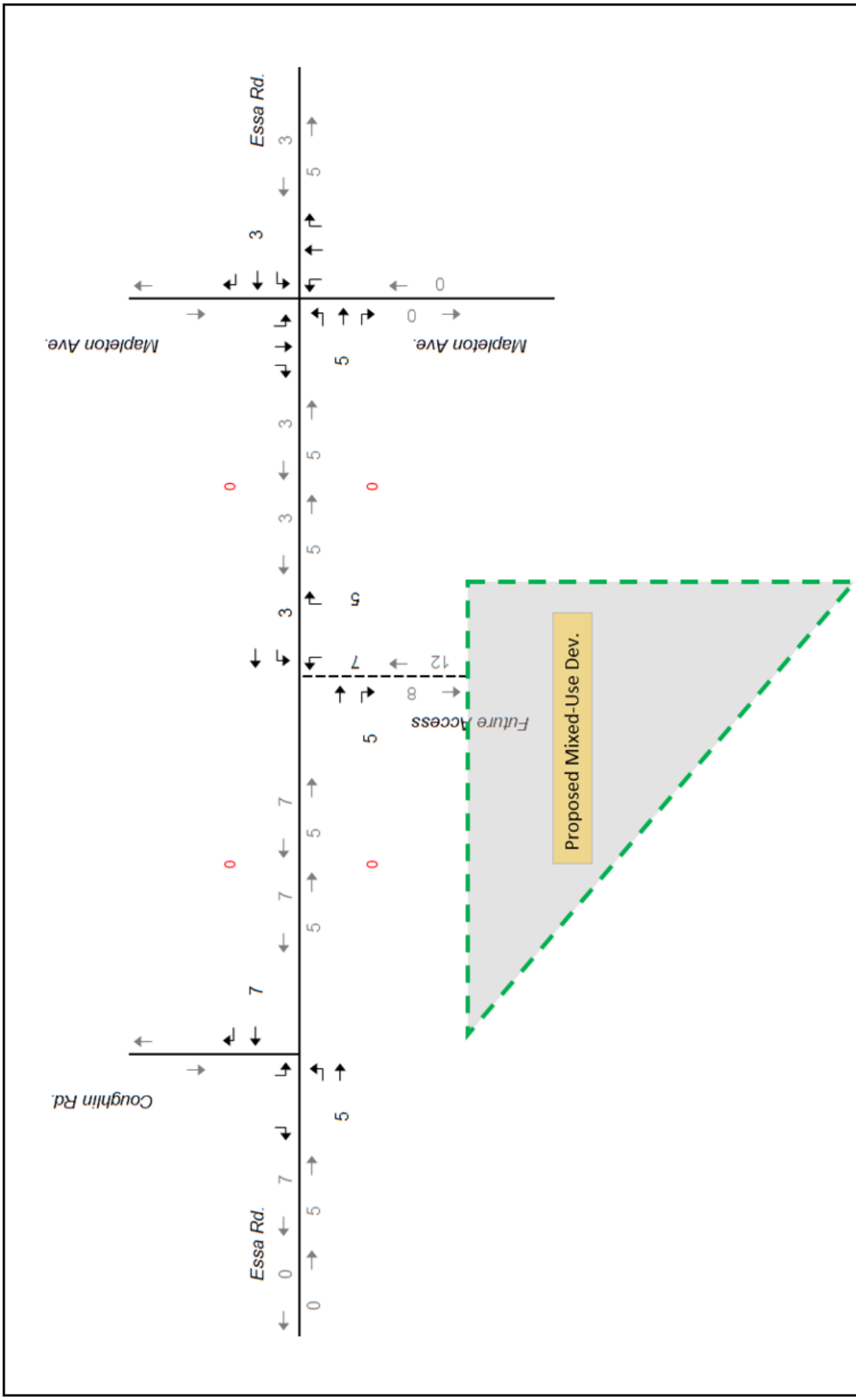


Figure 7-1:
Site Traffic Assignment – A.M. Peak Hour (NTS)

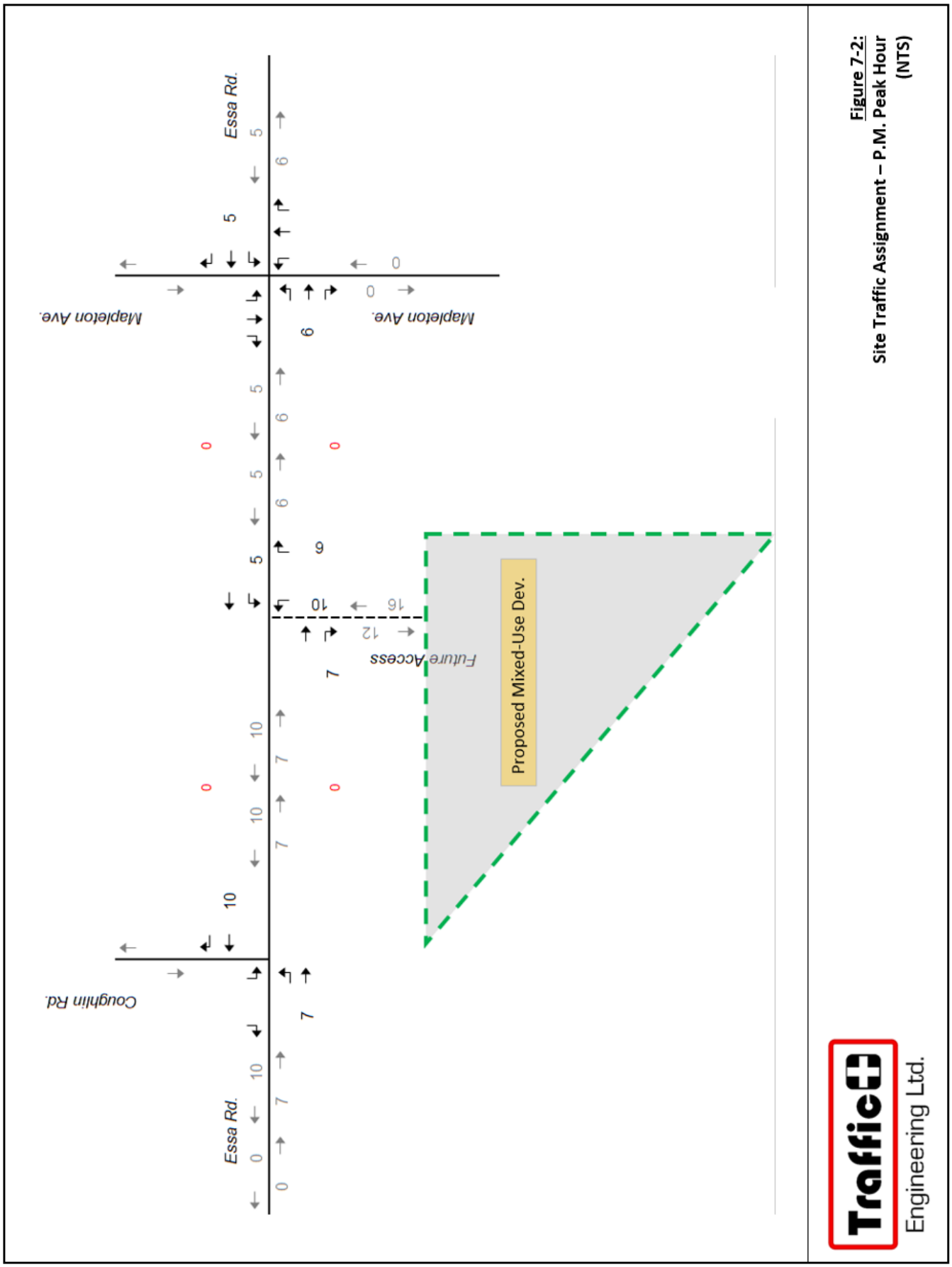


Figure 7-2:
Site Traffic Assignment – P.M. Peak Hour (NTS)

5.0 Future Total Traffic Conditions

5.1 Future Total Traffic Volumes

The future total traffic volumes were developed by superimposing the net site generated traffic volumes onto the future background traffic volumes. The horizon 2027 weekday A.M. and P.M. peak hour future total traffic volumes for the study area intersections are illustrated in **Figure 8-1** and **Figure 8-2**.

It should be noted that site synergy between the proposed development and Smartcentres was not taken into consideration, which would have further reduce total trips. This approach is undertaken to reflect a more conservative scenario to analyse the site traffic impacts within the study area.

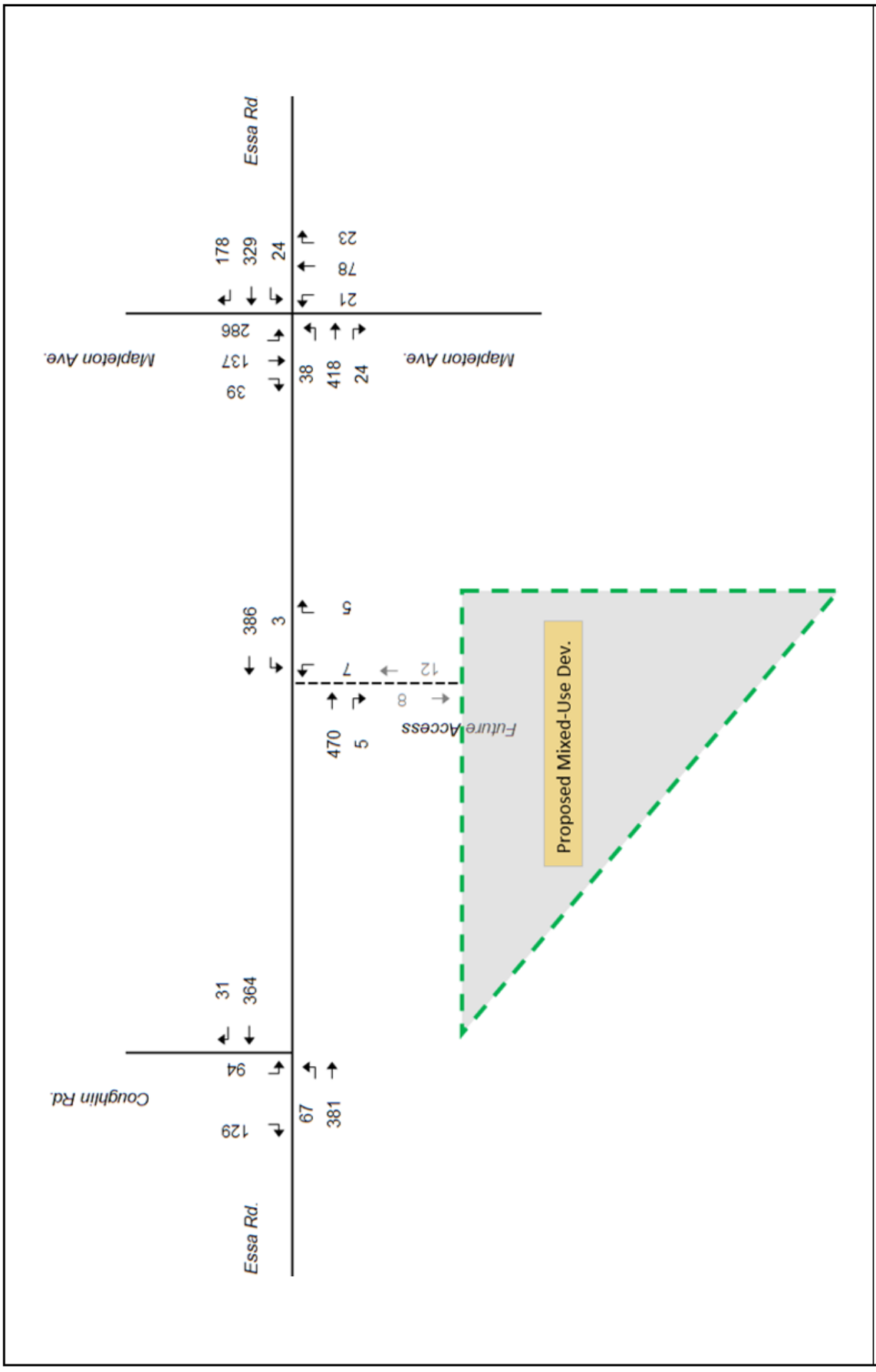


Figure 8-1: Future Total Traffic Volumes – A.M. Peak (NTS)

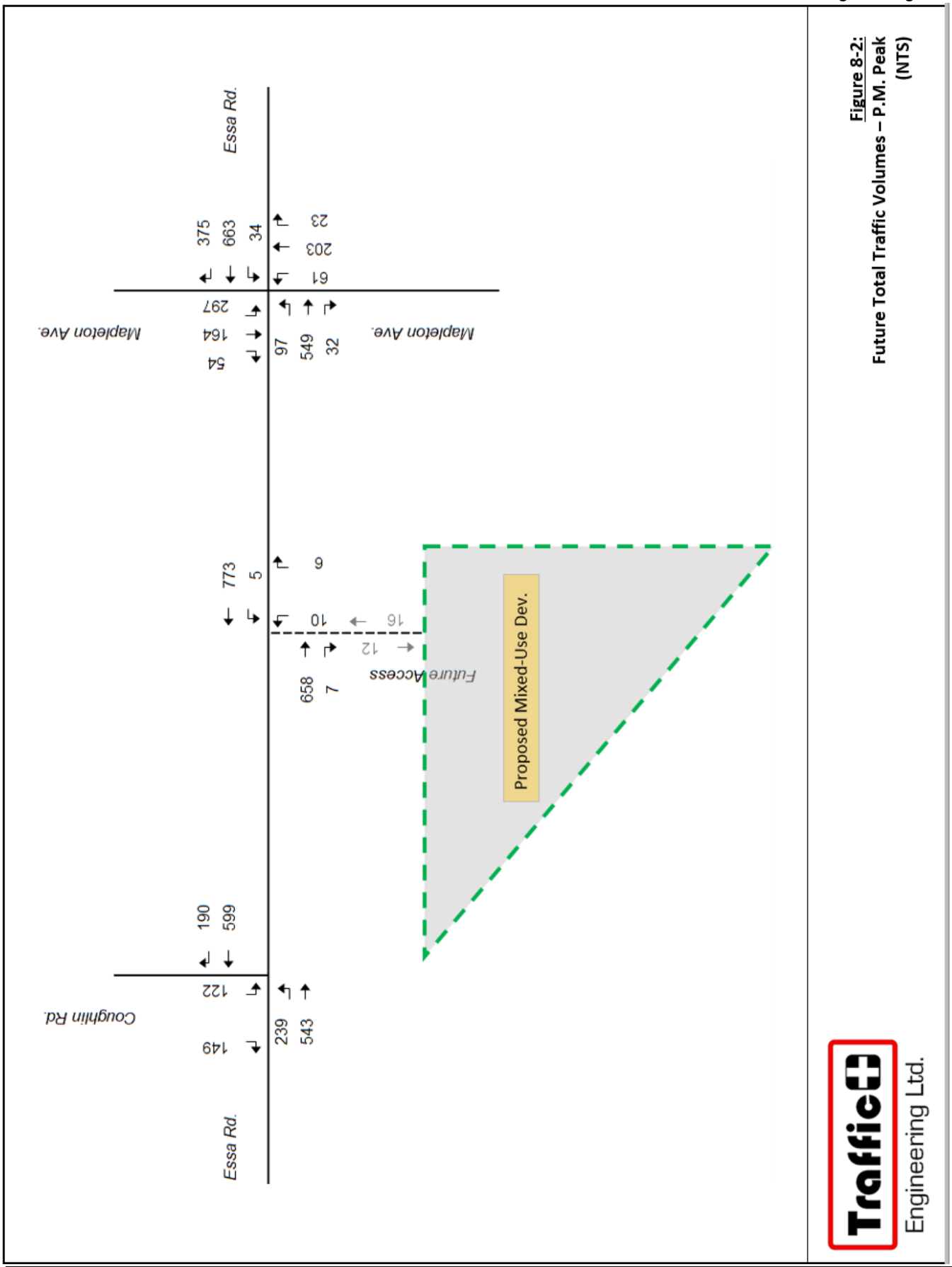


Figure 8-2:
Future Total Traffic Volumes – P.M. Peak (NTS)

5.2 Future Total Traffic Intersection Operations

The future total traffic operations of the study area intersections were analyzed using the horizon 2027 future total traffic forecasts. For the purpose of this analysis, the signal timings were optimized, with the existing cycle lengths unchanged. **Table 6** summarizes the resulting traffic operations.

Detailed Synchro 9.1 output is provided in **Appendix E**.

Table 6: Future Total Peak Hour Traffic Operations – 2027 Horizon Year

Analysis Period	Intersection	Control Type	MOE	Directions / Movements / Approaches																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Essa Rd. / Mapleton Ave.	Signalized	LOS	C	B		C	C	C		C	B	C		C	B	C		C	C
			Delay	21.7	17.9		20.3	35.0	31.7		32.2	16.7	26.5		25.7	16.0	22.2		21.9	**23.4**
			V/C	0.48	0.22			0.07	0.22			0.12	0.38			0.07	0.43			**0.48**
			95th Queue	69.3	41.0			11.6	35.2			10.9	55.4			7.9	54.8			
	Essa Rd. / Coughlin Rd.	Signalized	LOS	C		A	B					A	A		A		B		B	B
			Delay	28.2		6.4	15.6					7.1	8.4		8.2		13.8		13.8	**11.8**
			V/C	0.21		0.27						0.12	0.20				0.25			**0.27**
			95th Queue	29.0		14.2						9.8	23.3				34.2			
	Essa Rd. / Access Driveway	Unsignalised	LOS					B		B	B		A	A	A	A	A		A	A
			Delay					12.3		12.3	12.3		0.0	0.0	0.0	8.2	0.0		0.1	**0.20**
			V/C					0.03		0.03			0.20	0.10		0.00	0.12			**0.20**
			95th Queue					0.6		0.6			0.0	0.0		0.1	0.0			
PM Peak Hour	Essa Rd. / Mapleton Ave.	Signalized	LOS	C	C		C	D	D		D	C	C		C	B	D		D	C
			Delay	30.4	20.8		26.3	39.3	44.2		43.1	31.2	25.2		26.1	15.4	36.9		36.3	**32.3**
			V/C	0.70	0.31			0.25	0.58			0.59	0.44			0.10	0.86			**0.86**
			95th Queue	73.6	51.6			26.0	78.1			26.8	73.5			9.9	141.8			
	Essa Rd. / Coughlin Rd.	Unsignalised	LOS	C		A	B					B	A		B		B		B	B
			Delay	30.9		6.4	17.5					14	8.9		10.5		19.2		19.2	**15.2**
			V/C	0.29		0.31						0.61	0.27				0.54			**0.61**
			95th Queue	37.6		15.5						31.2	34.5				76.8			
	Essa Rd. / Access Driveway	Unsignalised	LOS					B		B	B		A	A	A	A	A		A	A
			Delay					11.8		11.8	11.8		0.0	0.0	0.0	8.8	8.4		0	**0.20**
			V/C					0.03		0.03			0.28	0.14		0.01	0.25			**0.28**
			95th Queue					0.8		0.8			0.0	0.0		0.1	0.0			

As summarized in **Table 6**, the signalized and unsignalized intersections at the boundary road network are expected to operate at levels of service ranging from LOS A to LOS D on the basis of the projected future total traffic volumes. It should be noted that the above analysis, the signalised intersections were not optimised and the cycle length remained the same as the existing conditions.

Regarding the individual turning movements the following is noted:

A.M. peak:

Under future total traffic conditions, traffic operations during A.M. peak at all signalized and unsignalized intersections are still expected to continue to operate with no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS A (excellent) to LOS C (good) and the volume over capacity ratios are below capacity.

P.M. peak:

During P.M. peak, all intersections are still expected to operate at levels of service ranging from LOS A to LOS D, with no critical movements or capacity constraints.

In summary, the proposed development is anticipated to have very minimal impacts on traffic operations within the study area and at key signalized and unsignalized intersections.

6.0 Parking Reduction Justification

Based on the City's parking by-law, *"City of Barrie Comprehensive Zoning By-law 2009-141*", the following is undertaken to justify the proposed site parking reduction:

- Defining the City of Barrie Comprehensive Zoning By-law 2009-141 parking requirements for mixed-use developments; and

- Review of residential parking standards used by other nearby municipalities from City of Barrie;

6.1 City of Barrie Parking By-law

The "*City of Barrie Comprehensive Zoning By-law 2009-141*" requires for proposed residential buildings located outside the urban growth centre to provide 1.5 space per unit with no specific parking ratio for visitors parking., although it is expected that visitors would utilize the residential site and no on-street parking will be permitted. For commercial units, 1.0 parking space per 24 m^2 is required.

6.2 Parking Ratios from Other Municipalities

Parking by-laws adopted by other municipalities for residential building are summarized in **Table 7**.

As summarized in the table, the parking rates for residential buildings range between 0.75 to 1.35 spaces per unit. While some municipalities provide blanket rates for an entire geographical region regardless of development attributes.

However, the City of Barrie's parking by-law does not specify the parking ratio for visitors, which means the developer has the choice to allocate any number of parking spaces for visitors.

Table 7: Summary of Parking By-laws Adopted by Other Municipalities

Municipalities	Parking Ratios		
	Residential Units	Visitors	Total Parking
City of Barrie	1.5	Not Specified	1.5
Town of Newmarket (Apt. Building or a Mixed-Use Building)	Bachelor: 0.7 per Unit One Bed: 0.8 per unit Two Bed: 1.0	Bachelor: 0.15 per Unit One Bed: 0.15 per unit Two Bed: 0.15	Bachelor: 0.85 per Unit One Bed: 0.95 per unit Two Bed: 1.15
City of Orillia	0.75	Not Specified	0.75
City of North Bay	0.5	Not Specified	0.5

6.3 Proposed Parking Ratio

Given the above parking by-laws required by nearby municipalities to City of Barrie, it is therefore and reasonable to recommend the following parking supply:

Table 8: Proposed Parking Supply

UNIT TYPES	Proposed Parking Supply					
	Number of Units	Ratio - Residential	Residential Parking	Ratio - Visitor	Visitor Parking	Total Parking
1 - Bedroom	19	0.8	15	0.09	9	101
2 - Bedroom	82	0.94	77			

Total Number of Units	101

It should be noted that this parking reduction is supported by on-site bike storage located on the ground floor (surface area equal to 772.0 ft^2), as stated in Section 2.4, as well as a frequent bus system where a bus stop is located near the proposed mixed-use development.

Furthermore, there are numerous amenities located just across from the development. Which will not require residents to use their vehicles.

Regarding the commercial parking reduction, from the City of Barrie parking by-law it is required to provide 18 parking spaces, whereas it is proposed 15 spaces, a 3 parking spaces

reduction. Based on our experience, this reduction will not have any impacts on future businesses considering that there may be businesses (not yet defined) which may have a low customer attractions. Hence, the proposed 15 parking spaces will be more than sufficient.

7.0 Site Circulation Assessments

Based on the proposed site layout and type of development, which will consist of a mixed-use residential building, the garbage truck will access the building from the main access driveway located off Essa Road inside the building where the staging area will be located. The assessments will consist of undertaking numerous swept paths at the proposed staging area utilizing City of Barrie garbage truck as well as a more common garbage truck (Wayne Titan truck).

7.1 Type of Garbage Trucks

In consultation with City of Barrie Staff, information regarding the type of garbage truck to be used in the swept path assessments were provided. It was indicated in the document provided by City staff that the truck dimensions provided were approximate to help in access design requirement and that are subject to change. In this study, the swept path assessments used two types of vehicles, the City of Barrie's garbage truck and a more common garbage truck (Wayne Titan truck) that is shorter to the City of Barrie's garbage truck by 0.69 metres (total length 10.31 metres). The dimensions and turning movement radii specifications for all types of vehicles used in the assessment were replicated in AutoTurn software, and City of Barrie's garbage truck dimensions document, are found in **Appendix F**.

7.2 Swept Path Assessments

The vehicular circulation assessments around the proposed site were completed using AutoTurn 11 software package for all vehicles. Based on the comprehensive AutoTurn assessments, it can be conclude that the proposed site layout around the development, as well as at the proposed staging area, can accommodate both garbage truck vehicles, however, the City of Barrie's truck may have to perform additional maneuvers to exit the site.

Detailed AutoTurn assessments in different locations around the proposed development are illustrated in **Figures 9-1, Figure 9-2, Figure 10-1, Figure 10-2, and Figure 10-3**.

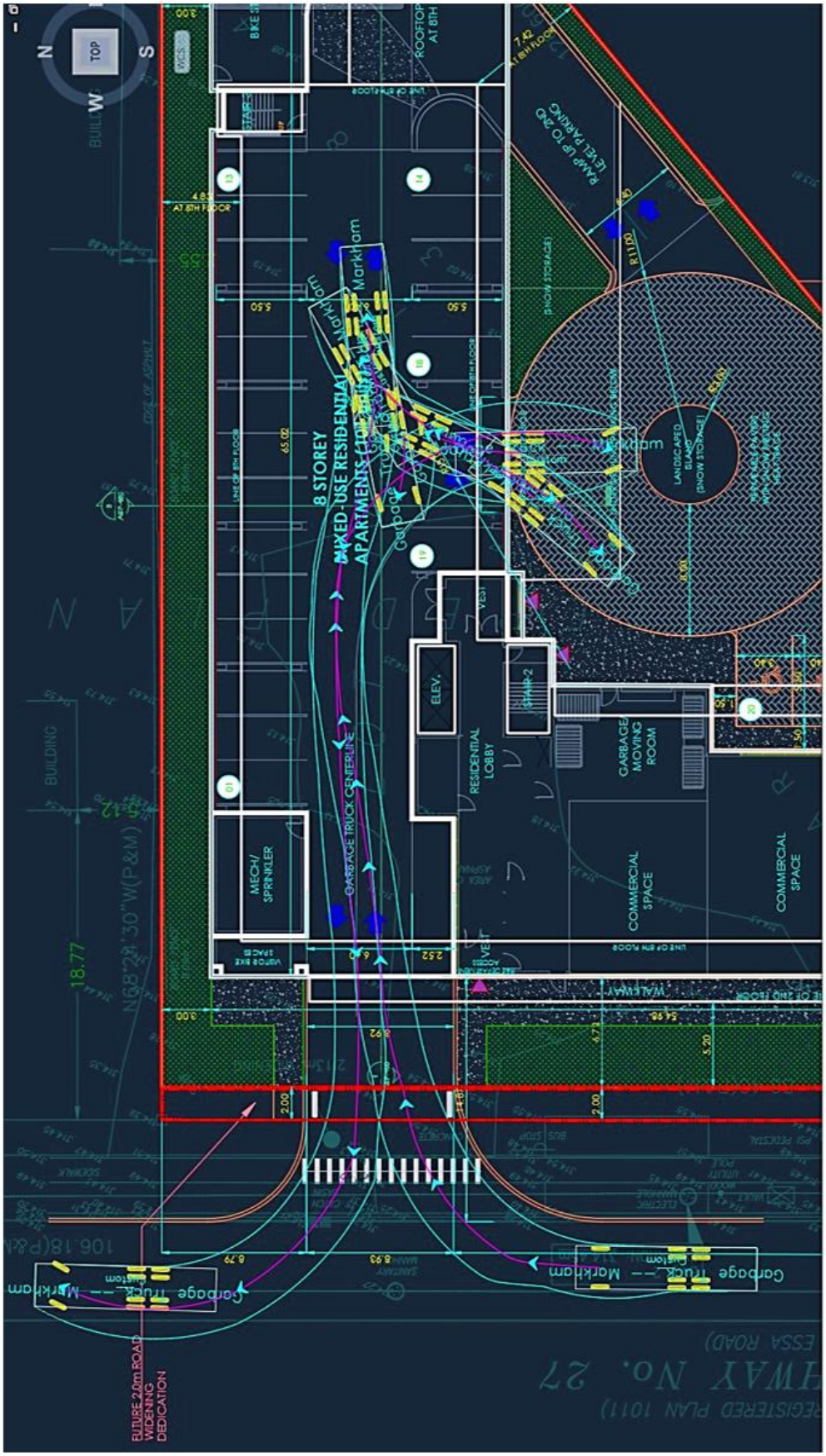


Figure 9-1:
Swept Path Assessments - City of Barrie Garbage Truck
Source: City of Barrie

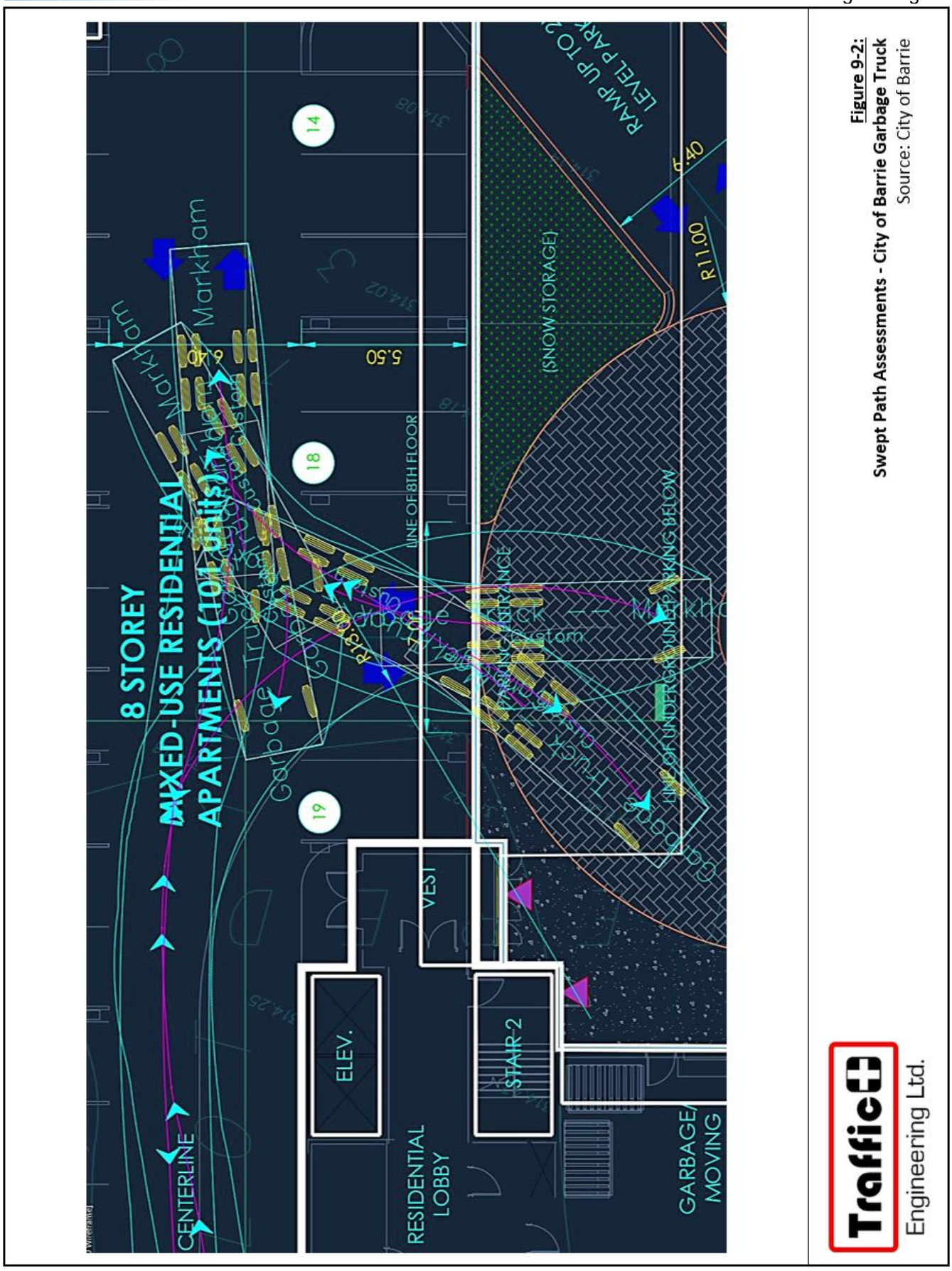


Figure 9-2:
Swept Path Assessments - City of Barrie Garbage Truck
Source: City of Barrie

Figure 10-1:
Swept Path Assessments - City of Barrie Garbage Truck
Source: City of Barrie

Traffic Engineering Ltd.

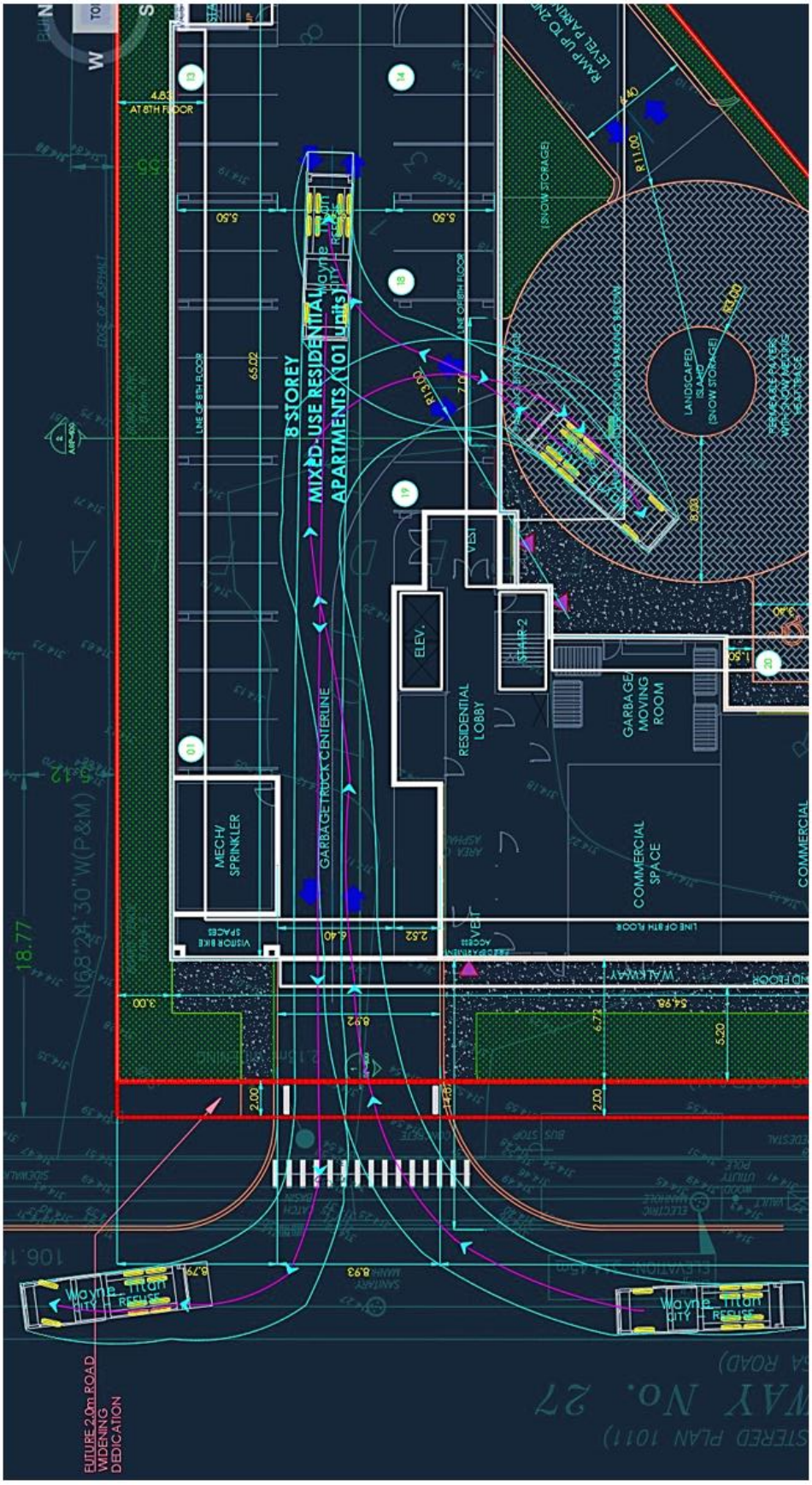


Figure 10-2:
Swept Path Assessments - Wayne Titan Garbage Truck

Traffic Engineering Ltd.

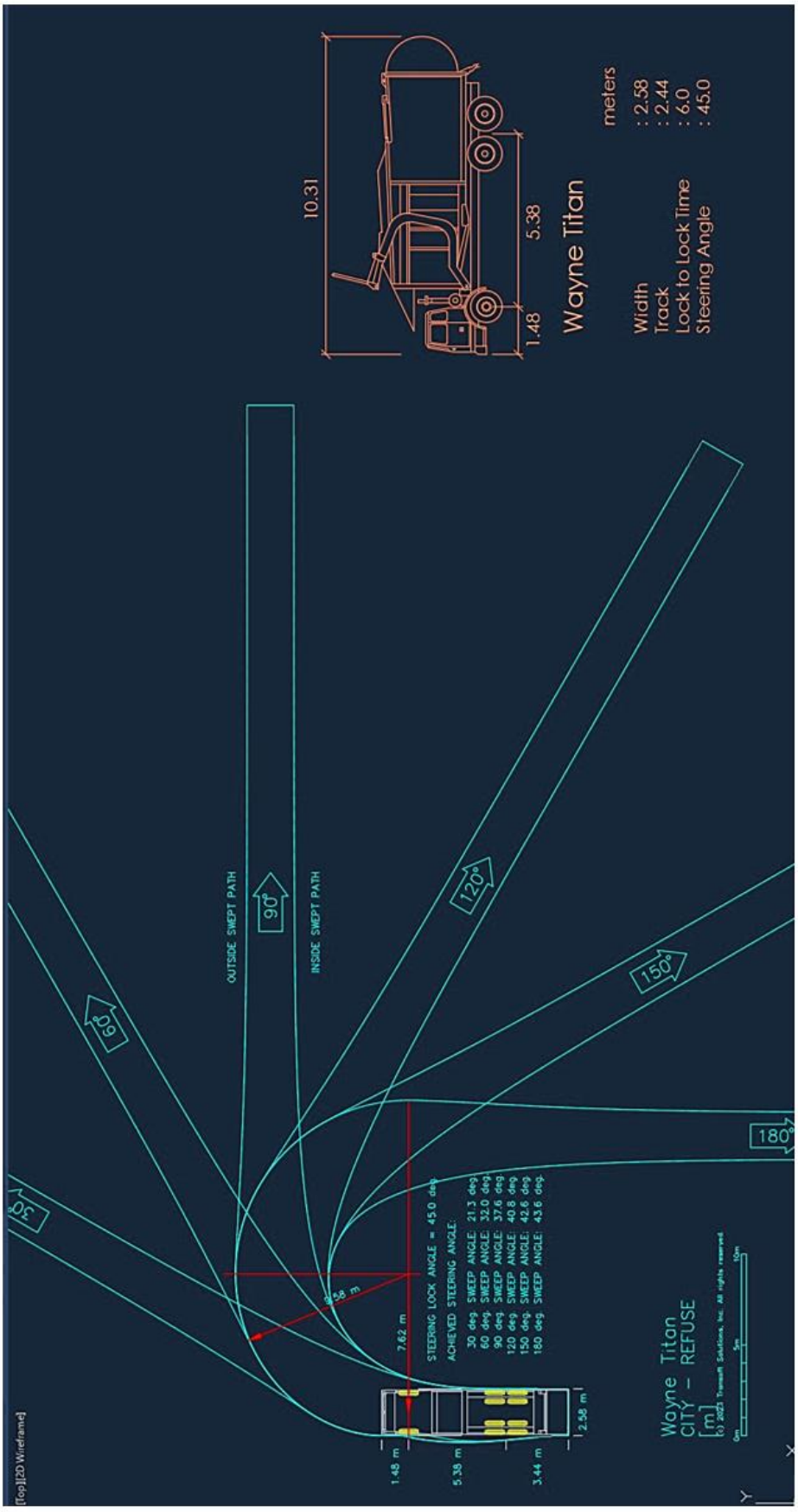


Figure 10-3:
Swept Path Assessments – Wayne Titan Garbage Truck

Traffic Engineering Ltd.

8.0 Construction Management

City of Barrie staff requested to undertake a high level construction staging plan to ensure a safe and efficient movements around the site for pedestrians, vehicular traffic and construction trucks around the site during construction. Additionally, an assessment was undertaken pertaining to parking of construction workers, delivery of construction material, maintenance of adjacent property access, pedestrian movements in the vicinity of the site, any impacts to City infrastructure, and any other pertinent elements. The preliminary construction staging plan is illustrated in **Figure 11**.

The access to the site during construction will be provided via the proposed driveway entrance located on Essa Drive. The proposed driveway will be the main access throughout the entire duration of construction, to include demolition, site preparation for construction, servicing, and building construction.

All deliveries and construction personnel parking can be accommodated on-site and onto the created local access road. To ensure safer operations, construction work will occur within the property limits and at the temporary site access located south of the property. Pedestrian movements adjacent to the site will not be affected by the construction of the proposed development, and sidewalks near the site will not be closured.

The proposed preliminary construction staging plan is not expected to obstruct traffic flows in the vicinity of the site or into neighbouring houses. During the egress and ingress of delivery trucks and construction trucks, a flagman will be standing at the temporary access off of Essa Road to guide traffic and trucks, this is to ensure a safer vehicular flow.

Based on the City of Barrie construction By-law, all construction activities within the site, this is to include start-up and warm-up of construction equipment, will only happen between 07:00 AM and 7:00 PM on weekdays and Saturdays. No construction activities will occur outside the above-noted periods without an approval from the City.

Fences covered with plywood will be erected along the site along Essa Road to ensure that no debris or dust will fall onto the sidewalk.

Construction signage will be posted at the site access point and as required, notifying visitors that check-in at the site office is mandatory. Signage will also be provided to identify the area as a ‘construction site’, and clearly showing that all visitors and construction employees are required be wear personal protection equipment (PPE) suitable for a construction zone, this is to include, but not limited to hard hat, construction footwear, high visibility gear. Signage will also be provided informing that access to the site is limited to authorized personnel only.

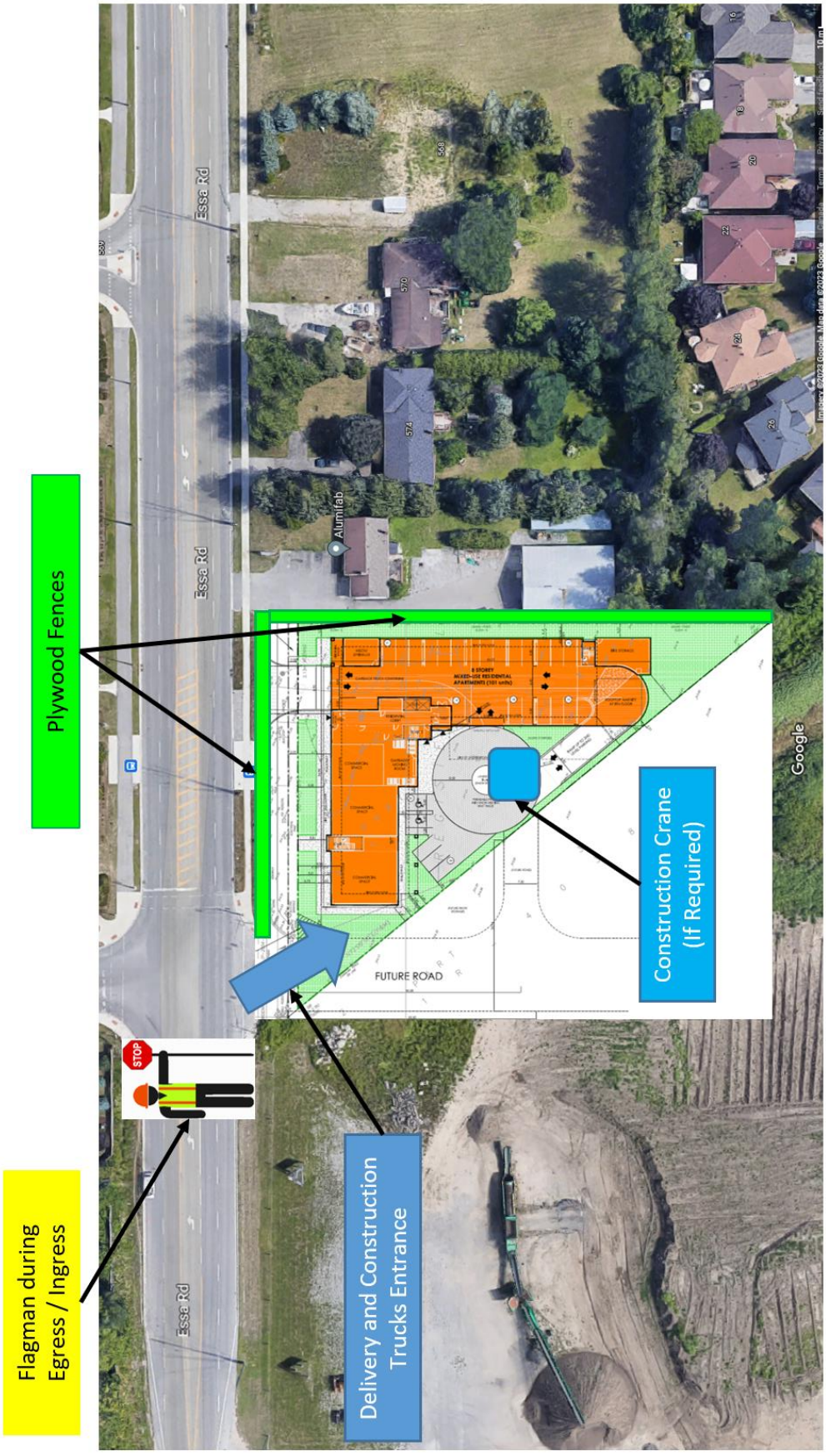


Figure 11:
Preliminary Construction Management Plan

Traffic Engineering Ltd.

9.0 Signage Plan

A signage plan is provided for a safe vehicular circulation around the internal site.

The Signage Plan is found in **Appendix G**

10.0 Findings and Conclusions

The findings and conclusions of our study are as follows:

- **Development:**

The proposed development will consist of a condominium building of eight (8) storeys with a total of 101 residential units and three (3) commercial units to be located at street level, which will be built on a vacant land with a total surface area of approximately 3,771.95 m² (40,600.93 ft²).

- **Existing Traffic Operations:**

A.M. peak:

Existing traffic operations during A.M. peak that both signalized intersections have no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS C and the volume over capacity ratios are well below capacity.

P.M. peak:

Existing traffic operations during P.M. peak that the two signalized intersections have no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS D and the volume over capacity ratios are well below capacity.

- **Future Background Traffic Operations:**

A.M. peak:

Under future background traffic conditions, traffic operations during A.M. peak the two signalized intersections are mostly expected to continue to operate with no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS B to LOS C and the volume over capacity ratios are below capacity.

P.M. peak:

During P.M. peak, all intersections are expected to operate at levels of service ranging from LOS B to LOS D, with no critical movements or capacity constraints

The signalised intersections were not optimised and kept as the existing signal timing, and the cycle length remained the same as existing conditions.

- **Modal Split:**

Given that the trip generation was derived using ITE Trip Generation Manual (11th Edition), Volume 2, where the trip generation surveys were gathered in "Dense Multi-Use Urban and Centre City Core", where multimodal transportation are existent. Therefore, no modal split reduction factor has been applied to the total trip generation given that the proposed development has easy access to a well-served transit system and amenities are within walking distance.

- **Trip Generation:**

The development is estimated to generate approximately 20 trips in the AM peak hour and 28 trips in the PM peak hour;

- **Future Total Traffic Operations:**

A.M. peak:

Under future total traffic conditions, traffic operations during A.M. peak at all signalized and unsignalized intersections are still expected to continue to operate with no critical movements or capacity constraints where levels of service on each movement at these intersections range from LOS A (excellent) to LOS C (good) and the volume over capacity ratios are below capacity.

P.M. peak:

During P.M. peak, all intersections are still expected to operate at levels of service ranging from LOS A to LOS D, with no critical movements or capacity constraints.

The signalised intersections were not optimised and kept as the existing signal timing, and the cycle length remained the same as existing conditions.

- **Parking Reduction Justification**

A parking justification assessment was undertaken by comparing the "*City of Barrie Comprehensive Zoning By-law 2009-141*" with other nearby municipalities' parking ratios, where it was found the following:

- City of Barrie parking ratio does not provide a specific parking ratio for visitors. Therefore, a reasonable number of visitors parking can be chosen by the developer; and
- There is no specific parking ratio per unit type (for bachelor unit, 1 bedroom unit, 2 bedrooms units, etc)

Therefore, proposed parking ratios were provided with in mind the location of the development being well served by transit and nearby numerous amenities, as well as an on-site bike storage room with a surface area equal to 772.0 ft^2, where they will justify such parking reduction.

Regarding the commercial parking reduction, from the City of Barrie parking by-law it is required to provide 18 parking spaces, whereas it is proposed 15 spaces, a 3 parking spaces reduction. This reduction will not have any impacts on future businesses hence, the proposed 15 parking spaces will be more than sufficient.

- **Site Circulation Assessments**

The swept path assessments were undertaken for two types of garbage vehicles, one that the City of Barrie provided and the second with a more common garbage truck in use in different municipalities. It can be concluded, based on the assessments that the City of Barrie design truck can be accommodated on the site, however with more maneuvers to exit the staging area compared to the design truck than the second garbage truck.

- **Construction Management**

City of Barrie staff requested to undertake a high level construction staging plan to ensure a safe and efficient movements around the site for pedestrians, vehicular traffic and construction trucks around the site during construction.

Numerous items are listed in order to achieve the above conditions:

- All construction activities within the site, this is to include start-up and warm-up of construction equipment, will only happen between 07:00 AM and 7:00 PM on weekdays and Saturdays. No construction activities will occur outside the above-noted periods without an approval from the City
- Construction signage will be posted at the site access point and as required, notifying visitors that check-in at the site office is mandatory
- Signage that identify the area as a ‘construction site’,
- Signage showing that all visitors and construction employees are required be wear personal protection equipment (PPE) suitable for a construction zone
- Signage showing that access to the site is limited to authorized personnel only
- During the egress and ingress of delivery trucks and construction trucks, a flagman will be standing at the temporary access off of Essa Road to guide traffic and trucks, to ensure a safer vehicular flow.

In summary, the proposed development is anticipated to have a very minimal impact on traffic operations within the study area.

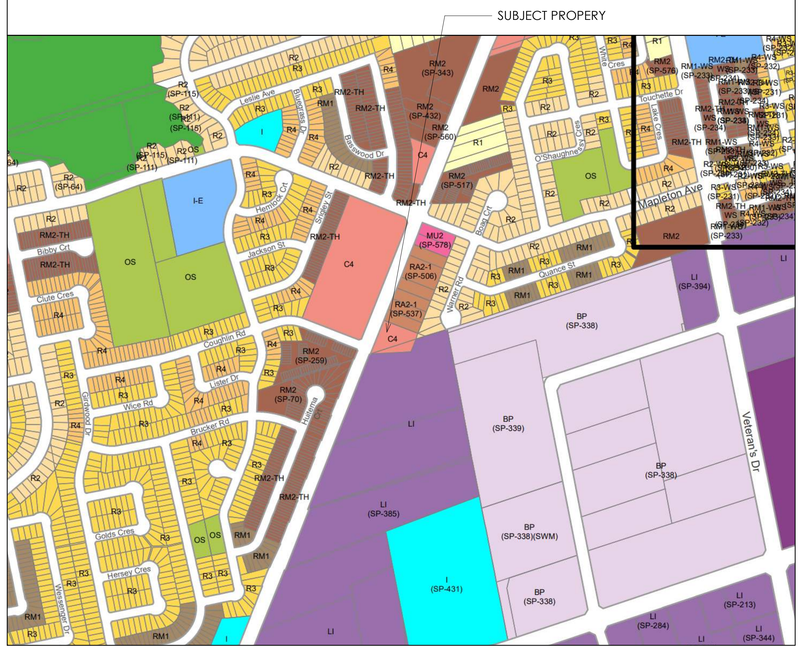
APPENDIX A

Site Plan

582 ESSA ROAD
BARRIE, ON

SITE PLAN APPROVAL SET

ZONING MAP



CLIENT:
INSPIRATION GROUP
MISSISSAUGA, ON

ARCHITECT:
KHALSA DESIGN INC.
BRAMPTON, ON

PLANNER:
TRACEY PILLION

CIVIL:
GERRITS ENGINEERINGS
MAPLEVIEW, ON
905-737-3303

LANDSCAPE:
ABOUD & ASSOCIATES INC.
GUELPH, ON

ELECTRICAL:

TRAFFIC:
TRAFFIC+ ENGINEERING LTD.

GEOTECHNICAL:
CAMBIUM
BARRIE, ON

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.
BRAMPTON, ON
TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	

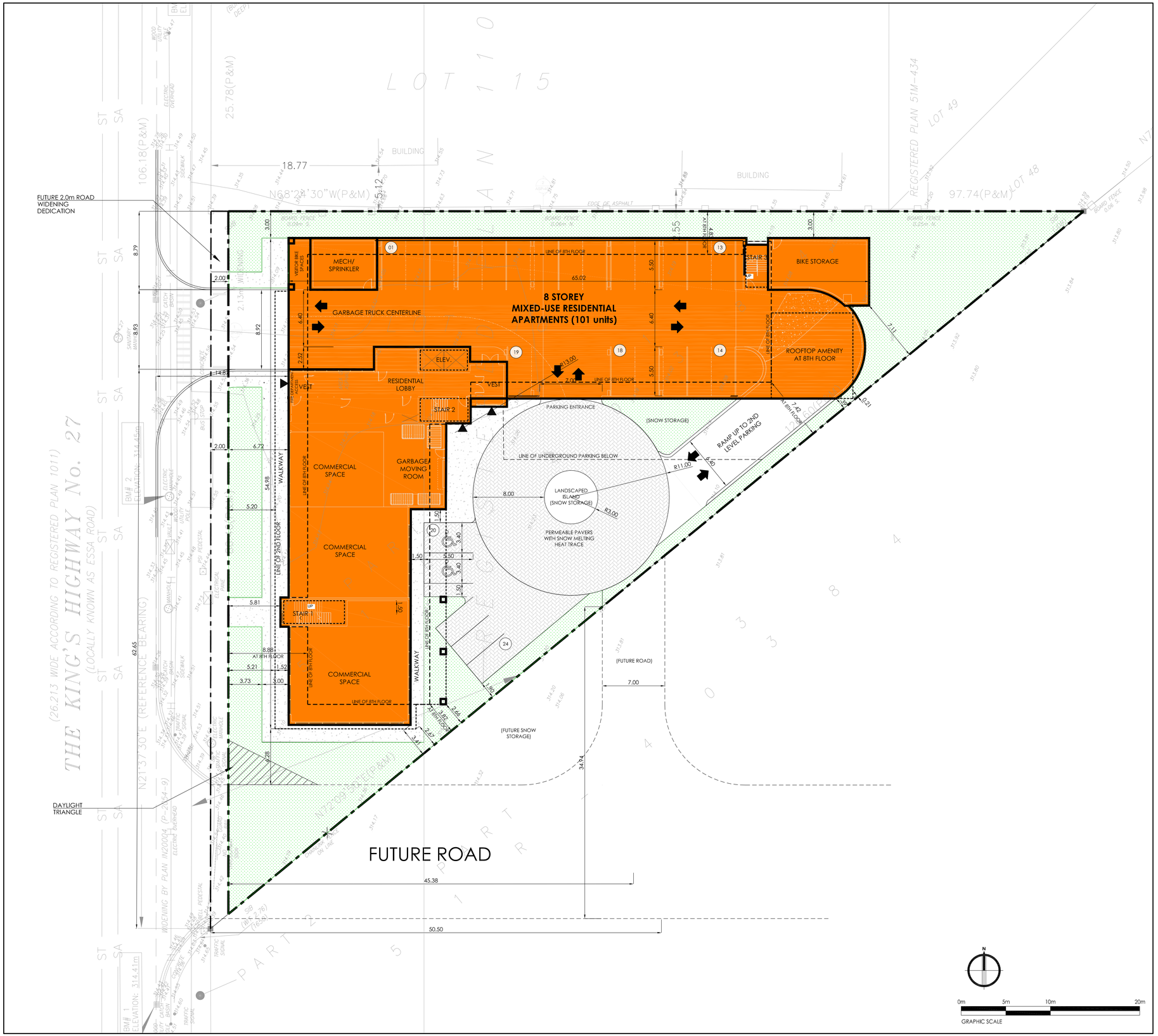
REVISIONS

No.	Description	Date

COVER SHEET

ASP-000

BARRIE APARTMENTS



1 SITE PLAN
1:200

SITE PLAN APPLICATIION NUMBER

D28-021-2022

CITY OF BARRIE

LOT 16 ON REGISTERED PLAN 1101
CITY OF BARRIE
COUNTY OF SIMCOE, ONTARIO

2 KEY PLAN
N.T.S

GENERAL NOTES:

1. ALL EXISTING PAVEMENT, CURBS, SIDEWALKS, DRIVEWAYS AND BOULEVARD AREAS DISTURBED BY THE CONSTRUCTION MUST BE REINSTATED TO THE SATISFACTION OF THE TOWN.
2. UTILITY IS THE RESPONSIBILITY OF THE DEVELOPER/OWNER.
3. THE CONTRACTOR/OWNER IS RESPONSIBLE FOR ALL UTILITY LOCATES AND AND DAMAGE OR DISTURBANCE DURING CONSTRUCTION.
4. ALL BARRIER FREE ENTRANCES AND BARRIER FREE PATHS OF TRAVEL MUST COMPLY WITH O.B.C. 3.8.
5. ALL EXTERIOR ILLUMINATION TO BE DIRECTED DOWNWARD AS WELL AS INWARD AND DESIGNED TO MAINTAIN ZERO CUTOFF LIGHT DISTRIBUTION AS THE PROPERTY LINE.
6. ALL DOWNSPOUTS TO BE CONNECTED TO THE STORM DRAINAGE SYSTEM.
7. THERE WILL BE NO CURBSIDE WASTE COLLECTION.
8. ALL CONDENSING UNITS TO BE SCREENED ON THE ROOF
9. SEPARATE PERMITS ARE REQUIRED FOR ANY SIGNAGE ON THE PROPERTY.
10. WHERE POSSIBLE TREES ARE TO BE PROTECTED FROM CONSTRUCTION.
11. EXCESS SNOW WILL BE REMOVED BY PRIVATE HAULER SUBJECT TO DEMAND FOR PARKING.
12. ALL FIRE ROUTES SHALL BE CONSTRUCTED OF HARD SURFACE MATERIAL SUCH AS ASPHALT OR CONCRETE AND DESIGNED TO SUPPORT A LOAD OF NOT LESS THAN 11,363kg PER AXLE AND HAVE A CHANGE IN GRADIENT OF NOTE MORE THAN 1 IN 12.5 OVER A MIN. DISTANCE OF 15M. ACCESS ROUTE SHALL BE A MIN. WIDTH OF 6.0m AND ALL TURNS IN THE ROUTE SHALL HAVE A CENTERLINE RADIUS OF 12.0m
13. FIRE ROUTES SHALL BE DESIGNATED AS PER BY-LAW AS AMENDED PRIOR TO OCCUPANCY OF THE BUILDING.
14. THE TOPS OF ANY CURBS BORDERING DRIVEWAYS WITHIN THE MUNICIPAL BOULEVARDS WILL BE FLUSH WITH THE MUNICIPAL SIDEWALK AND ROAD CURB.
15. AT THE ENTRANCES TO THE SITE, THE MUNICIPAL CURB AND SIDEWALK WILL BE CONTINUOUS THROUGH THE DRIVEWAY AND A CURB DEPRESSION WILL BE PROVIDED FOR EACH ENTRANCE.
16. CONSTRUCTION CHAINLINK HOARDING MUST BE INSTALLED WITH SEDIMENT CONTROL AS PER CITY STANDARDS AND APPROVALS.
17. ROAD OCCUPANCY PERMIT MUST BE OBTAINED 48 HOURS PRIOR TO COMMENCING ANY WORKS WITHIN THE MUNICIPAL ROAD ALLOWANCE.
18.

ZONING TABLE

ZONE C4- GENERAL COMMERCIAL

NOTE: FUTURE ROAD WIDENING REMOVED FROM LOT AREA

	PERMITTED	PROPOSED
MINIMUM LOT AREA	450.00 m²	3771.95 m²
MINIMUM LOT FRONTAGE	15.00 m	80.40 m
MINIMUM FRONT YARD	6.00 m	5.20 m
MINIMUM REAR YARD	7.00 m	N/A
MINIMUM SIDE YARD	6.00 m	3.00 m
MINIMUM SIDE YARD	6.00 m	0.22 m
MINIMUM EXTERIOR SIDE YARD	n/a	n/a
MAXIMUM LOT COVERAGE	50%	49.947
		1883.960 m²
MAXIMUM BUILDING HEIGHT	9.00 m	27.20 m
MIN. LANDSCAPE AREA		
SOFT SPACE (GREEN SPACE)		1036.50 m²
HARDSPACE (WALKWAYS)		283.40 m²
TOTAL		1319.90 m²
LOT COVERAGE		
TOTAL BUILDING COVERAGE	1883.96 m²	
TOTAL LOT COVERAGE	49.95 m²	

PARKING/LOADING CALCULATIONS

ZONE C4 - GENERAL COMMERCIAL

TOTAL RESIDENTIAL UNITS = 65 UNITS

	REQUIRED	PROVIDED
COMMERCIAL SPACE	1 SPACE PER 25m² [17 SPACE REQUIRED]	15 SPACES
RESIDENTIAL SPACES	1.50 PER UNIT [152 SPACES REQUIRED]	101 SPACES
TOTAL SPACES REQUIRED	169 SPACES	
TOTAL SPACES PROVIDED	116 SPACES	
BARRIER FREE SPACE (INCLUDED IN PARKING COUNT)	2 SPACES	

N

0m 5m 10m 20m

GRAPHIC SCALE

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.

DESIGN
KHALSA

BRAMPTON, ON
TELEPHONE: 647-468-2940

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	AB
Checked by	KDI
Scale	As indicated

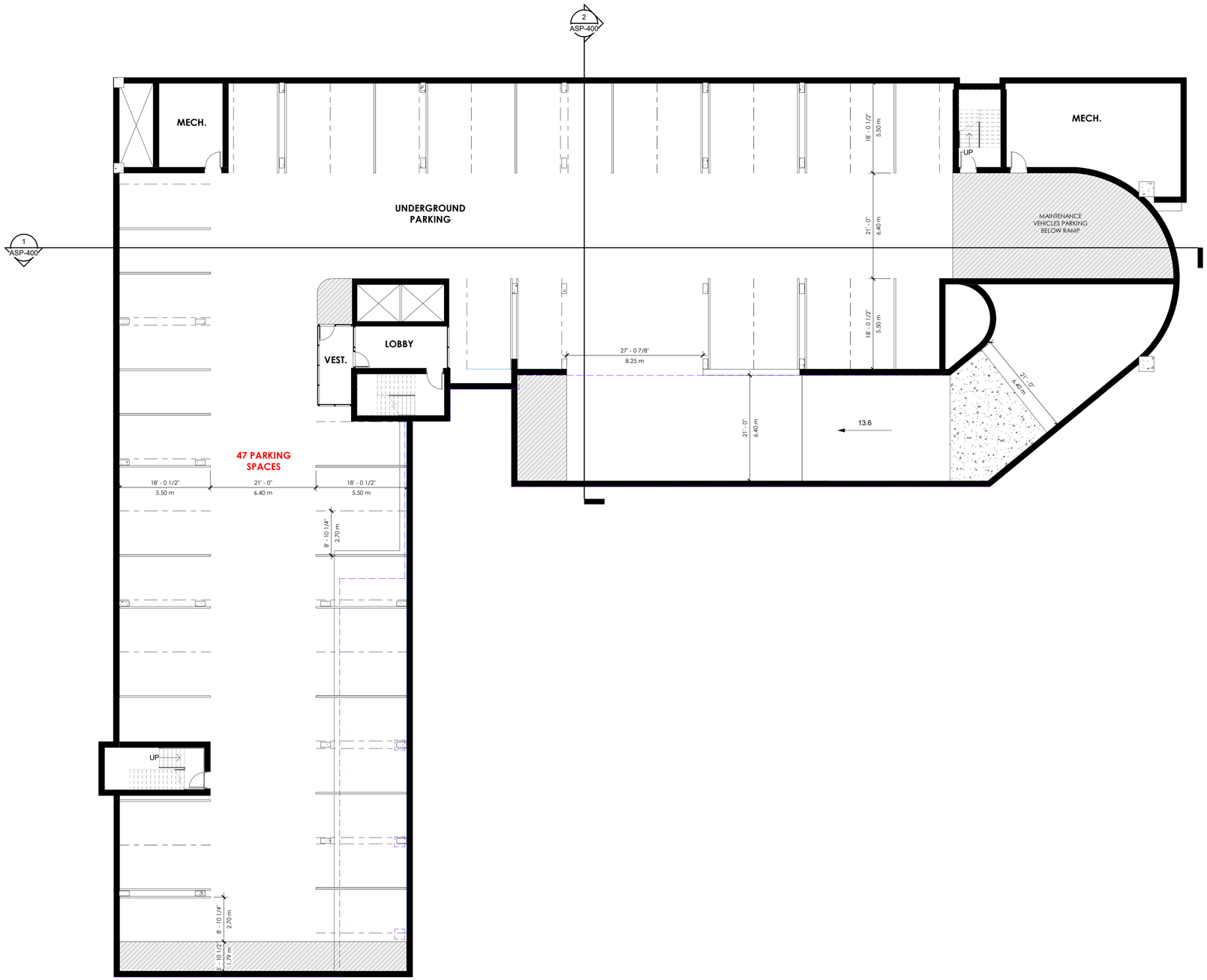
REVISIONS

No.	Description	Date
1	ISSUED FOR PRE-CONSULTATION	03/11/2022
2	ISSUED FOR SPA	12/05/2022

PROPOSED
SITE PLAN

ASP-1

BARRIE APARTMENTS



1 ASP-100 T/O BASEMENT
3/32" = 1'-0"

BUILDING AREA SUMMARY		
Name	Area	Area (Metric)
GROUND FLOOR	8696 SF	808 m²
SECOND FLOOR	2292 SF	213 m²
TYPICAL FLOOR	19397 SF	1802 m²
4TH FLOOR	19397 SF	1802 m²
5TH FLOOR	19397 SF	1802 m²
SIXTH FLOOR	19397 SF	1802 m²
7TH FLOOR	19397 SF	1802 m²
8TH FLOOR	13723 SF	1275 m²
Grand total	121694 SF	11306 m²

PARKING AREA		
Name	Area	Area (Metric)
UNDERGROUND PARKING	22158 SF	2059 m²
GROUND FLOOR PARKING	7959 SF	739 m²
PARKING LEVEL 2	17895 SF	1663 m²
Grand total	48012 SF	4460 m²

PROJECT NAME

BARRIE APARTMENTS

PROJECT ADDRESS

582 ESSA ROAD
BARRIE, ON

CLIENT

INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.

DESIGN
KHALSA

BRAMPTON, ON

TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

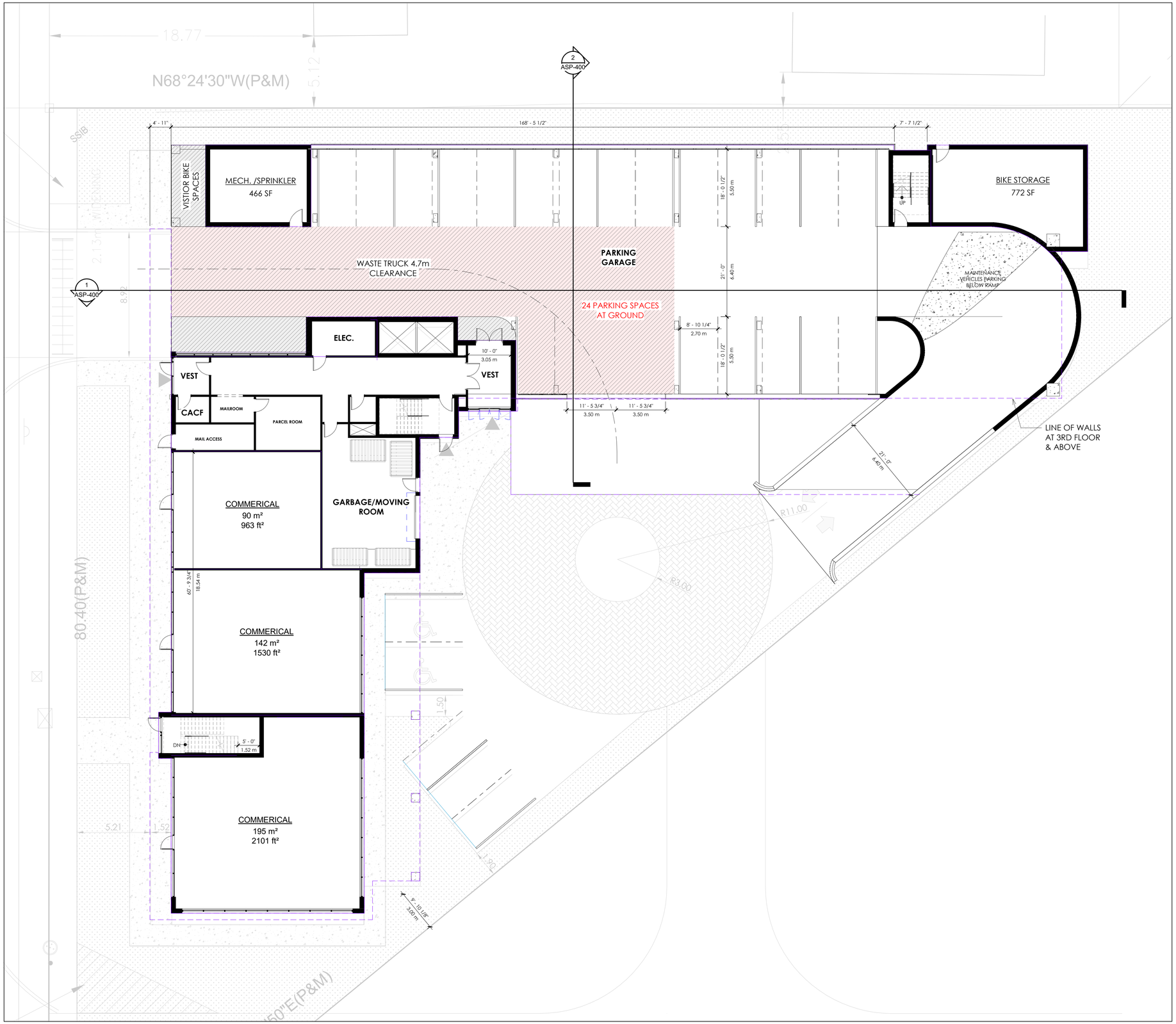
REVISIONS

No.	Description	Date

UNDERGROUND PARKING

ASP-100

BARRIE APARTMENTS



1 ASP-101 T/O GROUND FLOOR
3/32" = 1'-0"

BUILDING AREA SUMMARY		
Name	Area	Area (Metric)
GROUND FLOOR	8696 SF	808 m²
SECOND FLOOR	2292 SF	213 m²
TYPICAL FLOOR	19397 SF	1802 m²
4TH FLOOR	19397 SF	1802 m²
5TH FLOOR	19397 SF	1802 m²
SIXTH FLOOR	19397 SF	1802 m²
7TH FLOOR	19397 SF	1802 m²
8TH FLOOR	13723 SF	1275 m²
Grand total	121694 SF	11306 m²

PARKING AREA		
Name	Area	Area (Metric)
UNDERGROUND PARKING	22158 SF	2059 m²
GROUND FLOOR PARKING	7959 SF	739 m²
PARKING LEVEL 2	17895 SF	1663 m²
Grand total	48012 SF	4460 m²

PROJECT NAME

BARRIE APARTMENTS

PROJECT ADDRESS

582 ESSA ROAD
BARRIE, ON

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TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

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Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

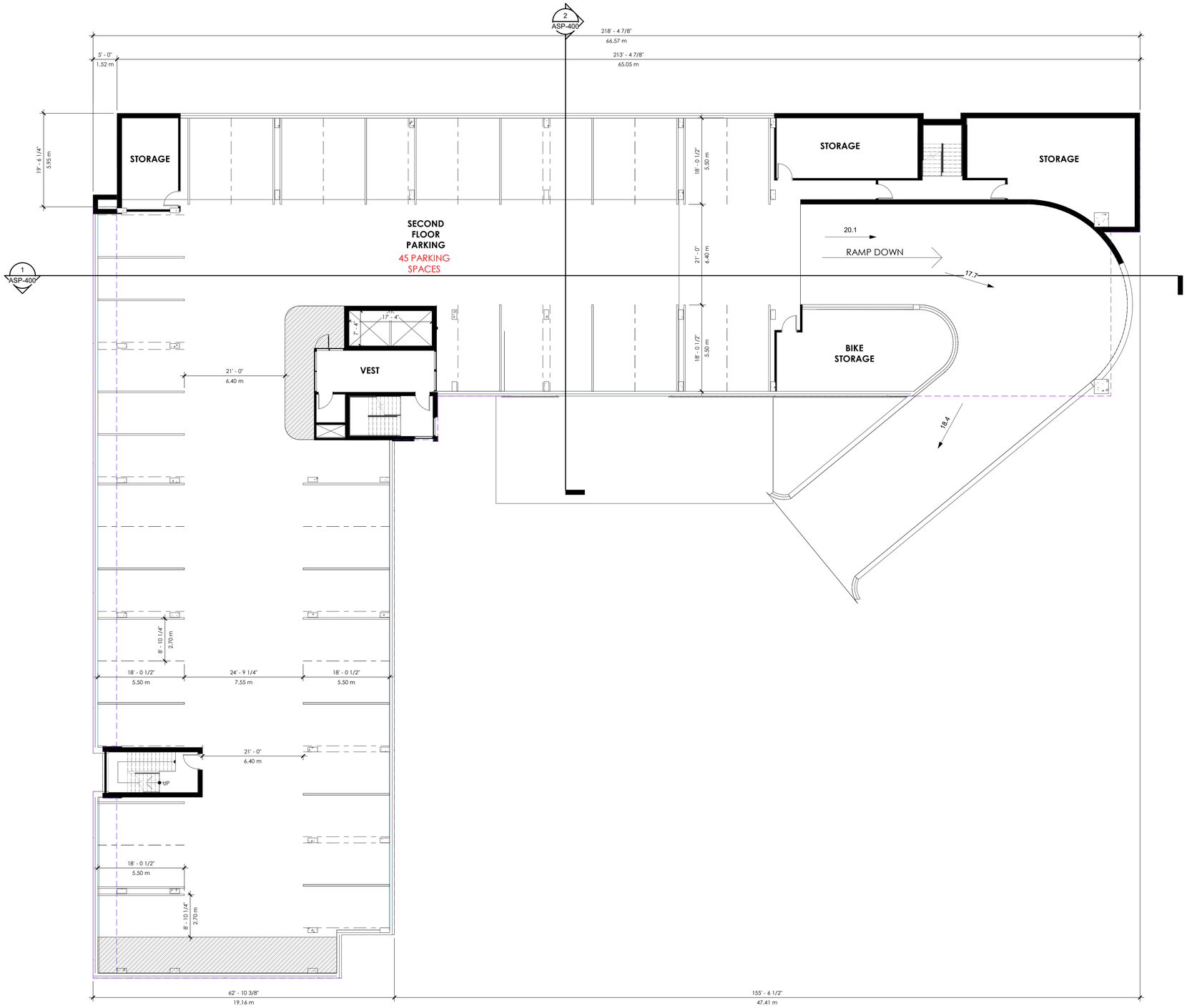
REVISIONS

No.	Description	Date

GROUND FLOOR PLAN

ASP-101

BARRIE APARTMENTS



1 T/O SECOND FLOOR
ASP-102 3/32" = 1'-0"

BUILDING AREA SUMMARY		
Name	Area	Area (Metric)
GROUND FLOOR	8696 SF	808 m²
SECOND FLOOR	2292 SF	213 m²
TYPICAL FLOOR	19397 SF	1802 m²
4TH FLOOR	19397 SF	1802 m²
5TH FLOOR	19397 SF	1802 m²
SIXTH FLOOR	19397 SF	1802 m²
7TH FLOOR	19397 SF	1802 m²
8TH FLOOR	13723 SF	1275 m²
Grand total	121694 SF	11306 m²

PARKING AREA		
Name	Area	Area (Metric)
UNDERGROUND PARKING	22158 SF	2059 m²
GROUND FLOOR PARKING	7959 SF	739 m²
PARKING LEVEL 2	17895 SF	1663 m²
Grand total	48012 SF	4460 m²

PROJECT NAME

BARRIE APARTMENTS

PROJECT ADDRESS

582 ESSA ROAD
BARRIE, ON

CLIENT

INSPIRATION GROUP

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KHALSA

BRAMPTON, ON

TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

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Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

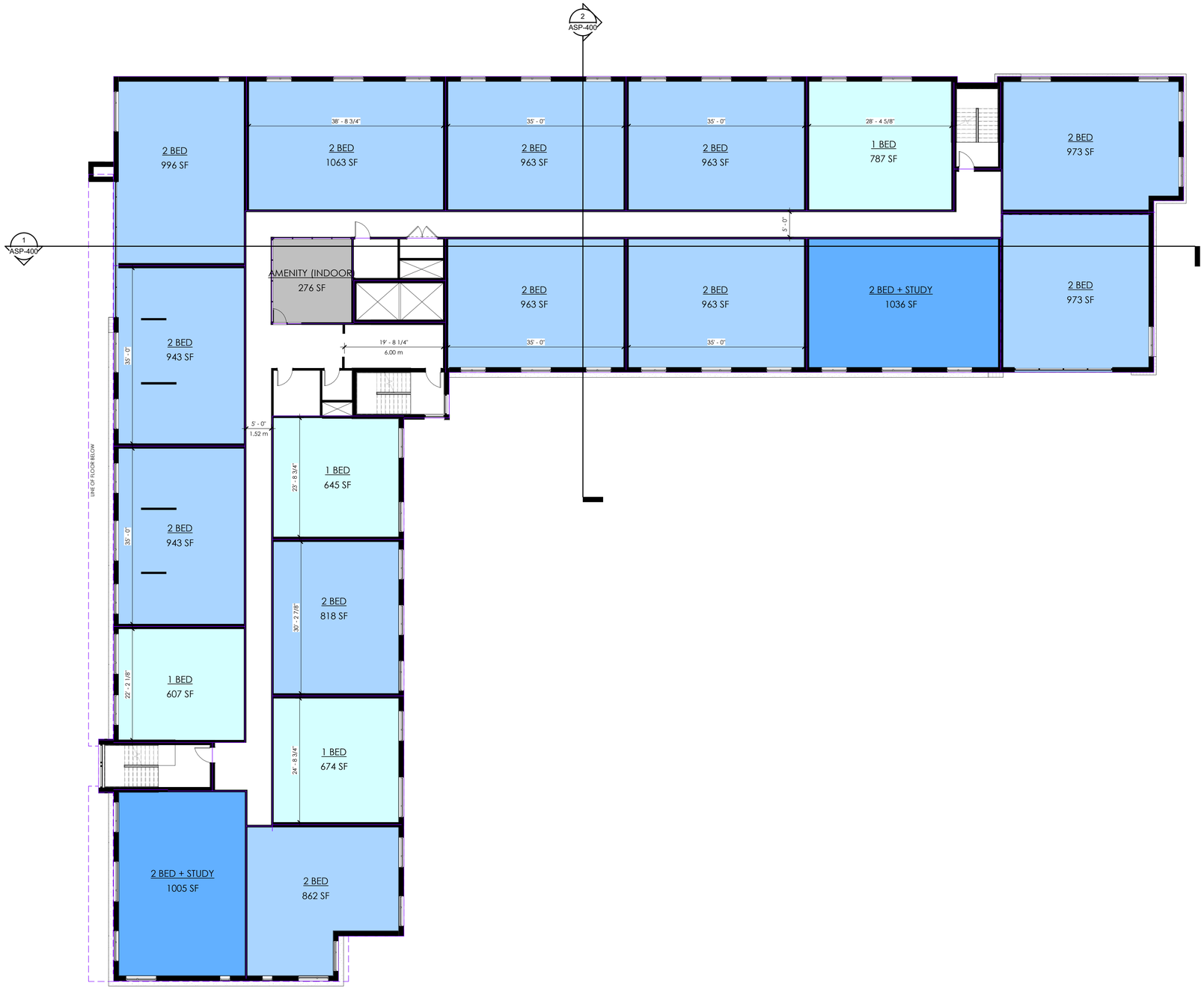
REVISIONS

No.	Description	Date

SECOND FLOOR PLAN (PARKING)

ASP-102

BARRIE APARTMENTS



1 T/O THIRD FLOOR
ASP-102 3/32" = 1'-0"

Rentable Area Legend

- 1 BED
- 2 BED
- 2 BED + STUDY
- AMENITY (INDOOR)

UNT COUNT
Name
T/O THIRD FLOOR
1 BED
2 BED
2 BED + STUDY
T/O THIRD FLOOR: 18
T/O FOURTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FOURTH FLOOR: 18
T/O FIFTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FIFTH FLOOR: 18
T/O SIXTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SIXTH FLOOR: 17
T/O SEVENTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SEVENTH FLOOR: 17
T/O EIGHT FLOOR
1 BED
2 BED
T/O EIGHT FLOOR: 13
Grand total: 101

UNIT TYPES
Name
1 BED
1 BED
1 BED: 19
2 BED
2 BED
2 BED: 72
2 BED + STUDY
2 BED + STUDY
2 BED + STUDY: 10
Grand total: 101

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.
DESIGN
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BRAMPTON, ON
TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

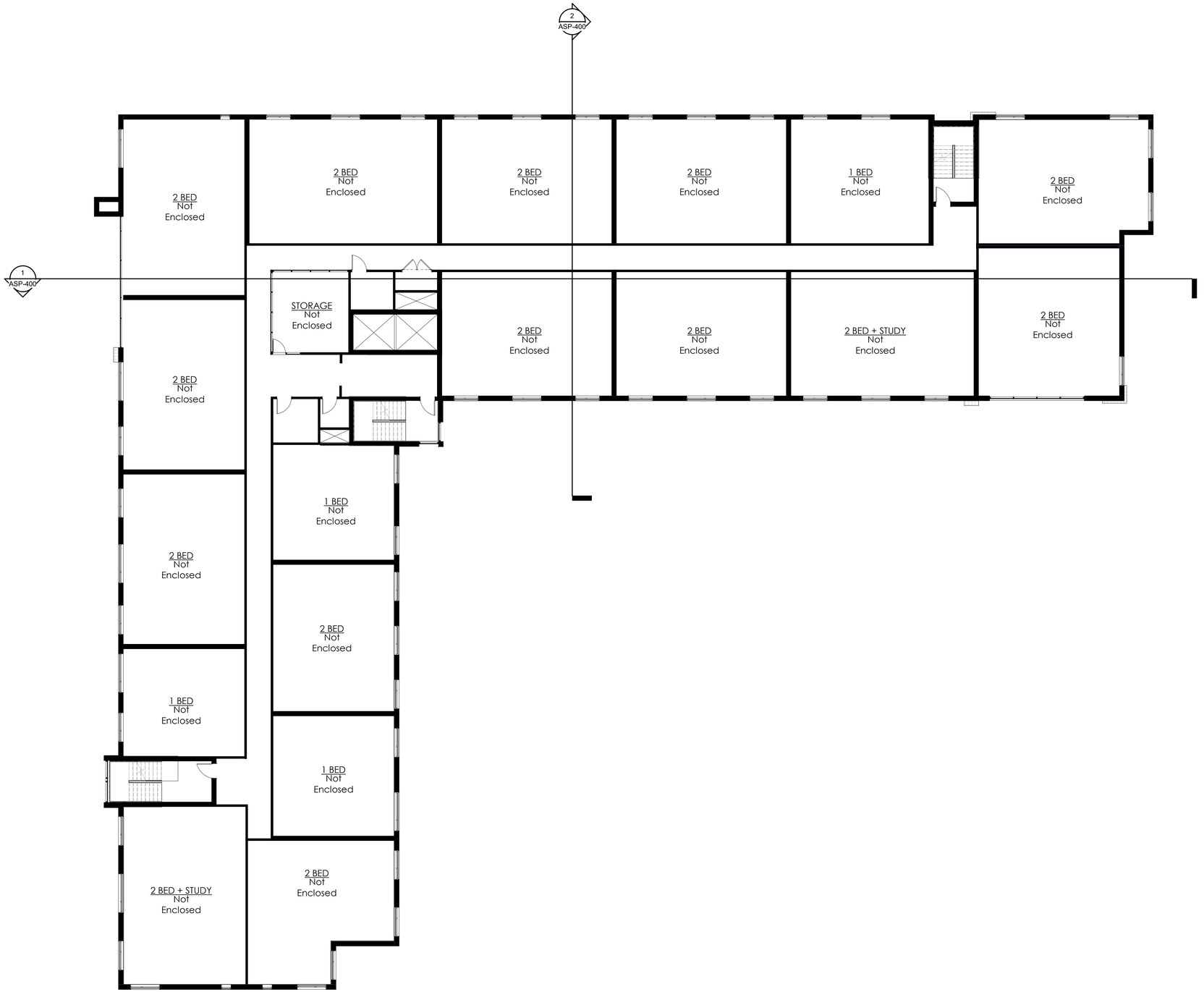
REVISIONS

No.	Description	Date

3RD FLOOR

ASP-103

BARRIE APARTMENTS



1 ASP-400 T/O FOURTH FLOOR
3/32" = 1'-0"

Rentable Area Legend

- 1 BED
- 2 BED
- 2 BED + STUDY
- STORAGE

UNT COUNT
Name
T/O THIRD FLOOR
1 BED
2 BED
2 BED + STUDY
T/O THIRD FLOOR: 18
T/O FOURTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FOURTH FLOOR: 18
T/O FIFTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FIFTH FLOOR: 18
T/O SIXTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SIXTH FLOOR: 17
T/O SEVENTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SEVENTH FLOOR: 17
T/O EIGHT FLOOR
1 BED
2 BED
T/O EIGHT FLOOR: 13
Grand total: 101

UNIT TYPES
Name
1 BED
1 BED
1 BED: 19
2 BED
2 BED
2 BED: 72
2 BED + STUDY
2 BED + STUDY
2 BED + STUDY: 10
Grand total: 101

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
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TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

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Scale	3/32" = 1'-0"

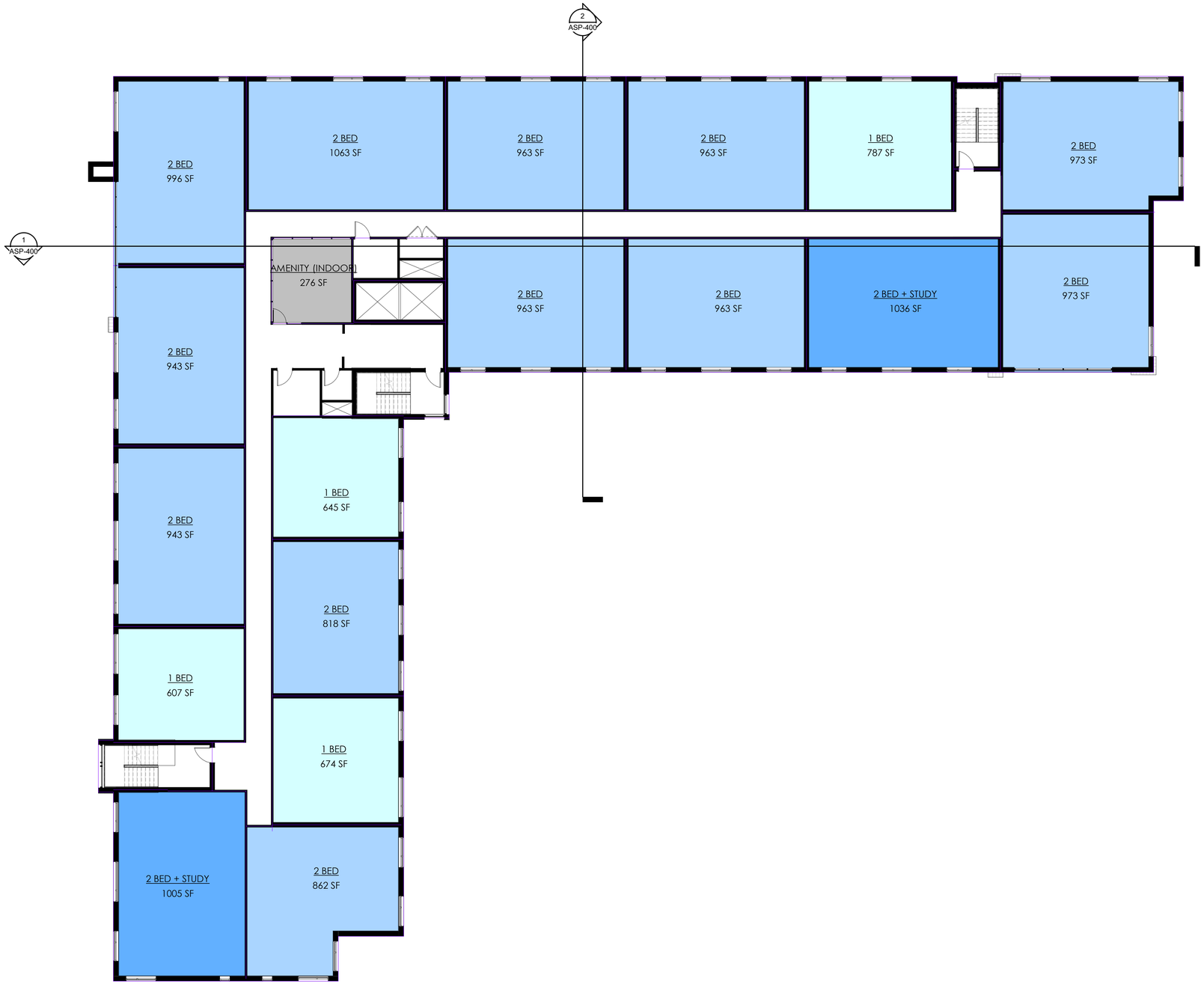
REVISIONS

No.	Description	Date

4TH FLOOR

ASP-104

BARRIE APARTMENTS



1 T/O FIFTH FLOOR
ASP-105 3/32" = 1'-0"

Rentable Area Legend

- 1 BED
- 2 BED
- 2 BED + STUDY
- AMENITY (INDOOR)

UNT COUNT
Name
T/O THIRD FLOOR
1 BED
2 BED
2 BED + STUDY
T/O THIRD FLOOR: 18
T/O FOURTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FOURTH FLOOR: 18
T/O FIFTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FIFTH FLOOR: 18
T/O SIXTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SIXTH FLOOR: 17
T/O SEVENTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SEVENTH FLOOR: 17
T/O EIGHT FLOOR
1 BED
2 BED
T/O EIGHT FLOOR: 13
Grand total: 101

UNIT TYPES
Name
1 BED
1 BED
1 BED: 19
2 BED
2 BED
2 BED: 72
2 BED + STUDY
2 BED + STUDY
2 BED + STUDY: 10
Grand total: 101

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.
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TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

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Checked by	KDI
Scale	3/32" = 1'-0"

REVISIONS

No.	Description	Date

5TH FLOOR

ASP-105

BARRIE APARTMENTS

1 T/O SIXTH FLOOR
ASP-104 3/32" = 1'-0"

Rentable Area Legend

- 1 BED
- 2 BED
- 2 BED + STUDY
- AMENITY (INDOOR)
- STORAGE

UNT COUNT
Name
T/O THIRD FLOOR
1 BED
2 BED
2 BED + STUDY
T/O THIRD FLOOR: 18
T/O FOURTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FOURTH FLOOR: 18
T/O FIFTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FIFTH FLOOR: 18
T/O SIXTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SIXTH FLOOR: 17
T/O SEVENTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SEVENTH FLOOR: 17
T/O EIGHT FLOOR
1 BED
2 BED
T/O EIGHT FLOOR: 13
Grand total: 101

UNIT TYPES
Name
1 BED
1 BED
1 BED: 19
2 BED
2 BED
2 BED: 72
2 BED + STUDY
2 BED + STUDY
2 BED + STUDY: 10
Grand total: 101

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.
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KHALSA
BRAMPTON, ON
TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

REVISIONS

No.	Description	Date

6TH FLOOR

ASP-106

BARRIE APARTMENTS

1 T/O SEVENTH FLOOR
ASP-107 3/32" = 1'-0"

Rentable Area Legend

- 1 BED
- 2 BED
- 2 BED + STUDY
- AMENITY (INDOOR)
- STORAGE

UNT COUNT
Name
T/O THIRD FLOOR
1 BED
2 BED
2 BED + STUDY
T/O THIRD FLOOR: 18
T/O FOURTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FOURTH FLOOR: 18
T/O FIFTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FIFTH FLOOR: 18
T/O SIXTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SIXTH FLOOR: 17
T/O SEVENTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SEVENTH FLOOR: 17
T/O EIGHT FLOOR
1 BED
2 BED
T/O EIGHT FLOOR: 13
Grand total: 101

UNIT TYPES
Name
1 BED
1 BED
1 BED: 19
2 BED
2 BED
2 BED: 72
2 BED + STUDY
2 BED + STUDY
2 BED + STUDY: 10
Grand total: 101

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
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DESIGN
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BRAMPTON, ON
TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

REVISIONS

No.	Description	Date

7TH FLOOR PLAN

ASP-107

BARRIE APARTMENTS

1 T/O EIGHT FLOOR
ASP-108 3/32" = 1'-0"

Rentable Area Legend

- 1 BED
- 2 BED
- AMENITY (OUTDOOR)
- STORAGE

UNT COUNT
Name
T/O THIRD FLOOR
1 BED
2 BED
2 BED + STUDY
T/O THIRD FLOOR: 18
T/O FOURTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FOURTH FLOOR: 18
T/O FIFTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O FIFTH FLOOR: 18
T/O SIXTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SIXTH FLOOR: 17
T/O SEVENTH FLOOR
1 BED
2 BED
2 BED + STUDY
T/O SEVENTH FLOOR: 17
T/O EIGHT FLOOR
1 BED
2 BED
T/O EIGHT FLOOR: 13
Grand total: 101

UNIT TYPES
Name
1 BED
1 BED
1 BED: 19
2 BED
2 BED
2 BED: 72
2 BED + STUDY
2 BED + STUDY
2 BED + STUDY: 10
Grand total: 101

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.
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TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

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Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

REVISIONS

No.	Description	Date

8TH FLOOR PLAN

ASP-108

BARRIE APARTMENTS

1 ASP-301 NORTH ELEVATION
3/32" = 1'-0"

2 ASP-301 EAST ELEVATION
3/32" = 1'-0"

EXTERIOR ELEVATION LEGEND

PROJECT NAME

BARRIE APARTMENTS

PROJECT ADDRESS

582 ESSA ROAD
BARRIE, ON

CLIENT

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BRAMPTON, ON

TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

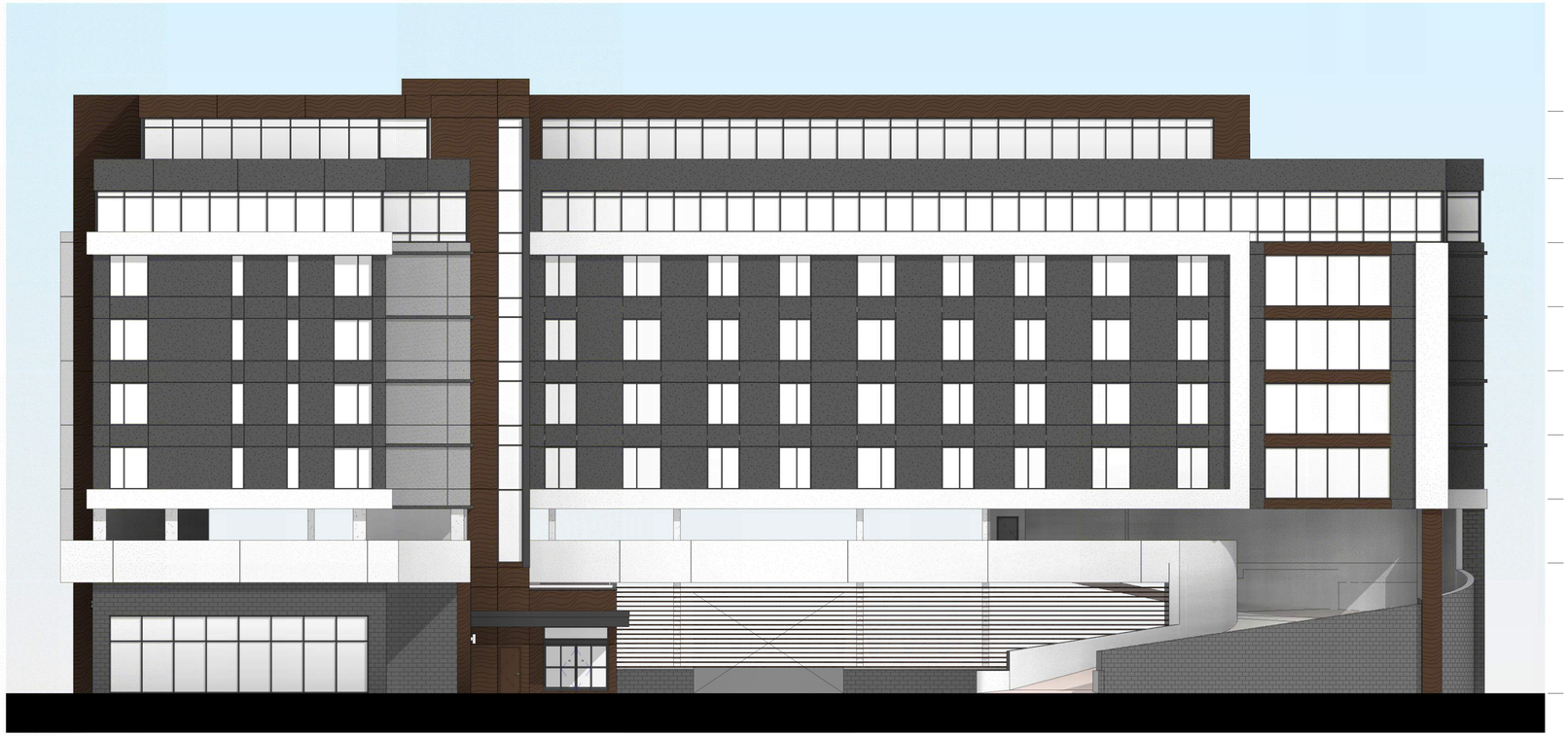
REVISIONS

No.	Description	Date

EXTERIOR ELEVATION I

ASP-301

BARRIE APARTMENTS



1 ASP-302 SOUTH ELEVATION
3/32" = 1'-0"

2 ASP-302 WEST ELEVATION
3/32" = 1'-0"

EXTERIOR ELEVATION LEGEND

PROJECT NAME

BARRIE APARTMENTS

PROJECT ADDRESS

582 ESSA ROAD
BARRIE, ON

CLIENT

INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.

DESIGN
KHALSA

BRAMPTON, ON

TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

REVISIONS

No.	Description	Date

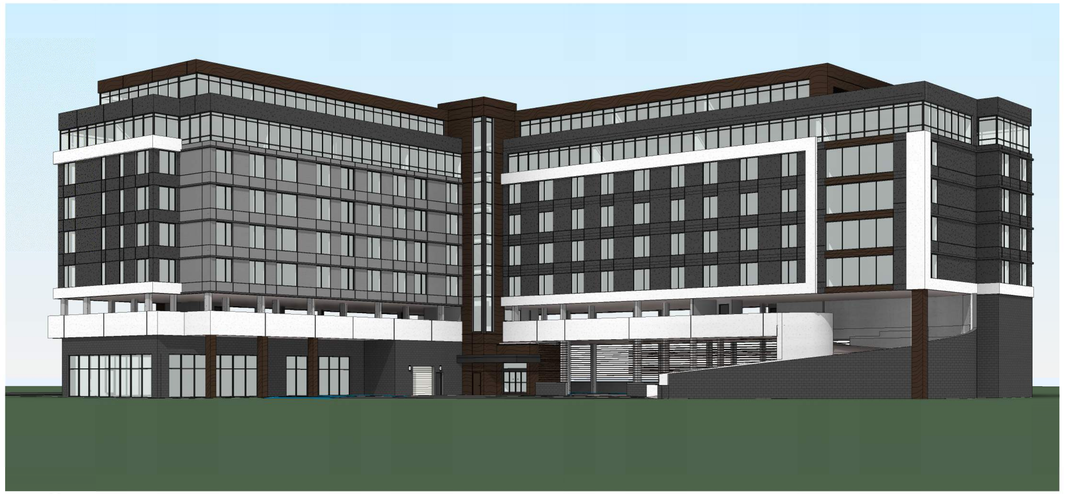
EXTERIOR ELEVATION II

ASP-302

BARRIE APARTMENTS

3 ASP-302 PERSPECTIVE II

1 ASP-302 PERSPECTIVE I



2 ASP-302 PERSPECTIVE III

4 ASP-302 PERSPECTIVE IV

5 ASP-302 AERIAL VIEW 1

6 ASP-302 AERIAL VIEW II

PROJECT NAME

BARRIE APARTMENTS

PROJECT ADDRESS

582 ESSA ROAD
BARRIE, ON

CLIENT

INSPIRATION GROUP

ARCHITECT
KHALSA DESIGN INC.

DESIGN
KHALSA

BRAMPTON, ON

TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	

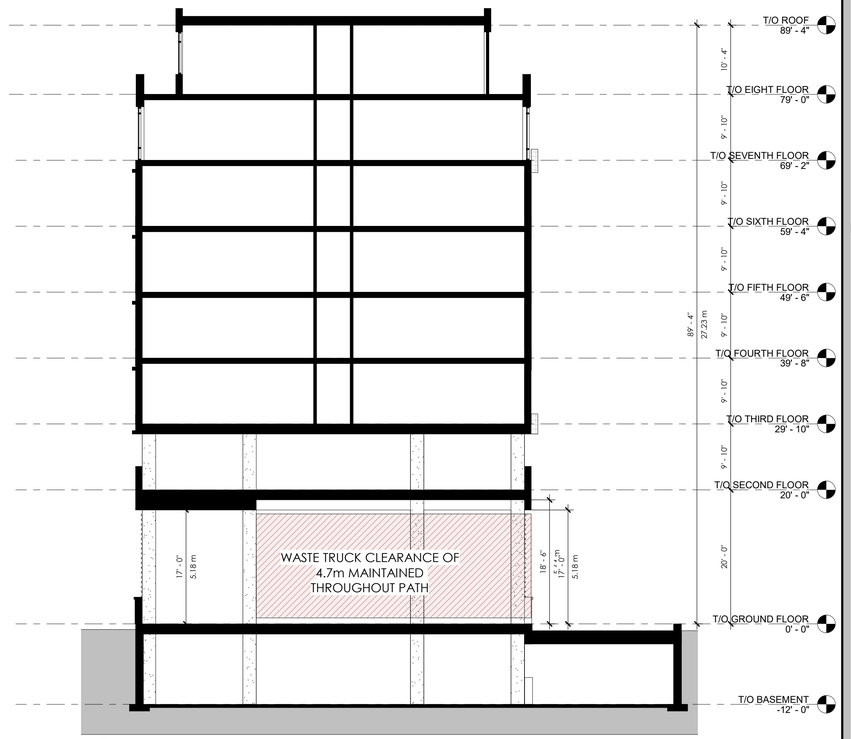
REVISIONS

No.	Description	Date

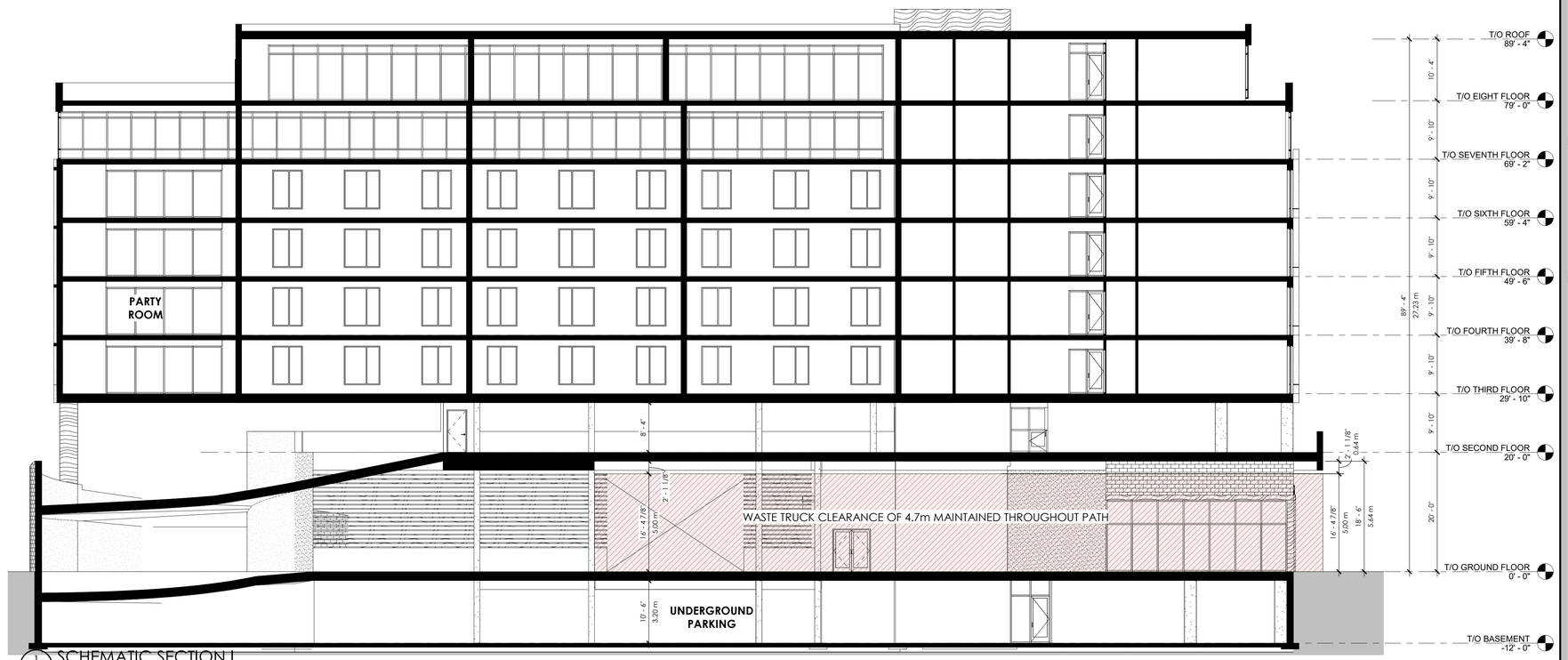
PERSPECTIVES

ASP-303

BARRIE APARTMENTS



2 SCHEMATIC SECTION II
ASP-400 3/32" = 1'-0"



1 SCHEMATIC SECTION I
ASP-400 3/32" = 1'-0"

PROJECT NAME

BARRIE APARTMENTS

PROJECT ADDRESS

582 ESSA ROAD
BARRIE, ON

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KHALSA

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TELEPHONE: 647-468-2940

CONSULTANTS:

REGISTRATION

Project number	23002
Date	12/05/2022
Drawn by	ASB
Checked by	KDI
Scale	3/32" = 1'-0"

REVISIONS

No.	Description	Date

SCHEMATIC BUILDING SECTIONS

ASP-400

BARRIE APARTMENTS

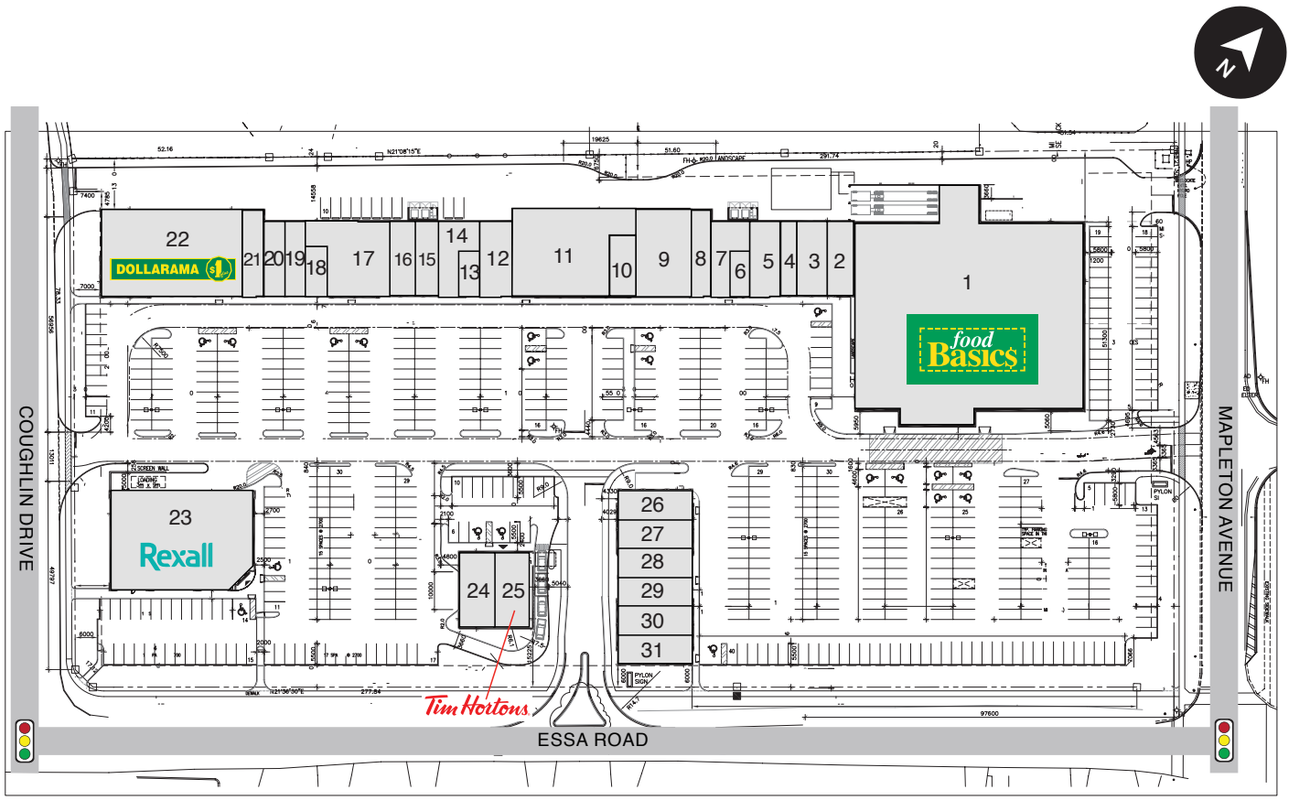
APPENDIX B

Existing Amenities

BARRIE, ONTARIO

SMARTCENTRES BARRIE ESSA

555 ESSA ROAD (MAPLETON AVE & ESSA RD)

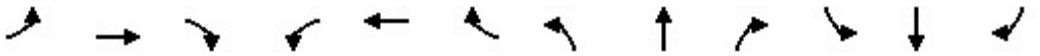


104,909 SF CENTRE

1. Food Basics
2. Tokyo Smoke
3. Pet Valu
4. The Wine Shop
5. Sunset Tan
6. Koodo/Telus
7. Kenzo Ramen
8. Osmow's Grill
9. Style Encore
10. Optica Nova
11. Barrie Karate
12. KFF Gift Shop
13. Magicuts
14. Century Nails
15. Guac Mexi Grill
16. Academy for Math and English
17. Barrie Public Library
18. Freedom Mobile
19. Holly Physiotherapy
20. Asian One
21. Essa Walk-In Clinic
22. Dollarama
23. Rexall Pharma Plus
24. Mary Browns
25. Tim Hortons
26. Easyfinancial
27. Pizzaville
28. Mapleton Family Dental
29. uBreakiFix
30. Foxy's Gentlemen's Hair Salon
31. Stacked Pancake & Breakfast House

APPENDIX C

Existing Traffic Operations – Synchro Output

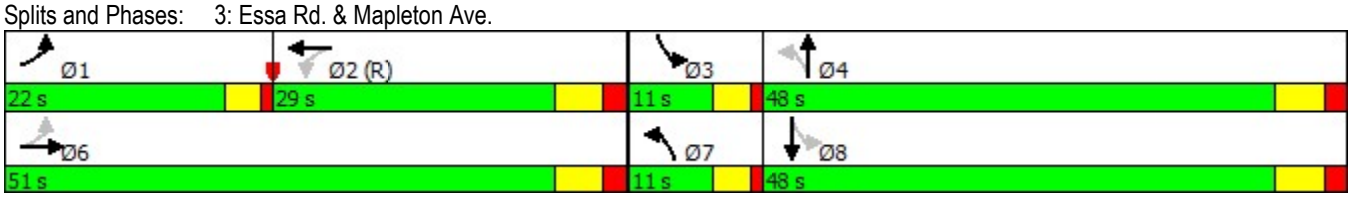


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	130	37	20	74	22	33	358	21	23	282	169
Future Volume (vph)	272	130	37	20	74	22	33	358	21	23	282	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	20.0		0.0	55.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.967			0.965			0.992			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1801	0	1770	1798	0	1770	3511	0	1770	3341	0
Flt Permitted	0.607			0.643			0.405			0.465		
Satd. Flow (perm)	1131	1801	0	1198	1798	0	754	3511	0	866	3341	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			12			6			132	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		132.3			143.0			319.8			110.4	
Travel Time (s)		9.5			10.3			23.0			7.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	296	141	40	22	80	24	36	389	23	25	307	184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	181	0	22	104	0	36	412	0	25	491	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6			2		7	4		3	8	
Permitted Phases	6			2			4			8		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6		2	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0		7.0	40.0		7.0	40.0	
Minimum Split (s)	21.0	43.0		43.0	43.0		11.0	49.0		11.0	49.0	
Total Split (s)	22.0	51.0		29.0	29.0		11.0	48.0		11.0	48.0	
Total Split (%)	20.0%	46.4%		26.4%	26.4%		10.0%	43.6%		10.0%	43.6%	
Maximum Green (s)	18.0	45.0		23.0	23.0		7.0	42.0		7.0	42.0	
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	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		6.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		9.0		9.0	9.0			26.0			26.0	
Flash Dont Walk (s)		14.0		14.0	14.0			14.0			14.0	
Pedestrian Calls (#/hr)		0		0	0			0			0	
Act Effct Green (s)	53.4	51.4		31.0	31.0		46.2	40.0		46.2	40.0	
Actuated g/C Ratio	0.49	0.47		0.28	0.28		0.42	0.36		0.42	0.36	
v/c Ratio	0.46	0.21		0.07	0.20		0.09	0.32		0.06	0.38	
Control Delay	21.3	17.7		34.8	31.2		16.4	25.7		16.0	19.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.3	17.7		34.8	31.2		16.4	25.7		16.0	19.4	
LOS	C	B		C	C		B	C		B	B	
Approach Delay		20.0			31.8			25.0			19.3	
Approach LOS		B			C			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 22.1		Intersection LOS: C	
Intersection Capacity Utilization 65.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Essa Rd. & Mapleton Ave.

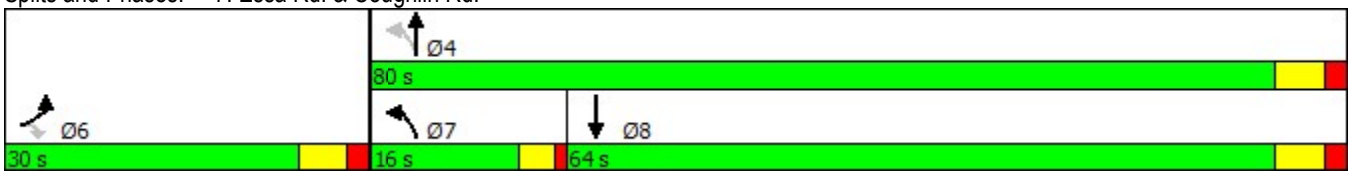


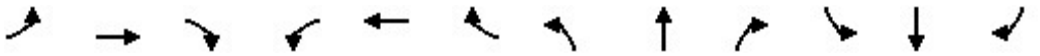
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	89	123	58	324	308	27
Future Volume (vph)	89	123	58	324	308	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0	0.0	55.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.988	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3497	0
Flt Permitted	0.950		0.490			
Satd. Flow (perm)	1770	1583	913	3539	3497	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		134			12	
Link Speed (k/h)	50			50	50	
Link Distance (m)	144.6			163.5	319.8	
Travel Time (s)	10.4			11.8	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	134	63	352	335	29
Shared Lane Traffic (%)						
Lane Group Flow (vph)	97	134	63	352	364	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	6		7	4	8	
Permitted Phases		6	4			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	6	6	7	4	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	44.0	44.0	
Minimum Split (s)	27.0	27.0	48.0	70.0	70.0	
Total Split (s)	30.0	30.0	16.0	80.0	64.0	
Total Split (%)	27.3%	27.3%	14.5%	72.7%	58.2%	
Maximum Green (s)	24.0	24.0	12.0	74.0	58.0	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max	None	None	None	
Walk Time (s)	8.0	8.0		32.0	32.0	
Flash Dont Walk (s)	13.0	13.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	24.1	24.1	55.2	53.2	44.1	
Actuated g/C Ratio	0.27	0.27	0.62	0.60	0.49	
v/c Ratio	0.20	0.26	0.10	0.17	0.21	
Control Delay	27.9	6.4	6.9	8.2	13.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	27.9	6.4	6.9	8.2	13.3	
LOS	C	A	A	A	B	
Approach Delay	15.4			8.0	13.3	
Approach LOS	B			A	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 89.3			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.26			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: Essa Rd. & Coughlin Rd.



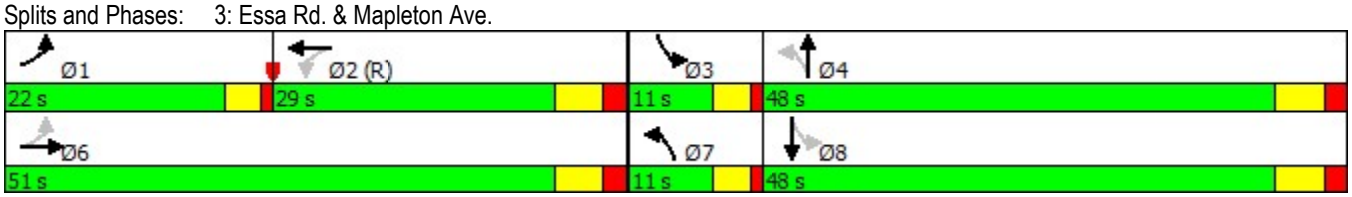


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	130	37	20	74	22	33	358	21	23	282	169
Future Volume (vph)	272	130	37	20	74	22	33	358	21	23	282	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	20.0		0.0	55.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.967			0.965			0.992			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1801	0	1770	1798	0	1770	3511	0	1770	3341	0
Flt Permitted	0.607			0.643			0.405			0.465		
Satd. Flow (perm)	1131	1801	0	1198	1798	0	754	3511	0	866	3341	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			12			6			132	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		132.3			143.0			319.8			110.4	
Travel Time (s)		9.5			10.3			23.0			7.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	296	141	40	22	80	24	36	389	23	25	307	184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	296	181	0	22	104	0	36	412	0	25	491	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6			2		7	4		3	8	
Permitted Phases	6			2			4			8		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6		2	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0		7.0	40.0		7.0	40.0	
Minimum Split (s)	21.0	43.0		43.0	43.0		11.0	49.0		11.0	49.0	
Total Split (s)	22.0	51.0		29.0	29.0		11.0	48.0		11.0	48.0	
Total Split (%)	20.0%	46.4%		26.4%	26.4%		10.0%	43.6%		10.0%	43.6%	
Maximum Green (s)	18.0	45.0		23.0	23.0		7.0	42.0		7.0	42.0	
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	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		6.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		9.0		9.0	9.0			26.0			26.0	
Flash Dont Walk (s)		14.0		14.0	14.0			14.0			14.0	
Pedestrian Calls (#/hr)		0		0	0			0			0	
Act Effct Green (s)	53.4	51.4		31.0	31.0		46.2	40.0		46.2	40.0	
Actuated g/C Ratio	0.49	0.47		0.28	0.28		0.42	0.36		0.42	0.36	
v/c Ratio	0.46	0.21		0.07	0.20		0.09	0.32		0.06	0.38	
Control Delay	21.3	17.7		34.8	31.2		16.4	25.7		16.0	19.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.3	17.7		34.8	31.2		16.4	25.7		16.0	19.4	
LOS	C	B		C	C		B	C		B	B	
Approach Delay		20.0			31.8			25.0			19.3	
Approach LOS		B			C			C			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 22.1		Intersection LOS: C	
Intersection Capacity Utilization 65.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Essa Rd. & Mapleton Ave.

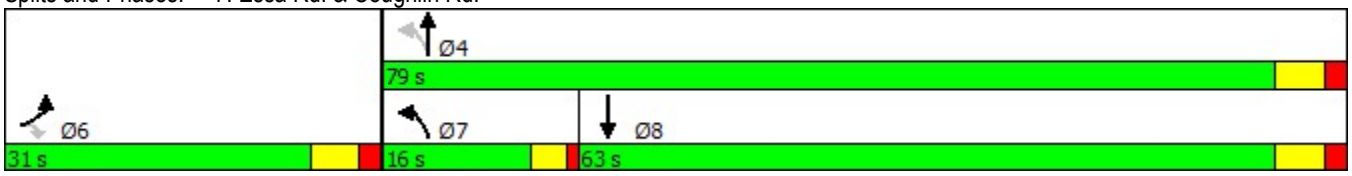


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	116	142	206	462	508	164
Future Volume (vph)	116	142	206	462	508	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0	0.0	55.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.963	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3408	0
Flt Permitted	0.950		0.280			
Satd. Flow (perm)	1770	1583	522	3539	3408	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		154			59	
Link Speed (k/h)	50			50	50	
Link Distance (m)	144.6			163.5	319.8	
Travel Time (s)	10.4			11.8	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	154	224	502	552	178
Shared Lane Traffic (%)						
Lane Group Flow (vph)	126	154	224	502	730	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	6		7	4	8	
Permitted Phases		6	4			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	6	6	7	4	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	44.0	44.0	
Minimum Split (s)	27.0	27.0	48.0	70.0	70.0	
Total Split (s)	31.0	31.0	16.0	79.0	63.0	
Total Split (%)	28.2%	28.2%	14.5%	71.8%	57.3%	
Maximum Green (s)	25.0	25.0	12.0	73.0	57.0	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max	None	None	None	
Walk Time (s)	8.0	8.0		32.0	32.0	
Flash Dont Walk (s)	13.0	13.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	25.0	25.0	61.1	59.1	44.0	
Actuated g/C Ratio	0.26	0.26	0.64	0.61	0.46	
v/c Ratio	0.27	0.29	0.47	0.23	0.46	
Control Delay	30.6	6.5	10.7	8.6	17.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.6	6.5	10.7	8.6	17.5	
LOS	C	A	B	A	B	
Approach Delay	17.3			9.3	17.5	
Approach LOS	B			A	B	

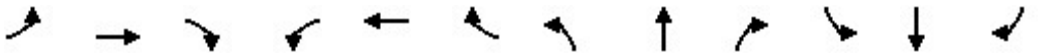
Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 96.1			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.47			
Intersection Signal Delay: 14.0		Intersection LOS: B	
Intersection Capacity Utilization 69.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: Essa Rd. & Coughlin Rd.



APPENDIX D

Future Background Traffic Operations – Synchro Output

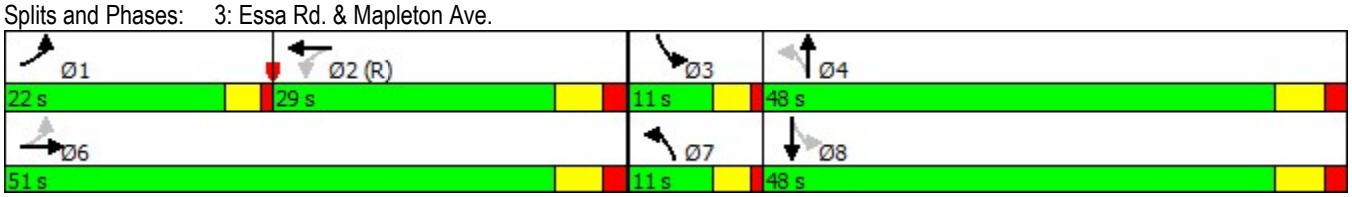


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	286	137	39	21	78	23	38	415	24	24	327	178
Future Volume (vph)	286	137	39	21	78	23	38	415	24	24	327	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	20.0		0.0	55.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.967			0.966			0.992			0.947	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1801	0	1770	1799	0	1770	3511	0	1770	3352	0
Flt Permitted	0.603			0.637			0.365			0.415		
Satd. Flow (perm)	1123	1801	0	1187	1799	0	680	3511	0	773	3352	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			12			6			108	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		132.3			143.0			319.8			110.4	
Travel Time (s)		9.5			10.3			23.0			7.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	311	149	42	23	85	25	41	451	26	26	355	193
Shared Lane Traffic (%)												
Lane Group Flow (vph)	311	191	0	23	110	0	41	477	0	26	548	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6			2		7	4		3	8	
Permitted Phases	6			2			4			8		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6		2	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0		7.0	40.0		7.0	40.0	
Minimum Split (s)	21.0	43.0		43.0	43.0		11.0	49.0		11.0	49.0	
Total Split (s)	22.0	51.0		29.0	29.0		11.0	48.0		11.0	48.0	
Total Split (%)	20.0%	46.4%		26.4%	26.4%		10.0%	43.6%		10.0%	43.6%	
Maximum Green (s)	18.0	45.0		23.0	23.0		7.0	42.0		7.0	42.0	
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	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		6.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		9.0		9.0	9.0			26.0			26.0	
Flash Dont Walk (s)		14.0		14.0	14.0			14.0			14.0	
Pedestrian Calls (#/hr)		0		0	0			0			0	
Act Effct Green (s)	53.4	51.4		30.7	30.7		46.2	40.0		46.2	40.0	
Actuated g/C Ratio	0.49	0.47		0.28	0.28		0.42	0.36		0.42	0.36	
v/c Ratio	0.48	0.22		0.07	0.22		0.12	0.37		0.07	0.43	
Control Delay	21.7	17.9		35.0	31.7		16.7	26.5		16.0	22.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.7	17.9		35.0	31.7		16.7	26.5		16.0	22.0	
LOS	C	B		C	C		B	C		B	C	
Approach Delay		20.3			32.2			25.7			21.7	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 23.3		Intersection LOS: C	
Intersection Capacity Utilization 65.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Essa Rd. & Mapleton Ave.



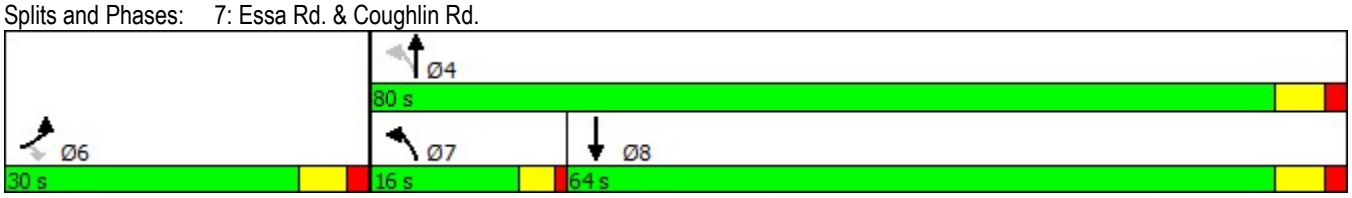
Future Background AM
7: Essa Rd. & Coughlin Rd.

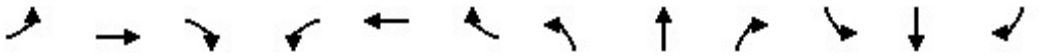
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	94	129	67	376	357	31
Future Volume (vph)	94	129	67	376	357	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0	0.0	55.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.988	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3497	0
Flt Permitted	0.950		0.458			
Satd. Flow (perm)	1770	1583	853	3539	3497	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		140			13	
Link Speed (k/h)	50			50	50	
Link Distance (m)	144.6			163.5	319.8	
Travel Time (s)	10.4			11.8	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	102	140	73	409	388	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	102	140	73	409	422	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	6		7	4	8	
Permitted Phases		6	4			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	6	6	7	4	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	44.0	44.0	
Minimum Split (s)	27.0	27.0	48.0	70.0	70.0	
Total Split (s)	30.0	30.0	16.0	80.0	64.0	
Total Split (%)	27.3%	27.3%	14.5%	72.7%	58.2%	
Maximum Green (s)	24.0	24.0	12.0	74.0	58.0	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max	None	None	None	
Walk Time (s)	8.0	8.0		32.0	32.0	
Flash Dont Walk (s)	13.0	13.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	24.1	24.1	55.5	53.5	44.2	
Actuated g/C Ratio	0.27	0.27	0.62	0.60	0.49	
v/c Ratio	0.21	0.27	0.12	0.19	0.24	
Control Delay	28.2	6.4	7.1	8.4	13.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.2	6.4	7.1	8.4	13.8	
LOS	C	A	A	A	B	
Approach Delay	15.6			8.2	13.8	
Approach LOS	B			A	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 89.6			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.27			
Intersection Signal Delay: 11.8		Intersection LOS: B	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: Essa Rd. & Coughlin Rd.



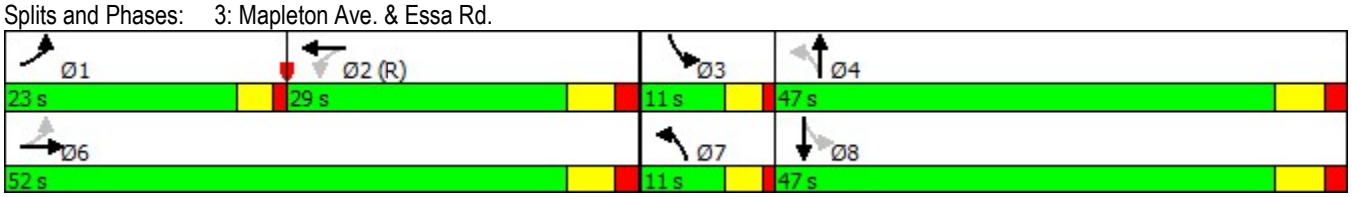


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	297	164	54	61	203	23	97	543	32	34	658	375
Future Volume (vph)	297	164	54	61	203	23	97	543	32	34	658	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	55.0		0.0	55.0		0.0	20.0		0.0	45.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.963			0.985			0.992			0.946	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1794	0	1770	1835	0	1770	3511	0	1770	3348	0
Flt Permitted	0.350			0.611			0.089			0.358		
Satd. Flow (perm)	652	1794	0	1138	1835	0	166	3511	0	667	3348	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			5			6			116	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		132.3			143.0			319.8			110.4	
Travel Time (s)		9.5			10.3			23.0			7.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	323	178	59	66	221	25	105	590	35	37	715	408
Shared Lane Traffic (%)												
Lane Group Flow (vph)	323	237	0	66	246	0	105	625	0	37	1123	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6			2		7	4		3	8	
Permitted Phases	6			2			4			8		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6		2	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0		7.0	40.0		7.0	40.0	
Minimum Split (s)	21.0	43.0		43.0	43.0		11.0	49.0		11.0	49.0	
Total Split (s)	23.0	52.0		29.0	29.0		11.0	47.0		11.0	47.0	
Total Split (%)	20.9%	47.3%		26.4%	26.4%		10.0%	42.7%		10.0%	42.7%	
Maximum Green (s)	19.0	46.0		23.0	23.0		7.0	41.0		7.0	41.0	
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	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		6.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		9.0		9.0	9.0			26.0			26.0	
Flash Dont Walk (s)		14.0		14.0	14.0			14.0			14.0	
Pedestrian Calls (#/hr)		0		0	0			0			0	
Act Effct Green (s)	48.5	46.5		25.2	25.2		51.1	44.9		49.5	40.5	
Actuated g/C Ratio	0.44	0.42		0.23	0.23		0.46	0.41		0.45	0.37	
v/c Ratio	0.70	0.31		0.25	0.58		0.59	0.43		0.10	0.86	
Control Delay	30.2	20.8		39.3	44.1		31.2	25.2		15.4	36.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.2	20.8		39.3	44.1		31.2	25.2		15.4	36.6	
LOS	C	C		D	D		C	C		B	D	
Approach Delay		26.2			43.1			26.0			35.9	
Approach LOS		C			D			C			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 32.1		Intersection LOS: C	
Intersection Capacity Utilization 84.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Mapleton Ave. & Essa Rd.

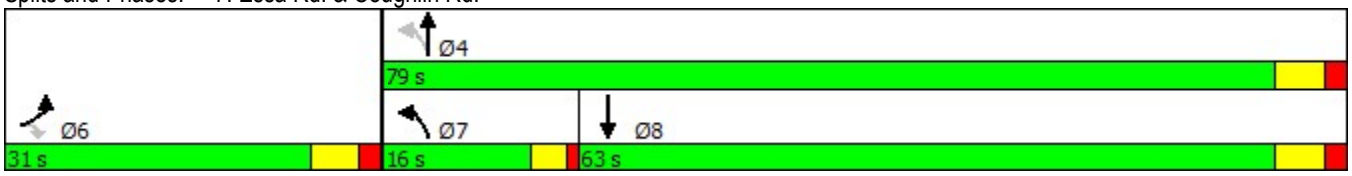


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	122	149	239	536	589	190
Future Volume (vph)	122	149	239	536	589	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0	0.0	55.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.963	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3408	0
Flt Permitted	0.950		0.227			
Satd. Flow (perm)	1770	1583	423	3539	3408	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		162			59	
Link Speed (k/h)	50			50	50	
Link Distance (m)	144.6			163.5	319.8	
Travel Time (s)	10.4			11.8	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	162	260	583	640	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	162	260	583	847	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	6		7	4	8	
Permitted Phases		6	4			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	6	6	7	4	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	44.0	44.0	
Minimum Split (s)	27.0	27.0	48.0	70.0	70.0	
Total Split (s)	31.0	31.0	16.0	79.0	63.0	
Total Split (%)	28.2%	28.2%	14.5%	71.8%	57.3%	
Maximum Green (s)	25.0	25.0	12.0	73.0	57.0	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max	None	None	None	
Walk Time (s)	8.0	8.0		32.0	32.0	
Flash Dont Walk (s)	13.0	13.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	25.0	25.0	61.5	59.5	44.0	
Actuated g/C Ratio	0.26	0.26	0.64	0.62	0.46	
v/c Ratio	0.29	0.31	0.60	0.27	0.53	
Control Delay	30.9	6.4	13.8	8.9	19.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.9	6.4	13.8	8.9	19.0	
LOS	C	A	B	A	B	
Approach Delay	17.5			10.4	19.0	
Approach LOS	B			B	B	

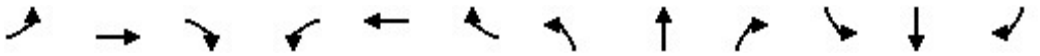
Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 96.5			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.60			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 71.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: Essa Rd. & Coughlin Rd.



APPENDIX E

Future Total Traffic Operations – Synchro Output

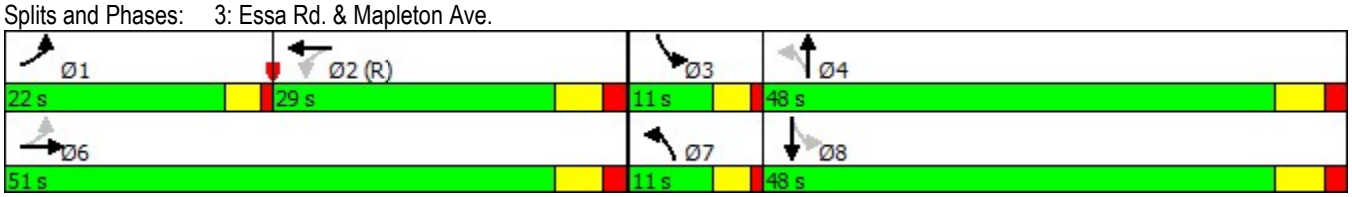


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	286	137	39	21	78	23	38	418	24	24	329	178
Future Volume (vph)	286	137	39	21	78	23	38	418	24	24	329	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	20.0		0.0	55.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.967			0.966			0.992			0.947	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1801	0	1770	1799	0	1770	3511	0	1770	3352	0
Flt Permitted	0.603			0.637			0.363			0.413		
Satd. Flow (perm)	1123	1801	0	1187	1799	0	676	3511	0	769	3352	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			12			6			105	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		132.3			143.0			266.8			110.4	
Travel Time (s)		9.5			10.3			19.2			7.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	311	149	42	23	85	25	41	454	26	26	358	193
Shared Lane Traffic (%)												
Lane Group Flow (vph)	311	191	0	23	110	0	41	480	0	26	551	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6			2		7	4		3	8	
Permitted Phases	6			2			4			8		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6		2	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0		7.0	40.0		7.0	40.0	
Minimum Split (s)	21.0	43.0		43.0	43.0		11.0	49.0		11.0	49.0	
Total Split (s)	22.0	51.0		29.0	29.0		11.0	48.0		11.0	48.0	
Total Split (%)	20.0%	46.4%		26.4%	26.4%		10.0%	43.6%		10.0%	43.6%	
Maximum Green (s)	18.0	45.0		23.0	23.0		7.0	42.0		7.0	42.0	
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	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		6.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		9.0		9.0	9.0			26.0			26.0	
Flash Dont Walk (s)		14.0		14.0	14.0			14.0			14.0	
Pedestrian Calls (#/hr)		0		0	0			0			0	
Act Effct Green (s)	53.4	51.4		30.7	30.7		46.2	40.0		46.2	40.0	
Actuated g/C Ratio	0.49	0.47		0.28	0.28		0.42	0.36		0.42	0.36	
v/c Ratio	0.48	0.22		0.07	0.22		0.12	0.38		0.07	0.43	
Control Delay	21.7	17.9		35.0	31.7		16.7	26.5		16.0	22.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.7	17.9		35.0	31.7		16.7	26.5		16.0	22.2	
LOS	C	B		C	C		B	C		B	C	
Approach Delay		20.3			32.2			25.7			21.9	
Approach LOS		C			C			C			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 23.4		Intersection LOS: C	
Intersection Capacity Utilization 65.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 3: Essa Rd. & Mapleton Ave.



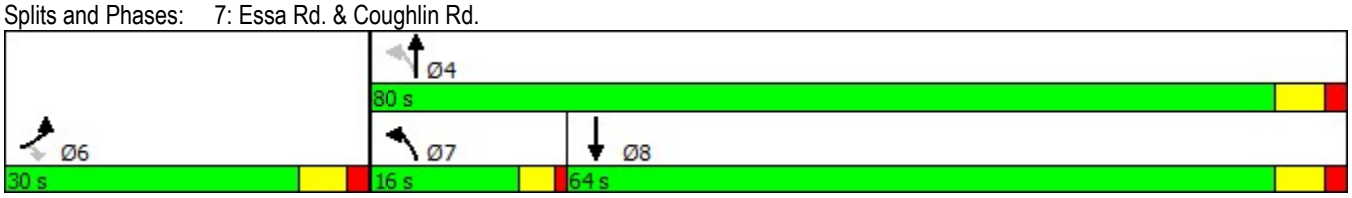
Future Total AM
7: Essa Rd. & Coughlin Rd.

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	94	129	67	381	364	31
Future Volume (vph)	94	129	67	381	364	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0	0.0	55.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.988	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3497	0
Flt Permitted	0.950		0.453			
Satd. Flow (perm)	1770	1583	844	3539	3497	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		140			12	
Link Speed (k/h)	50			50	50	
Link Distance (m)	144.6			163.5	53.0	
Travel Time (s)	10.4			11.8	3.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	102	140	73	414	396	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	102	140	73	414	430	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	6		7	4	8	
Permitted Phases		6	4			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	6	6	7	4	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	44.0	44.0	
Minimum Split (s)	27.0	27.0	48.0	70.0	70.0	
Total Split (s)	30.0	30.0	16.0	80.0	64.0	
Total Split (%)	27.3%	27.3%	14.5%	72.7%	58.2%	
Maximum Green (s)	24.0	24.0	12.0	74.0	58.0	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max	None	None	None	
Walk Time (s)	8.0	8.0		32.0	32.0	
Flash Dont Walk (s)	13.0	13.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	24.1	24.1	55.5	53.5	44.2	
Actuated g/C Ratio	0.27	0.27	0.62	0.60	0.49	
v/c Ratio	0.21	0.27	0.12	0.20	0.25	
Control Delay	28.2	6.4	7.1	8.4	13.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	28.2	6.4	7.1	8.4	13.8	
LOS	C	A	A	A	B	
Approach Delay	15.6			8.2	13.8	
Approach LOS	B			A	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 89.6			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.27			
Intersection Signal Delay: 11.8		Intersection LOS: B	
Intersection Capacity Utilization 64.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: Essa Rd. & Coughlin Rd.



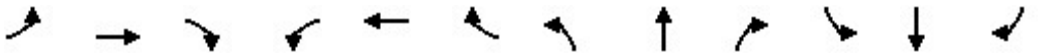
Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	5	470	5	3	386
Future Vol, veh/h	7	5	470	5	3	386
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	5	511	5	3	420

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	730	258	0	0	516	0
Stage 1	514	-	-	-	-	-
Stage 2	216	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	357	741	-	-	1046	-
Stage 1	565	-	-	-	-	-
Stage 2	799	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	356	741	-	-	1046	-
Mov Cap-2 Maneuver	356	-	-	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	797	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	454	1046	-
HCM Lane V/C Ratio	-	-	0.029	0.003	-
HCM Control Delay (s)	-	-	13.2	8.5	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	-

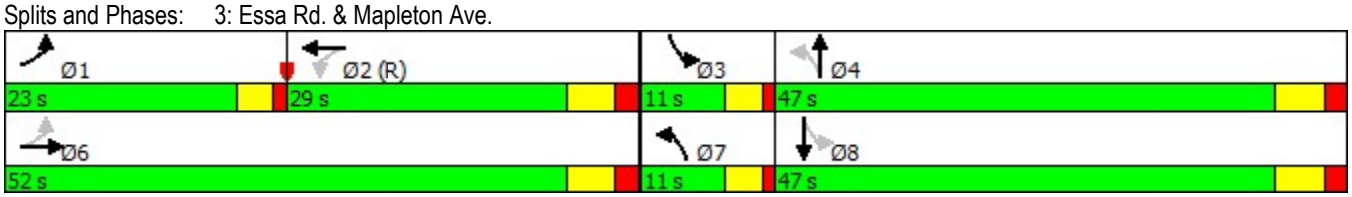


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	297	164	54	61	203	23	97	549	32	34	663	375
Future Volume (vph)	297	164	54	61	203	23	97	549	32	34	663	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	45.0		0.0	20.0		0.0	55.0		0.0	55.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.963			0.985			0.992			0.946	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1794	0	1770	1835	0	1770	3511	0	1770	3348	0
Flt Permitted	0.348			0.611			0.089			0.354		
Satd. Flow (perm)	648	1794	0	1138	1835	0	166	3511	0	659	3348	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		19			5			6			114	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		132.3			143.0			266.8			110.4	
Travel Time (s)		9.5			10.3			19.2			7.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	323	178	59	66	221	25	105	597	35	37	721	408
Shared Lane Traffic (%)												
Lane Group Flow (vph)	323	237	0	66	246	0	105	632	0	37	1129	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6			2		7	4		3	8	
Permitted Phases	6			2			4			8		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	1	6		2	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	7.0	10.0		10.0	10.0		7.0	40.0		7.0	40.0	
Minimum Split (s)	21.0	43.0		43.0	43.0		11.0	49.0		11.0	49.0	
Total Split (s)	23.0	52.0		29.0	29.0		11.0	47.0		11.0	47.0	
Total Split (%)	20.9%	47.3%		26.4%	26.4%		10.0%	42.7%		10.0%	42.7%	
Maximum Green (s)	19.0	46.0		23.0	23.0		7.0	41.0		7.0	41.0	
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		2.0	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		6.0	6.0		4.0	6.0		4.0	6.0	
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	Max		C-Max	C-Max		None	None		None	None	
Walk Time (s)		9.0		9.0	9.0			26.0			26.0	
Flash Dont Walk (s)		14.0		14.0	14.0			14.0			14.0	
Pedestrian Calls (#/hr)		0		0	0			0			0	
Act Effct Green (s)	48.4	46.4		25.2	25.2		51.2	45.0		49.6	40.6	
Actuated g/C Ratio	0.44	0.42		0.23	0.23		0.47	0.41		0.45	0.37	
v/c Ratio	0.70	0.31		0.25	0.58		0.59	0.44		0.10	0.86	
Control Delay	30.4	20.8		39.3	44.2		31.2	25.2		15.4	36.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.4	20.8		39.3	44.2		31.2	25.2		15.4	36.9	
LOS	C	C		D	D		C	C		B	D	
Approach Delay		26.3			43.1			26.1			36.3	
Approach LOS		C			D			C			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Offset: 0 (0%), Referenced to phase 2:WBTL, Start of Green			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 32.3		Intersection LOS: C	
Intersection Capacity Utilization 84.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Essa Rd. & Mapleton Ave.

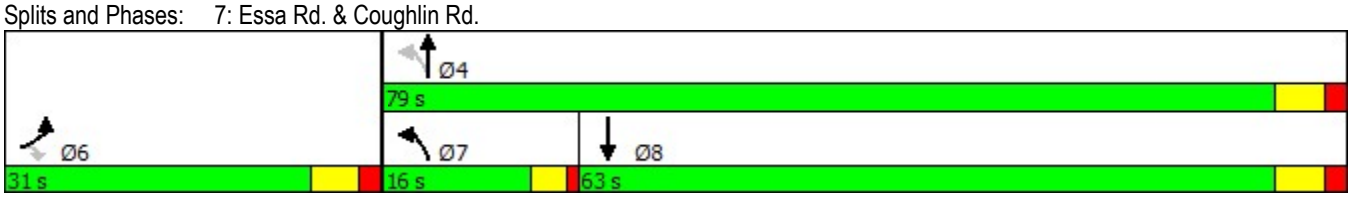


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	122	149	239	543	599	190
Future Volume (vph)	122	149	239	543	599	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (m)	25.0	0.0	55.0			0.0
Storage Lanes	1	1	1			0
Taper Length (m)	7.5		7.5			
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.850			0.964	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1770	1583	1770	3539	3412	0
Flt Permitted	0.950		0.223			
Satd. Flow (perm)	1770	1583	415	3539	3412	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		162			57	
Link Speed (k/h)	50			50	50	
Link Distance (m)	144.6			163.5	53.0	
Travel Time (s)	10.4			11.8	3.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	162	260	590	651	207
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	162	260	590	858	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	pm+pt	NA	NA	
Protected Phases	6		7	4	8	
Permitted Phases		6	4			

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	6	6	7	4	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	44.0	44.0	
Minimum Split (s)	27.0	27.0	48.0	70.0	70.0	
Total Split (s)	31.0	31.0	16.0	79.0	63.0	
Total Split (%)	28.2%	28.2%	14.5%	71.8%	57.3%	
Maximum Green (s)	25.0	25.0	12.0	73.0	57.0	
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	4.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max	None	None	None	
Walk Time (s)	8.0	8.0		32.0	32.0	
Flash Dont Walk (s)	13.0	13.0		12.0	12.0	
Pedestrian Calls (#/hr)	0	0		0	0	
Act Effct Green (s)	25.0	25.0	61.5	59.5	44.0	
Actuated g/C Ratio	0.26	0.26	0.64	0.62	0.46	
v/c Ratio	0.29	0.31	0.61	0.27	0.54	
Control Delay	30.9	6.4	14.0	8.9	19.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	30.9	6.4	14.0	8.9	19.2	
LOS	C	A	B	A	B	
Approach Delay	17.5			10.5	19.2	
Approach LOS	B			B	B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 96.5			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 15.2		Intersection LOS: B	
Intersection Capacity Utilization 71.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: Essa Rd. & Coughlin Rd.



Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	6	658	7	5	773
Future Vol, veh/h	10	6	658	7	5	773
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	250	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	7	715	8	5	840

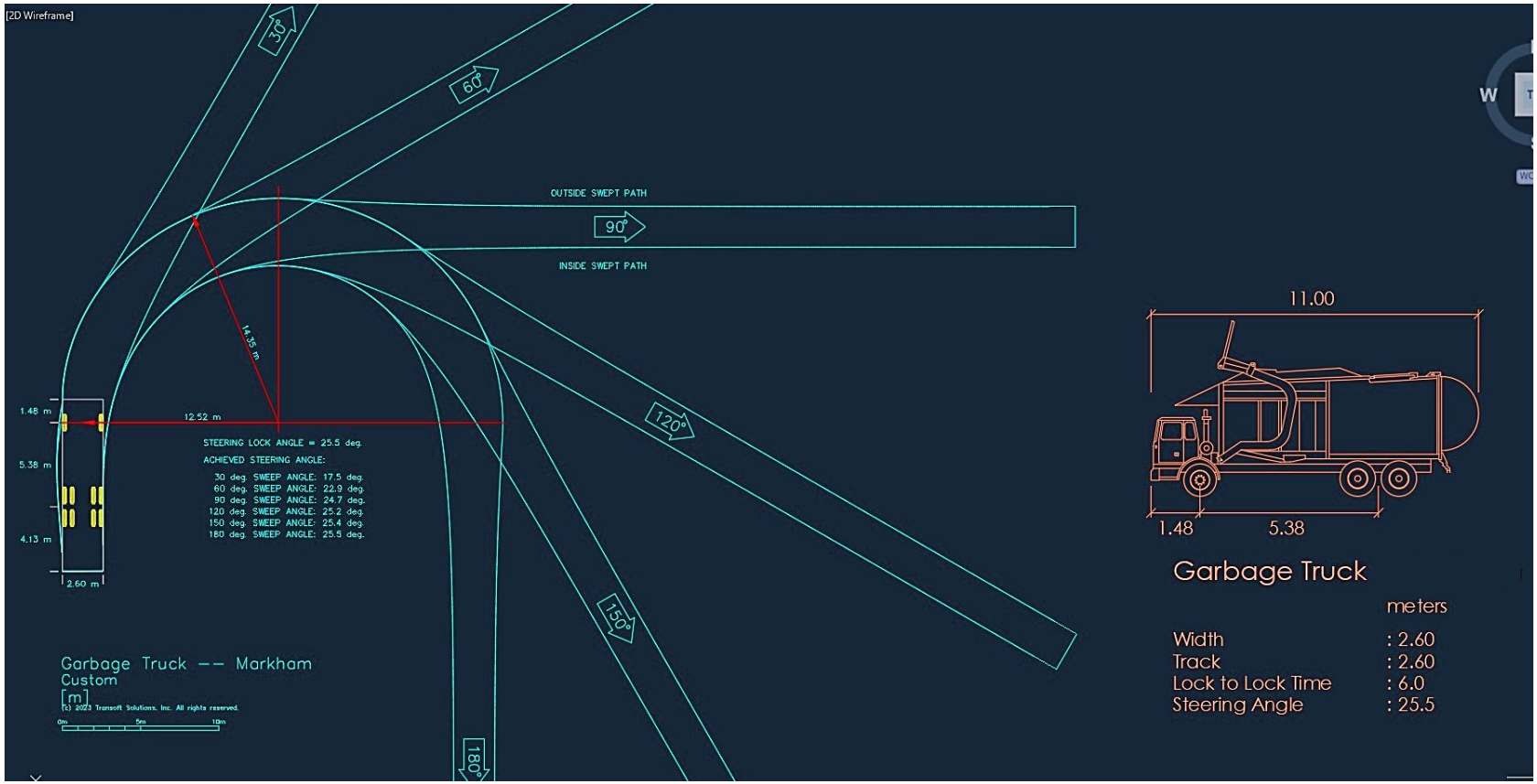
Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1149	362	0	0	723	0
Stage 1	719	-	-	-	-	-
Stage 2	430	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	192	635	-	-	875	-
Stage 1	444	-	-	-	-	-
Stage 2	624	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	191	635	-	-	875	-
Mov Cap-2 Maneuver	191	-	-	-	-	-
Stage 1	444	-	-	-	-	-
Stage 2	620	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.9	0	0.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	259	875	-
HCM Lane V/C Ratio	-	-	0.067	0.006	-
HCM Control Delay (s)	-	-	19.9	9.1	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.2	0	-

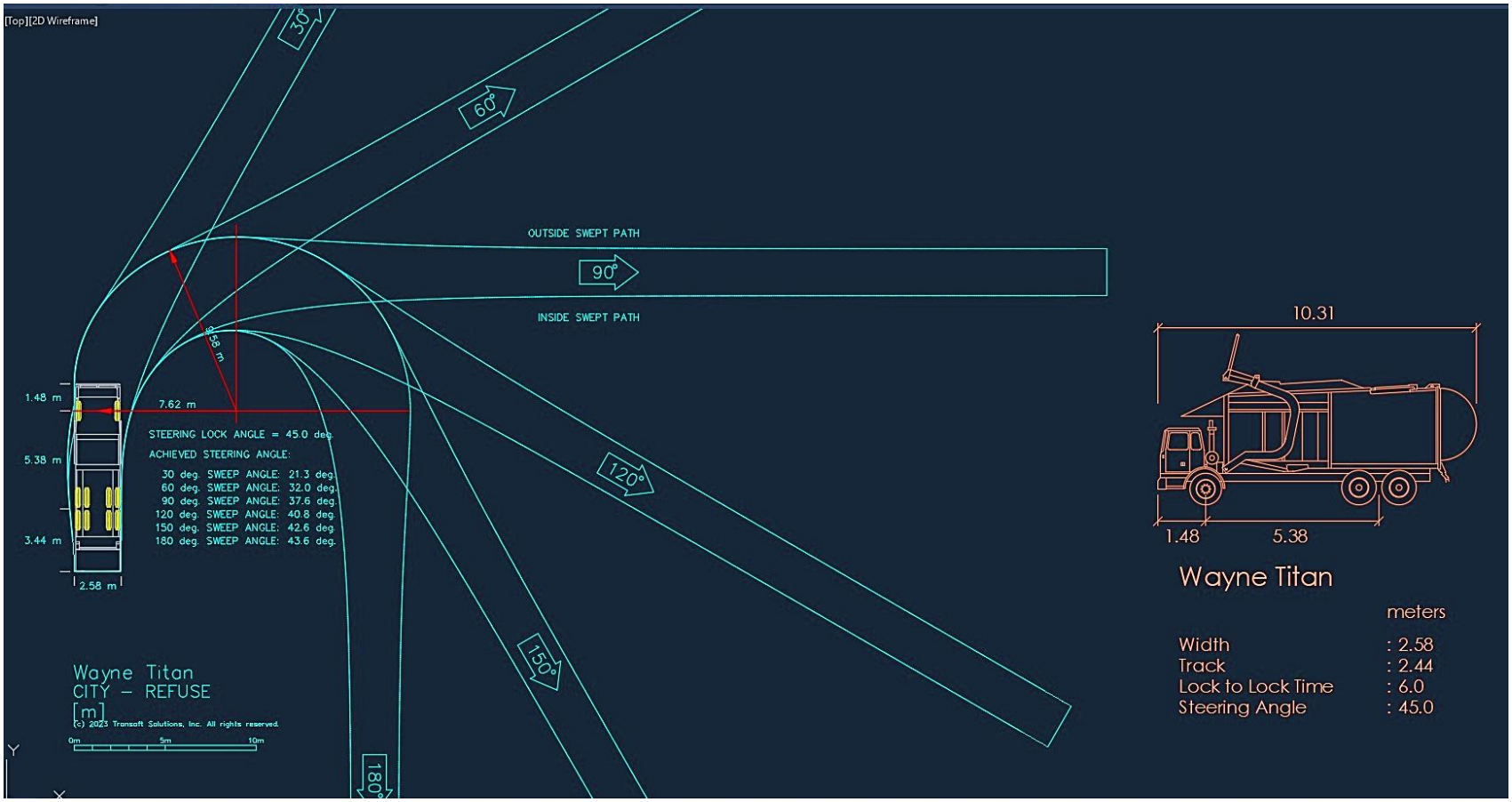
APPENDIX F

Truck Swept Path Design and Dimensions



Traffic Engineering Ltd.

Swept Path Assessments - City of Barrie Garbage Truck
Source: City of Barrie



Traffic Engineering Ltd.

Swept Path Assessments – Wayne Titan Garbage Truck

APPENDIX G

Signage Plan

SITE PLAN APPLICATIION NUMBER

D28-021-2022

CITY OF BARRIE

LOT 16 ON REGISTERED PLAN 1101
CITY OF BARRIE
COUNTY OF SIMCOE, ONTARIO

2 KEY PLAN
N.T.S

PROJECT NAME
BARRIE APARTMENTS

PROJECT ADDRESS
582 ESSA ROAD
BARRIE, ON

CLIENT
INSPIRATION GROUP

CONSULTANT
Traffic+ Engineering Ltd.
Toronto
Tel: (514) 891-3972
Website: TrafficPlus.ca

Date	May 11, 2023
Drawn and Designed by:	NGh.
Scale:	As Shown in the Plan

1 SITE PLAN
1:200

SIGNAGE PLAN

BARRIE APARTMENTS