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Retirement Manor at Rockwood in Sudbury

TRAFFIC IMPACT BRIEF

11415573 Canada Inc.

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Issue	Date	Description
1	February 17, 2023	Final Report

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1 Introduction

Tatham Engineering Limited was retained by 11415573 Canada Inc. to complete a Traffic Impact Brief in support of the proposed retirement development to be located at the southeast corner of the intersection of Rockwood Drive and Algonquin Road in the City of Greater Sudbury. The location of the development is illustrated in Figure 1.

The purpose of this study is to review the proposed development from a transportation perspective. Recognizing that the volume of traffic to be generated by this development will not be significant, the scope of this study has been limited to a traffic brief with a focus on the following:

- existing conditions, including a description of the study area road network, traffic volumes, operations, and planned/proposed improvements;
- details of the proposed development and anticipated trip generation; and
- transportation impacts associated with the proposed development on the existing road network and the daily operations of the Algonquin Road Public School.

2 Existing Conditions

This chapter will discuss the road network, traffic volumes, and operations for the existing conditions.

2.1 ROAD NETWORK

The road network to be addressed by this study consists of Rockwood Drive, Algonquin Road, Countryside Drive, and their respective intersection. Aerial imagery and photographs of the road system are provided in Figure 2.

2.1.1 Roads

Rockwood Drive

Rockwood Drive is a 2-lane road with a north-south orientation. Through the study area, Rockwood Drive has a rural cross-section with gravel shoulders and open ditches. As per *Schedule 7 – Transportation Network* of the *City of Greater Sudbury Official Plan*[1], Rockwood Drive is considered a local road and thus a planning capacity of 400 vehicles per hour per lane (vphpl) has been assumed.

Algonquin Road

As per the City's *Official Plan,* Algonquin Road is a collector road under the jurisdiction of the City. The road has a 2-lane urban cross-section (curb and gutter) with sidewalks provided on the north (east of Rockwood Drive) and east (north of Countryside Drive) sides of the road. Bicycle lanes are also provided through the study area. Algonquin Road changes alignment at its intersection with Rockwood Drive and Countryside Drive, transitioning from an east-west alignment (east of the intersection) to a north-south alignment (north of the intersection). As a collector road, Algonquin Road has an assumed planning capacity of 650 vphpl.

Countryside Drive

Countryside Drive is a 2-lane collector road, oriented east-west through the study area. Countryside Drive has an urban cross-section with bicycle lanes, and a sidewalk on the south side of the road. As a collector road, a planning capacity of 650 vphpl has been assumed.

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[1] *City of Greater Sudbury Official Plan*. City of Greater Sudbury Planning Services Division. Consolidated March 2022.

Speed Limits

Due to the presence of Algonquin Road Public School, the posted speed limit on all of the study area road sections is 40 km/h. Therefore, a design speed of 50 km/h (posted speed + 10 km/h for lower speed limits) has been assumed.

2.1.2 Intersection

Algonquin Road & Rockwood Drive/Countryside Drive

The intersection of Algonquin Road and Rockwood Drive/Countryside Drive is a 4-leg, unsignalized intersection operating under all-way stop control. Each approach consists of a single shared left-through-right turn lane.

2.2 TRAFFIC VOLUMES

To determine existing traffic volumes, traffic counts were conducted at the intersection of Algonquin Road with Rockwood Drive/Countryside Drive on Wednesday February 8, 2023 from 7:00AM to 10:00AM and 3:00PM to 6:00PM. Given the proximity of the study area intersection to the Algonquin Road Public School, the counts were conducted so as to capture the traffic impacts associated with the start (8:55AM) and end (3:15PM) of the school day.

The 2023 traffic volumes are illustrated in Figure 3 with detailed count sheets provided in Appendix A. The observed weekday AM and PM peak hours were 8:00AM to 9:00AM and 4:00PM to 5:00PM. Thus, the AM peak hour coincides with the start of the school day; whereas the PM peak hour occurs after the end of the school day (i.e. the school traffic associated with the end of school day is not significant enough to influence the PM peak hour of the road network).

2.3 TRAFFIC OPERATIONS

The capacity, and hence operations, of a road system is effectively governed by its intersections. To provide a baseline from which the future traffic operations can be assessed, the existing intersection operations were reviewed based on the following:

- the 2023 traffic volumes;
- the existing intersection configuration and control;
- and procedures outlined in the *2000 Highway Capacity Manual*[2] (using Synchro v.11 software).

[2] *Highway Capacity Manual.* Transportation Research Board, Washington DC, 2000.

For unsignalized intersections, the analysis considers:

- the average delay (measured in seconds);
- level of service (LOS); and
- volume to capacity (v/c) for critical movements (i.e. those operating under stop control).

With respect to the noted metrics:

- level of service A corresponds to the best operating condition with minimal delays whereas level of service F corresponds to poor operations resulting from high intersection delays (additional details regarding Level of Service definitions are provided in Appendix B; and
- a v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

A summary of the analysis is provided in Table 1 with detailed worksheets provided in Appendix C.

Table 1: Intersection Operations – 2023

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c
Algonquin Road & Rockwood Drive/ Countryside Drive	EB LTR	stop	9	A	0.20	9	A	0.18
	WB LTR	stop	11	B	0.42	9	A	0.21
	NB LTR	stop	9	A	0.16	9	A	0.05
	SB LTR	stop	9	A	0.22	9	A	0.28

L – left T – through R – right LT – left-through TR – through-right LTR – left-through-right

As indicated, the intersection of Algonquin Road with Rockwood Drive/Countryside Drive currently provides excellent operations (LOS B or better) during both the weekday AM and PM peak hours. No improvements are required to accommodate the existing traffic volumes.

3 Proposed Development

This section will provide additional details regarding the proposed development, including its location, projected site-generated traffic volumes, and the assignment of said volumes to the adjacent road network.

3.1 SITE LOCATION

The subject site is an approximate 1.0 ha vacant lot located on Rockwood Drive in the City of Greater Sudbury, as illustrated in Figure 1. The development is bound by Algonquin Road to the north, Rockwood Drive to the west, residential development to the east and a Bell station to the south.

3.2 DEVELOPMENT

The proposed development will consist of a 6-storey, 150-unit retirement home with access to Rockwood Drive. A site plan is provided in Figure 4.

3.3 SITE ACCESS & CIRCULATION

Access to the site will be provided by a new access point located on Rockwood Drive, located approximately 40 metres south of Algonquin Road. As per the Transportation Association of Canada's (TAC) *Geometric Design Guide for Canadian Roads*[3], the suggested minimum corner clearance between an access and a stop-controlled intersection on a local road is 15 metres (measured from edge of road to edge of access). With a proposed separation of 40 metres, the access location satisfies the noted TAC guidelines for corner clearance.

The site access will have a width of 8.0 metres (measured at the property line), narrowing to 6.0 metres internal to the site. The *City of Greater Sudbury Engineering Design Manual*[4] requires a minimum access width of 7.2 metres for an access serving a multi-residential building. As such, the access width satisfies the City's engineering standard. Internal aisles within the site will be a minimum of 6.0 metres wide (satisfying the requirements of the City's *Zoning By-law*[5]) with 12.0-metre centreline curve radii in accordance with requirements set forth in the *Ontario Building Code*. This will readily accommodate two-way traffic operations and the manoeuvring

[3] *Geometric Design Guide for Canadian Roads.* Transportation Association of Canada. June 2017.
[4] *City of Greater Sudbury Engineering Design Manual.* City of Greater Sudbury, Engineering Services Division. November 2012.
[5] *City of Greater Sudbury Zoning By-law 2010-100Z*. City of Greater Sudbury. Updated January 2023.

requirements of emergency response vehicles (i.e. a firetruck). A vehicle turning assessment is provided in Appendix D.

3.4 SITE PARKING

As per the City's *Zoning By-law*, a retirement home development must provide the following parking on-site:

- 4 spaces plus 0.5 spaces per guest room for the first 30 guest rooms;
- 0.25 spaces per guest room in excess of the first 30 guest rooms; and
- 1 space per 20 m^2 net floor area used for medical, health, or personal services.

The parking requirements for the development, as per the above requirements, are summarized in Table 2. As indicated, the site is required to provide 51 parking spaces. Per the site plan, the site will supply 83 spaces, which satisfies the City's requirements.

Table 2: Parking Requirements

LAND USE	PARKING RATE	VARIABLE	PARKING REQUIRED
retirement home	4 spaces + 0.5 spaces per guest room	30 rooms	19 spaces
	0.25 spaces per guest rooms in excess of 30	120 rooms	30 spaces
	1 space per 20 m^2 of health/personal services	40 m^2 NFA	2 spaces
Total Spaces Required			**51 spaces**

Regarding the provision of barrier-free parking spaces, the City's *Zoning By-law* requires a provision of 2 barrier free spaces for a provided parking supply of 51 to 100 spaces. The site will provide 3 barrier-free spaces, thus satisfying the City's requirements.

3.5 SITE TRAFFIC

3.5.1 Trip Generation

The number of vehicle trips to be generated by the proposed development for the weekday AM and weekday PM peak hours has been determined based on the type of use, development size, and trip generation rates per the *ITE Trip Generation Manual, 11th Edition*[6]. Based on the proposed

[6] *Trip Generation Manual, 11th Edition.* Institute of Transportation Engineers. September 2021.

development, trip rates for the *assisted living* land-use (ITE code 254) have been applied. While the *ITE Trip Generation Manual* provides rates for *senior adult housing – multifamily* (ITE code 252), the ITE description for the *assisted living* land-use was determined to be most representative of the retirement facility proposed for the subject site. Descriptions for both the *senior adult housing – multifamily* and *assisted living* land-uses are provided in Appendix E.

Trip generation rates and resulting trip estimates for the site are summarized in Table 3.

Table 3: Trip Estimates

LAND USE	VARIABLE/ SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
assisted living (ITE 254)	per bed	0.11	0.07	0.18	0.09	0.15	0.24
	150 beds	16	11	27	14	22	36

As indicated, the site is expected to generate 27 trips during the weekday AM peak hour and 36 trips during the weekday PM peak hour.

3.5.2 Trip Distribution & Assignment

It is expected that most trips (residents, visitors and staff) will be destined to/from locations within the Sudbury area, thus the distribution of the site generated traffic has been developed based on the location of the site within Sudbury. Based on the above and in consideration of expected travel routes, the following distribution was applied:

- to/from the north via Algonquin Road – 70%;
- to/from the east via Algonquin Road – 10%; and
- to/from the west via Countryside Drive – 20%.

No distribution was applied to/from the south along Rockwood Drive, recognizing that the road only serves the existing residential development to the south and does not provide connectivity to the wider road network. Rather, it is expected that traffic travelling to/from the south will utilize Countryside Drive to access Long Lake Road which provides access to the south (which in accounted for in the distribution to/from the west).

The resulting site-generated volumes assigned to the adjacent road network are illustrated in Figure 5.

4 Future Conditions

This chapter will address the resulting impacts of the proposed development on the adjacent road system. The following areas will be addressed:

- intersection operations;
- available sight lines at the proposed site access; and
- potential improvements to the study area road network, if necessary.

4.1 ROAD NETWORK

Per the *City of Greater Sudbury Transportation Study Report*[7], no road improvements are currently planned within the study area.

4.2 TRAFFIC VOLUMES

For the purposes of this study, a 5-year (2028) horizon has been considered to assess the impact of the development on the area road network. Given the limited traffic to be generated by the development, a 5-year horizon is considered sufficient in establishing the potential impacts to the surrounding road network.

4.2.1 Background Growth

Based on data from the 2011, 2016 and 2021 Canadian censuses, the population of the City of Greater Sudbury increased from 160,274 persons to 161,531 persons from 2011 to 2016 (translating to an annual growth rate of approximately 0.16%) and to 166,004 persons from 2016 to 2021 (annual growth of approximately 0.55%). This translates to an overall growth of approximately 0.35% per annum between 2011 and 2021.

As per the City's *Growth & Settlement Background Report*[8], the growth observed in the census data is consistent with the 'high growth' scenario projected in the *Official Plan* (approximately 0.3% growth per annum), resulting in a projected 2032 population in excess of 170,600 persons within the City. This growth is expected to be concentrated in existing population centres (such as Sudbury, Valley East, Nickel Centre, etc.).

[7] *City of Greater Sudbury Transportation Study Report*. WSP & MMM Group. December 2016.
[8] *Growth & Settlement Background Report and Issues Paper*. City of Greater Sudbury. May 28, 2012.

Based on the above census and growth planning data, a background growth rate of 1% per annum has been applied to the traffic volumes on the study area roads. The resulting 2028 background volumes (i.e. without the proposed development) area illustrated in Figure 6.

4.2.2 Future Traffic Volumes

The resulting 2028 traffic volumes are illustrated in Figure 7. The volumes are based on the 2023 traffic volumes adjusted to reflect the noted background growth rate and the additional traffic volumes generated by the subject development.

4.3 TRAFFIC OPERATIONS

4.3.1 Intersection Operations

The intersection of Algonquin Road and Rockwood Drive/Countryside Drive was analyzed again under future conditions. In addition, the site access was assessed under future conditions (assuming 1 inbound lane and 1 outbound lane operating under stop control). Results of the operational analysis are summarized in Table 4 with worksheets provided in Appendix F.

Table 4: Intersection Operations – 2028

INTERSECTION, MOVEMENTS & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c
Algonquin Road & Rockwood Drive/ Countryside Drive	EB LTR	stop	9	A	0.22	9	A	0.20
	WB LTR	stop	12	B	0.45	9	A	0.24
	NB LTR	stop	9	A	0.20	9	A	0.10
	SB LTR	stop	11	B	0.26	11	B	0.32
Rockwood Drive & Site Access	WB LR	stop	9	A	0.01	9	A	0.02

L – left T – through R – right LT – left-through TR – through-right LTR – left-through-right

As indicated, the intersection of Algonquin Road with Rockwood Drive/Countryside will continue to provide excellent operations (LOS B or better) during both the weekday AM and PM peak hours through the 2028 horizon. The site access is also expected to provide excellent operations (LOS A) through the 2028 horizon.

In consideration of the above, no improvements are required to accommodate the future traffic volumes.

4.3.2 Implications to Algonquin Road Public School

The development is not expected to create any impacts that would negatively affect the pick-up or drop-off operations associated with the Algonquin Road Public School. Parking in excess of the City's zoning by-law requirements is provided on-site, thus no on-street parking demand resulting from the subject development is expected. Additionally, most of the peak hour site traffic is expected to be generated by staff of the subject site at shift changeover points, which will occur prior to the observed peak periods on the adjacent roads (i.e. before 8:00AM and before 4:00PM). While there may be some overlap between the end of school day and the anticipated shift change at the subject site, the volumes on the road network at that time are less than that of the peak hour – and thus are not a concern. Furthermore, site traffic generated by residents of the development will not coincide with the peak hours of the road network or school operations, recognizing that seniors/retirees are not bound to travel during typical work/school commuting hours. The assessment completed above, therefore, is conservative as it assumes that both the peak generation of the site and adjacent streets will overlap, which, as indicated, is not expected to be problematic.

4.4 TURN LANE REQUIREMENTS

Despite the otherwise good operations anticipated at the site access, the need for exclusive left and right turn lanes at the site access has been reviewed based on MTO warrants. The review is based on the following:

- MTO guidelines[9] for auxiliary turn lanes at unsignalized intersections; and
- a design speed of 50 km/h (reflective of the 40 km/h posted speed on each road).

4.4.1 Left Turn Lanes

For unsignalized intersections on two-lane undivided highways, MTO warrants are based on design speed, the volume of left turning traffic, advancing volume (i.e. traffic travelling in the same direction as the left-turning traffic) and opposing volume (i.e. traffic travelling in the opposite direction as the left-turning traffic). The completed left turn warrants are provided in Appendix G. As indicated, due to the very low advancing and opposing volumes on Rockwood Drive, a left turn lane is not warranted.

[9] *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads.* Ontario Ministry of Transportation Design Standards & Specifications Office. April 2020.

4.4.2 Right Turn Lanes

MTO guidelines suggest that an exclusive right turn lane be considered where right turning volumes exceed 60 vehicles per hour (vph) and/or impede the operations of through traffic. As per the volume projections of Figure 7, minimal traffic is expected to access the site from the south. Therefore, a right turn lane is not necessary to serve the proposed development.

4.5 SIGHT LINE ASSESSMENT

The sight line assessment at the proposed site access has considered both minimum stopping sight distance and intersection sight distance requirements as per the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads*[10].

- Minimum stopping sight distance provides sufficient distance for an approaching motorist to observe a hazard in the road and bring their vehicle to a complete stop prior to the hazard.

Intersection sight distance allows a vehicle to enter a main road from a side street (or site access) and attain the appropriate operating speed without significantly impacting the operating speed of an approaching vehicle.

Table 5 summarizes the sight distance requirements for a design speed of 50 km/h, reflective of the 40 km/h posted speed limit along Rockwood Drive. The available sight lines along Rockwood Drive (as determined through field measurements) are also provided in

Table 5.

Table 5: Sight Distance Requirements & Availability

DESIGN SPEED	STOPPING SIGHT DISTANCE	INTERSECTION SIGHT DISTANCE		AVAILABLE SIGHT LINES TO/FROM	
		Left Turn	Right Turn	North	South
50 km/h	65 m	105 m	95 m	>150m	>150m

As indicated, sight lines along Rockwood Drive to/from the north and south are sufficient. It is further noted that give the proximity of the adjacent intersection to the site access, operating speeds across the frontage of the site will be reduced recognizing that motorists approaching from the north will be doing so having just completed a stop at the intersection (recall that the subject intersection is all-way stop controlled); whereas motorists approaching from the south

[10] *Geometric Design Guide for Canadian Roads, Chapter 9.* Transportation Association of Canada. June 2017.

will also be operating at a reduced speed at they slow their vehicles in preparation to stop at the intersection.

5 Summary

Proposed Development

This study has addressed the transportation impacts associated with the proposed retirement home development to be located on Rockwood Drive in the City of Greater Sudbury. The proposed development consists of a 6-storey, 150-unit retirement home. Upon completion, the site is expected to generate 27 trips during the weekday AM peak hour and 36 trips during the weekday PM peak hour.

Transportation Impacts

To assess the impact of the proposed development, the operations of the intersection of Algonquin Road with Rockwood Drive and Countryside Drive were analyzed under existing (2023) and future horizon (2028) periods.

Results of the operational analyses indicate that the intersection currently provides excellent operations (LOS B or better) with minimal delays and is expected to continue to provide excellent operations (LOS B or better) with minimal delays through the 2028 horizon. No improvements are required to accommodate the existing or future traffic volumes.

The site access was assessed under the future horizon as well. Based on the results of the assessment, the access is expected to provide excellent (LOS A) operations with minimal delays through the 2028 horizon.

No impacts to the operations of the nearby Algonquin Road Public School resulting from the subject development are expected.

Turn Lane Requirements

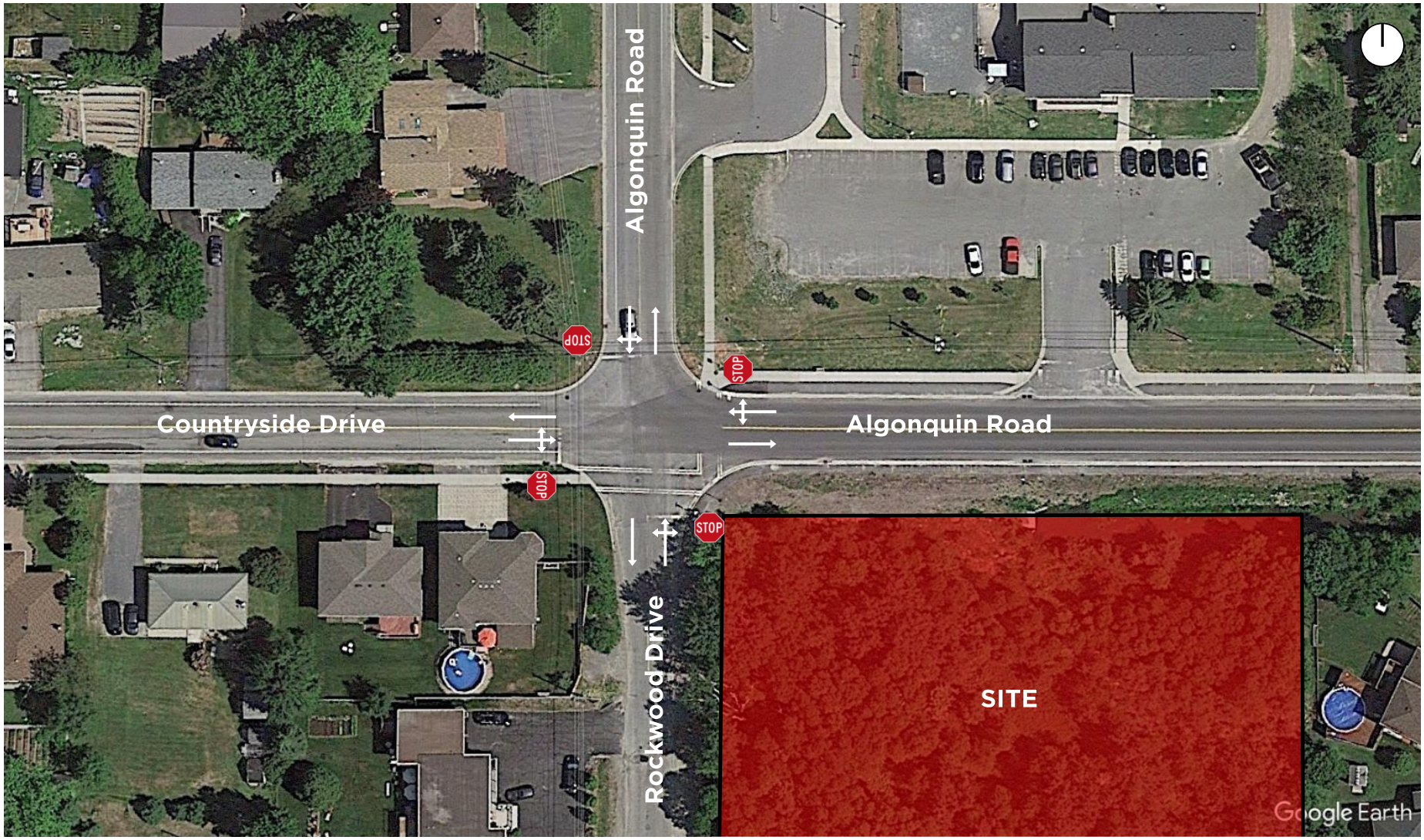
The need for exclusive left and right turn lanes at the proposed site access were reviewed in context of MTO warrant criteria. Based on this review, exclusive turns lanes are not necessary to accommodate future traffic volumes.

Sight Line Assessment

Sight lines at the proposed site access point were reviewed in context of TAC requirements for minimum stopping and intersection sight distances. Based on the review, sight lines were found to be adequate.

RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 1: Site Location



RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 2A: Road Network

Looking north along Algonquin Road from Countryside Drive/Algonquin Road

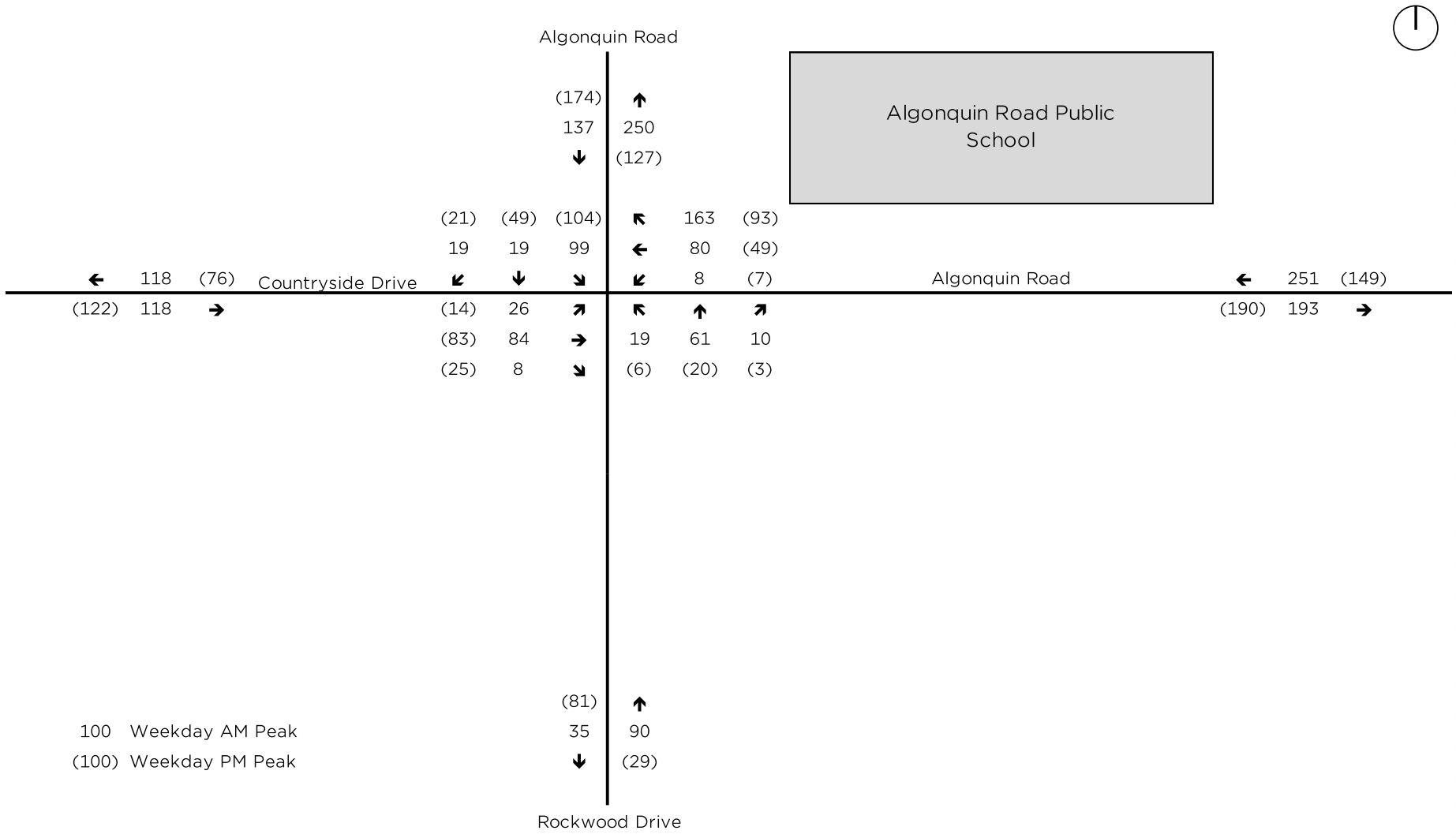
Looking east along Algonquin Road from Rockwood Drive/Algonquin Road

Looking south along Rockwood Drive from Algonquin Road/Countryside Drive

Looking west along Countryside Drive from Rockwood Drive/Algonquin Road

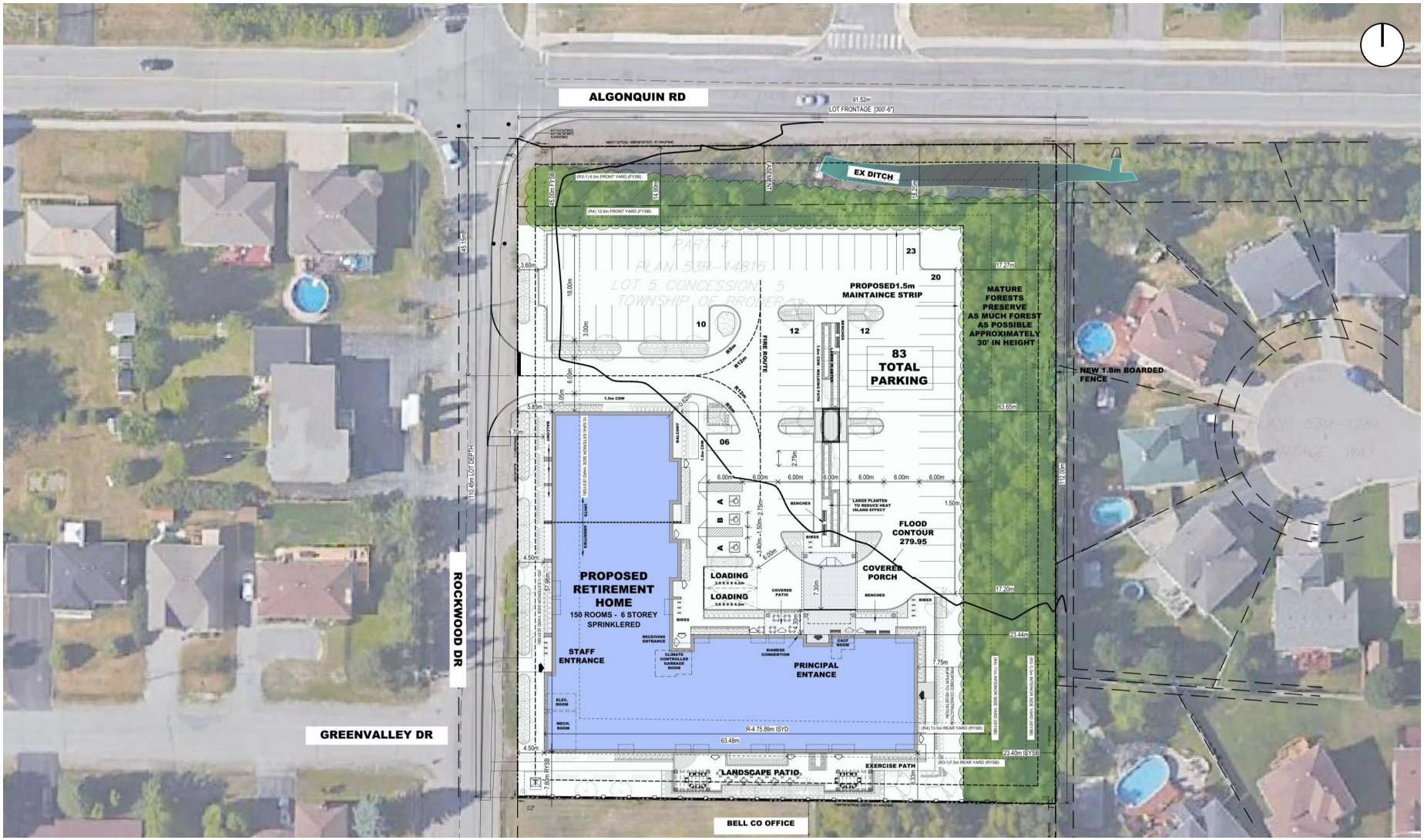
RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 2B: Road Network



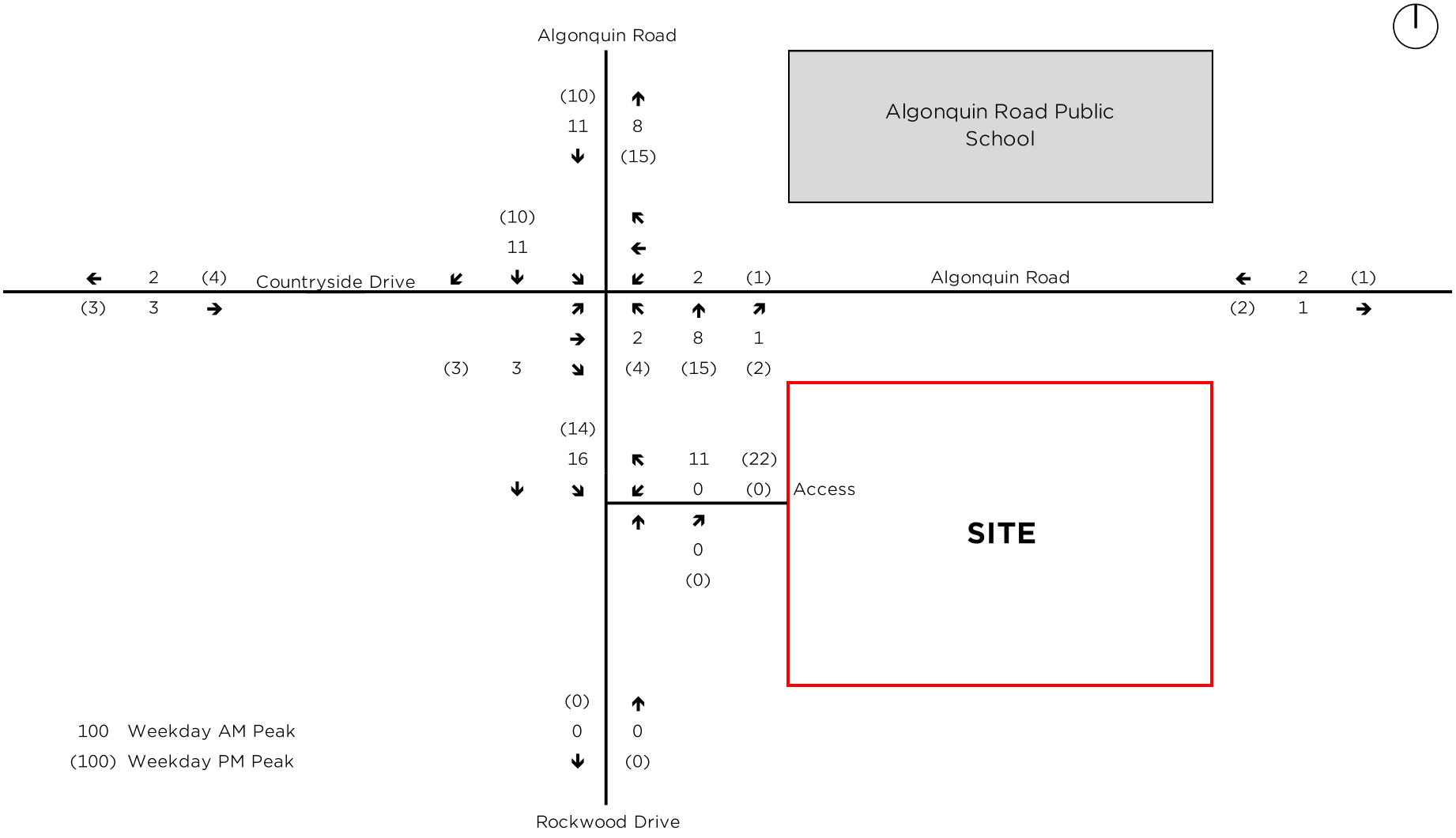
RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 3: Traffic Volumes – 2023



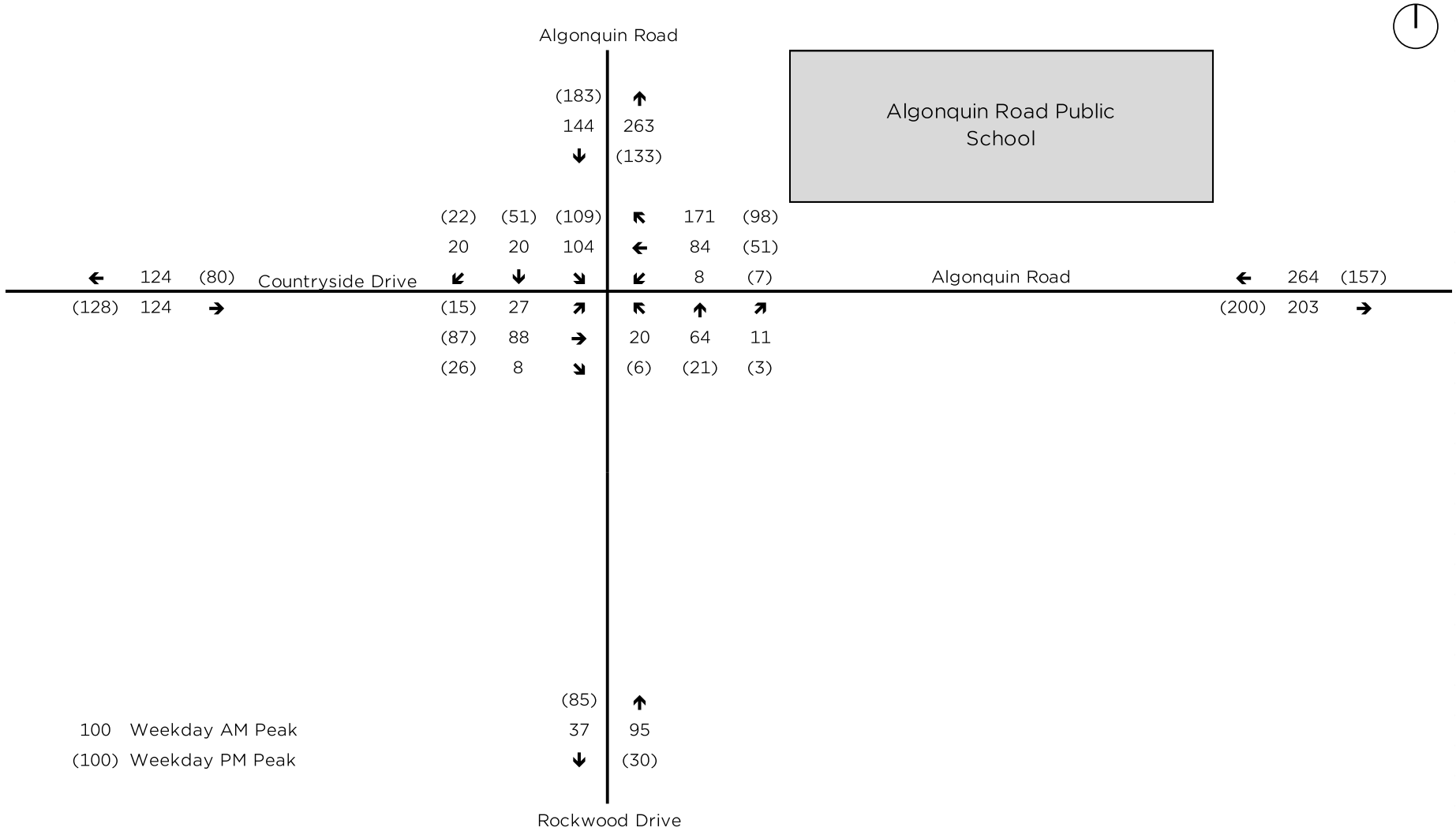
RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 4: Site Plan



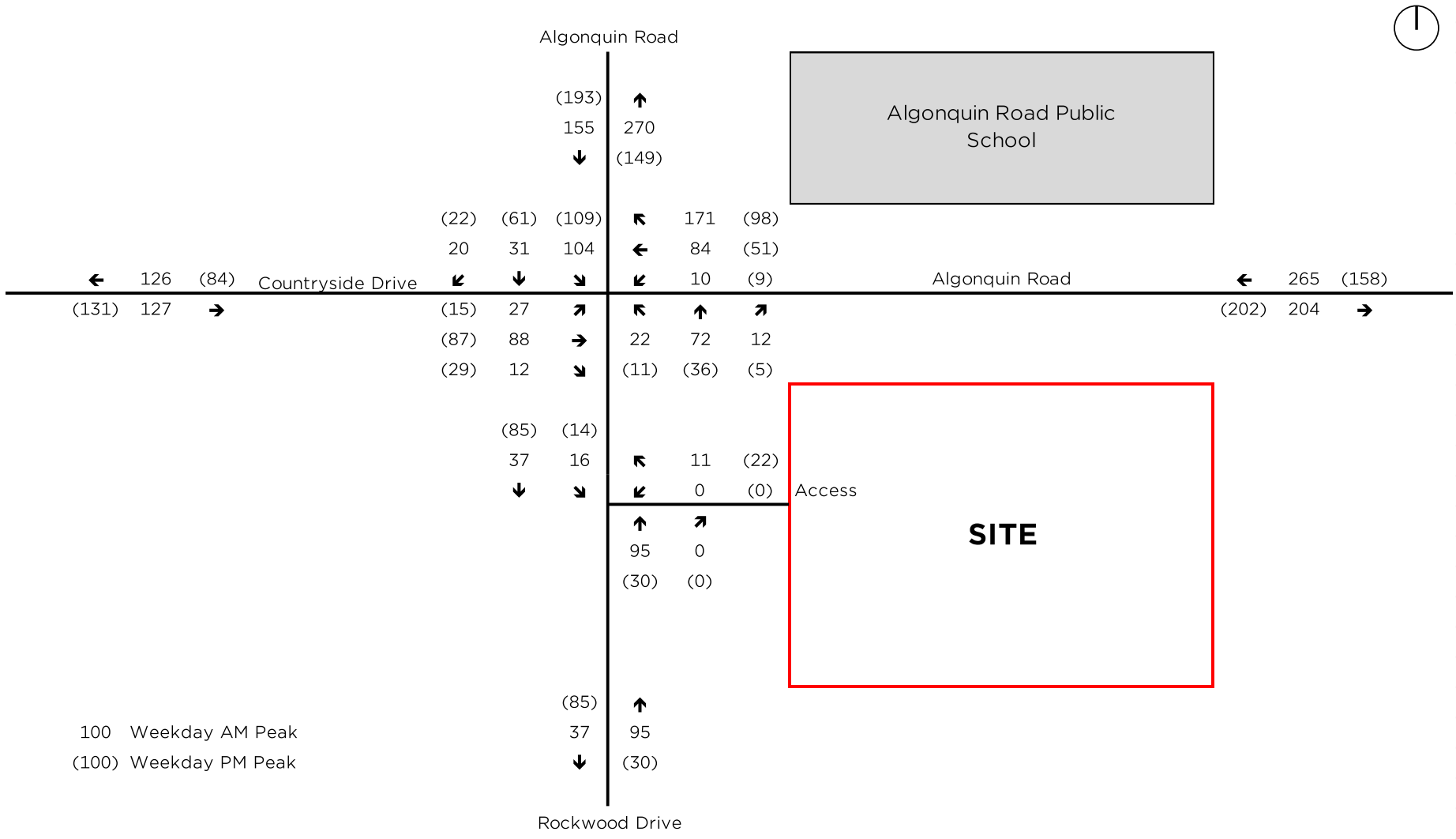
RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 5: Traffic Volumes - Site



RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 6: Traffic Volumes – 2028 Background



RETIREMENT MANOR AT ROCKWOOD IN SUDBURY

Figure 7: Traffic Volumes – 2028 Total

Appendix A:
Traffic Counts

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023

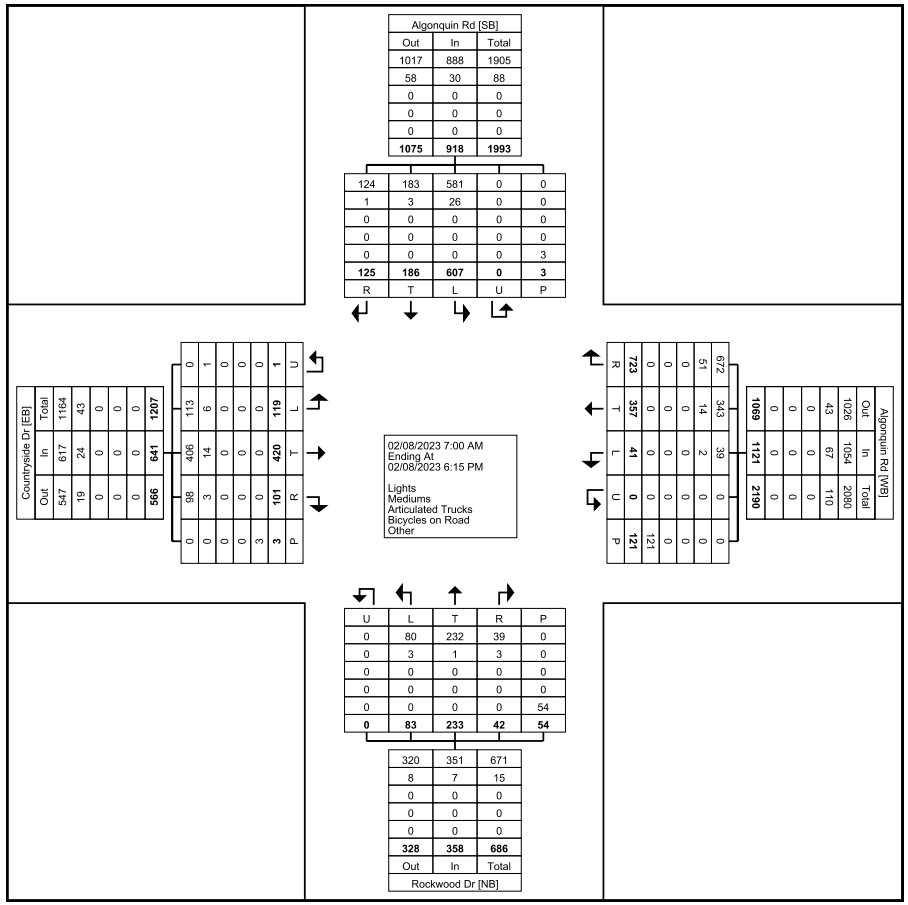
Turning Movement Data

Start Time	Algonquin Rd Southbound						Algonquin Rd Westbound						Rockwood Dr Northbound						Countryside Dr Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
7:00 AM	1	4	9	0	0	14	11	6	0	0	2	17	1	3	1	0	2	5	1	8	2	0	0	11	47
7:15 AM	3	1	4	0	0	8	18	5	2	0	1	25	2	4	4	0	0	10	0	8	0	0	0	8	51
7:30 AM	1	1	19	0	0	21	26	12	2	0	1	40	3	20	6	0	0	29	0	15	3	0	0	18	108
7:45 AM	8	2	30	0	0	40	24	18	1	0	0	43	2	9	3	0	0	14	1	25	4	0	0	30	127
Hourly Total	13	8	62	0	0	83	79	41	5	0	4	125	8	36	14	0	2	58	2	56	9	0	0	67	333
8:00 AM	4	3	26	0	0	33	39	18	0	0	5	57	1	24	3	0	5	28	2	29	2	0	0	33	151
8:15 AM	4	6	26	0	0	36	26	13	1	0	0	40	3	5	4	0	0	12	2	20	4	0	0	26	114
8:30 AM	3	5	23	0	0	31	40	19	5	0	1	64	5	15	6	0	0	26	3	21	11	0	0	35	156
8:45 AM	8	5	24	0	0	37	58	20	2	0	11	80	1	17	6	0	2	24	1	14	9	0	0	24	165
Hourly Total	19	19	99	0	0	137	163	70	8	0	17	241	10	61	19	0	7	90	8	84	26	0	0	118	586
9:00 AM	3	6	18	0	2	27	17	9	1	0	3	27	1	6	2	0	0	9	4	6	2	0	0	12	75
9:15 AM	1	2	10	0	0	13	12	7	0	0	3	19	1	6	0	0	0	7	0	4	4	0	0	8	47
9:30 AM	2	2	10	0	0	14	26	2	0	0	1	28	1	4	3	0	1	8	2	5	2	0	0	9	59
9:45 AM	0	0	18	0	0	18	17	5	2	0	3	24	1	4	3	0	1	8	5	8	1	0	0	14	64
Hourly Total	6	10	56	0	2	72	72	23	3	0	10	98	4	20	8	0	2	32	11	23	9	0	0	43	245
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00 AM	2	4	10	0	0	16	12	10	0	0	0	22	1	8	1	0	0	10	2	8	4	0	0	14	62
11:15 AM	0	11	12	0	0	23	13	9	0	0	1	22	0	5	0	0	0	5	1	6	3	0	0	10	60
11:30 AM	4	5	20	0	0	29	13	6	2	0	2	21	1	2	4	0	1	7	2	16	5	0	0	23	80
11:45 AM	6	4	10	0	0	20	19	8	0	0	3	27	1	6	2	0	2	9	4	5	1	0	0	10	66
Hourly Total	12	24	52	0	0	88	57	33	2	0	6	92	3	21	7	0	3	31	9	35	13	0	0	57	268
12:00 PM	1	7	12	0	0	20	19	7	1	0	3	27	2	8	1	0	2	11	4	8	6	0	0	18	76
12:15 PM	4	6	9	0	0	19	18	11	1	0	6	30	0	4	3	0	3	7	0	11	5	0	1	16	72
12:30 PM	5	5	9	0	0	19	14	6	0	0	5	20	0	2	2	0	5	4	5	8	2	0	0	15	58
12:45 PM	4	3	22	0	0	29	20	1	0	0	3	21	1	10	3	0	2	14	1	10	5	0	0	16	80
Hourly Total	14	21	52	0	0	87	71	25	2	0	17	98	3	24	9	0	12	36	10	37	18	0	1	65	286
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	5	6	17	0	0	28	31	7	3	0	2	41	4	6	2	0	1	12	7	10	4	0	0	21	102
3:15 PM	8	7	27	0	0	42	38	35	3	0	17	76	3	6	7	0	6	16	5	9	7	1	1	22	156
3:30 PM	8	8	22	0	0	38	26	15	1	0	10	42	1	7	1	0	3	9	1	8	5	0	0	14	103
3:45 PM	4	5	21	0	0	30	18	18	1	0	2	37	0	7	3	0	0	10	2	19	4	0	0	25	102
Hourly Total	25	26	87	0	0	138	113	75	8	0	31	196	8	26	13	0	10	47	15	46	20	1	1	82	463
4:00 PM	8	10	18	0	1	36	14	10	2	0	5	26	0	5	2	0	1	7	5	20	2	0	1	27	96

4:15 PM	4	12	27	0	0	43	24	14	3	0	4	41	3	3	2	0	2	8	7	22	6	0	0	35	127
4:30 PM	7	15	32	0	0	54	23	14	1	0	4	38	0	8	2	0	2	10	5	26	4	0	0	35	137
4:45 PM	2	12	27	0	0	41	32	11	1	0	4	44	1	4	0	0	3	5	8	15	2	0	0	25	115
Hourly Total	21	49	104	0	1	174	93	49	7	0	17	149	4	20	6	0	8	30	25	83	14	0	1	122	475
5:00 PM	5	6	35	0	0	46	15	9	2	0	6	26	0	6	1	0	5	7	3	13	1	0	0	17	96
5:15 PM	5	9	26	0	0	40	22	11	0	0	5	33	0	6	1	0	4	7	5	11	2	0	0	18	98
5:30 PM	1	10	19	0	0	30	17	11	0	0	3	28	2	5	2	0	1	9	4	17	4	0	0	25	92
5:45 PM	4	4	15	0	0	23	21	10	4	0	5	35	0	8	3	0	0	11	9	14	3	0	0	26	95
Hourly Total	15	29	95	0	0	139	75	41	6	0	19	122	2	25	7	0	10	34	21	55	10	0	0	86	381
6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Grand Total	125	186	607	0	3	918	723	357	41	0	121	1121	42	233	83	0	54	358	101	420	119	1	3	641	3038
Approach %	13.6	20.3	66.1	0.0	-	-	64.5	31.8	3.7	0.0	-	-	11.7	65.1	23.2	0.0	-	-	15.8	65.5	18.6	0.2	-	-	-
Total %	4.1	6.1	20.0	0.0	-	30.2	23.8	11.8	1.3	0.0	-	36.9	1.4	7.7	2.7	0.0	-	11.8	3.3	13.8	3.9	0.0	-	21.1	-
Lights	124	183	581	0	-	888	672	343	39	0	-	1054	39	232	80	0	-	351	98	406	113	0	-	617	2910
% Lights	99.2	98.4	95.7	-	-	96.7	92.9	96.1	95.1	-	-	94.0	92.9	99.6	96.4	-	-	98.0	97.0	96.7	95.0	0.0	-	96.3	95.8
Mediums	1	3	26	0	-	30	51	14	2	0	-	67	3	1	3	0	-	7	3	14	6	1	-	24	128
% Mediums	0.8	1.6	4.3	-	-	3.3	7.1	3.9	4.9	-	-	6.0	7.1	0.4	3.6	-	-	2.0	3.0	3.3	5.0	100.0	-	3.7	4.2
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	3	-	-	-	-	-	121	-	-	-	-	-	54	-	-	-	-	-	3	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023



Turning Movement Data Plot

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

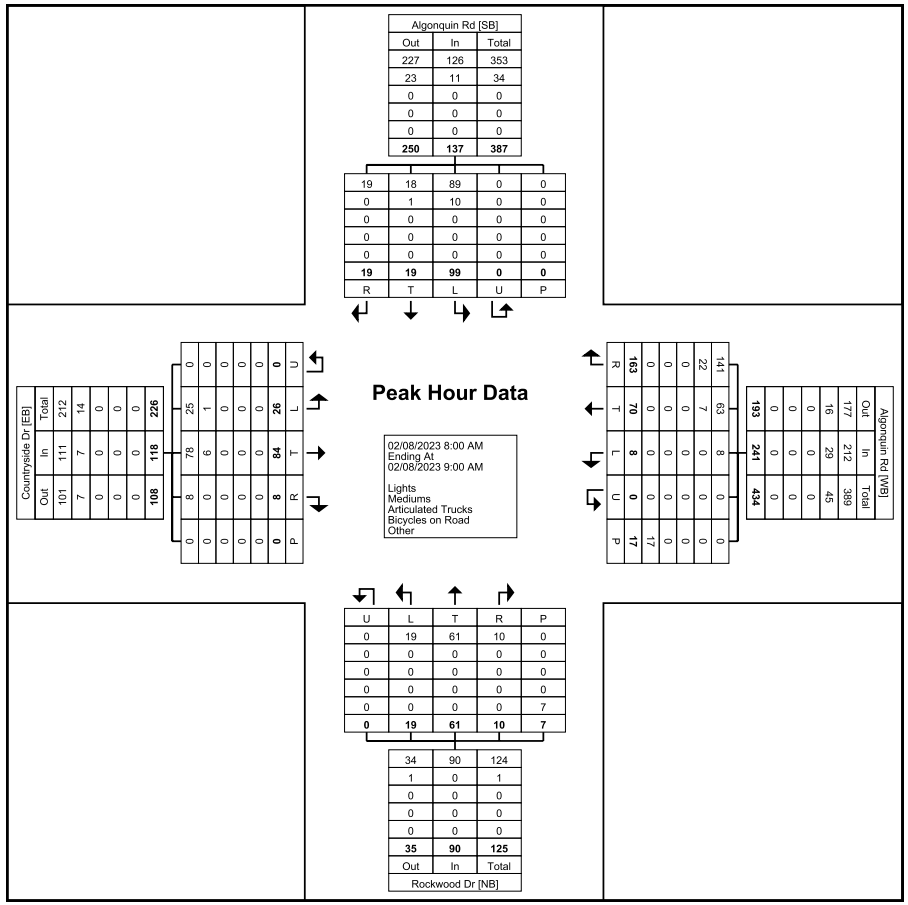
Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023

Turning Movement Peak Hour Data (8:00 AM)

Start Time	Algonquin Rd Southbound						Algonquin Rd Westbound						Rockwood Dr Northbound						Countryside Dr Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
8:00 AM	4	3	26	0	0	33	39	18	0	0	5	57	1	24	3	0	5	28	2	29	2	0	0	33	151
8:15 AM	4	6	26	0	0	36	26	13	1	0	0	40	3	5	4	0	0	12	2	20	4	0	0	26	114
8:30 AM	3	5	23	0	0	31	40	19	5	0	1	64	5	15	6	0	0	26	3	21	11	0	0	35	156
8:45 AM	8	5	24	0	0	37	58	20	2	0	11	80	1	17	6	0	2	24	1	14	9	0	0	24	165
Total	19	19	99	0	0	137	163	70	8	0	17	241	10	61	19	0	7	90	8	84	26	0	0	118	586
Approach %	13.9	13.9	72.3	0.0	-	-	67.6	29.0	3.3	0.0	-	-	11.1	67.8	21.1	0.0	-	-	6.8	71.2	22.0	0.0	-	-	-
Total %	3.2	3.2	16.9	0.0	-	23.4	27.8	11.9	1.4	0.0	-	41.1	1.7	10.4	3.2	0.0	-	15.4	1.4	14.3	4.4	0.0	-	20.1	-
PHF	0.594	0.792	0.952	0.000	-	0.926	0.703	0.875	0.400	0.000	-	0.753	0.500	0.635	0.792	0.000	-	0.804	0.667	0.724	0.591	0.000	-	0.843	0.888
Lights	19	18	89	0	-	126	141	63	8	0	-	212	10	61	19	0	-	90	8	78	25	0	-	111	539
% Lights	100.0	94.7	89.9	-	-	92.0	86.5	90.0	100.0	-	-	88.0	100.0	100.0	100.0	-	-	100.0	100.0	92.9	96.2	-	-	94.1	92.0
Mediums	0	1	10	0	-	11	22	7	0	0	-	29	0	0	0	0	-	0	0	6	1	0	-	7	47
% Mediums	0.0	5.3	10.1	-	-	8.0	13.5	10.0	0.0	-	-	12.0	0.0	0.0	0.0	-	-	0.0	0.0	7.1	3.8	-	-	5.9	8.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	17	-	-	-	-	-	7	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023



Turning Movement Peak Hour Data Plot (8:00 AM)

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

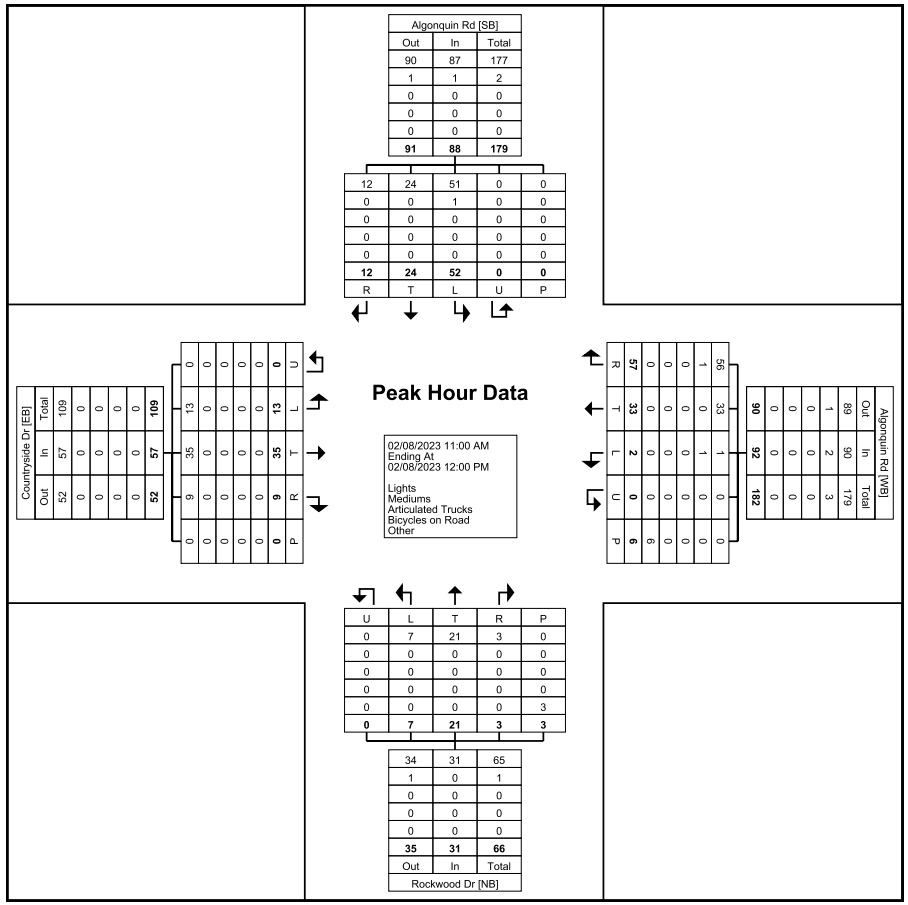
Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023

Turning Movement Peak Hour Data (11:00 AM)

Start Time	Algonquin Rd Southbound						Algonquin Rd Westbound						Rockwood Dr Northbound						Countryside Dr Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
11:00 AM	2	4	10	0	0	16	12	10	0	0	0	22	1	8	1	0	0	10	2	8	4	0	0	14	62
11:15 AM	0	11	12	0	0	23	13	9	0	0	1	22	0	5	0	0	0	5	1	6	3	0	0	10	60
11:30 AM	4	5	20	0	0	29	13	6	2	0	2	21	1	2	4	0	1	7	2	16	5	0	0	23	80
11:45 AM	6	4	10	0	0	20	19	8	0	0	3	27	1	6	2	0	2	9	4	5	1	0	0	10	66
Total	12	24	52	0	0	88	57	33	2	0	6	92	3	21	7	0	3	31	9	35	13	0	0	57	268
Approach %	13.6	27.3	59.1	0.0	-	-	62.0	35.9	2.2	0.0	-	-	9.7	67.7	22.6	0.0	-	-	15.8	61.4	22.8	0.0	-	-	-
Total %	4.5	9.0	19.4	0.0	-	32.8	21.3	12.3	0.7	0.0	-	34.3	1.1	7.8	2.6	0.0	-	11.6	3.4	13.1	4.9	0.0	-	21.3	-
PHF	0.500	0.545	0.650	0.000	-	0.759	0.750	0.825	0.250	0.000	-	0.852	0.750	0.656	0.438	0.000	-	0.775	0.563	0.547	0.650	0.000	-	0.620	0.838
Lights	12	24	51	0	-	87	56	33	1	0	-	90	3	21	7	0	-	31	9	35	13	0	-	57	265
% Lights	100.0	100.0	98.1	-	-	98.9	98.2	100.0	50.0	-	-	97.8	100.0	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	98.9
Mediums	0	0	1	0	-	1	1	0	1	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	3
% Mediums	0.0	0.0	1.9	-	-	1.1	1.8	0.0	50.0	-	-	2.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.1
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	6	-	-	-	-	-	3	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023



Turning Movement Peak Hour Data Plot (11:00 AM)

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

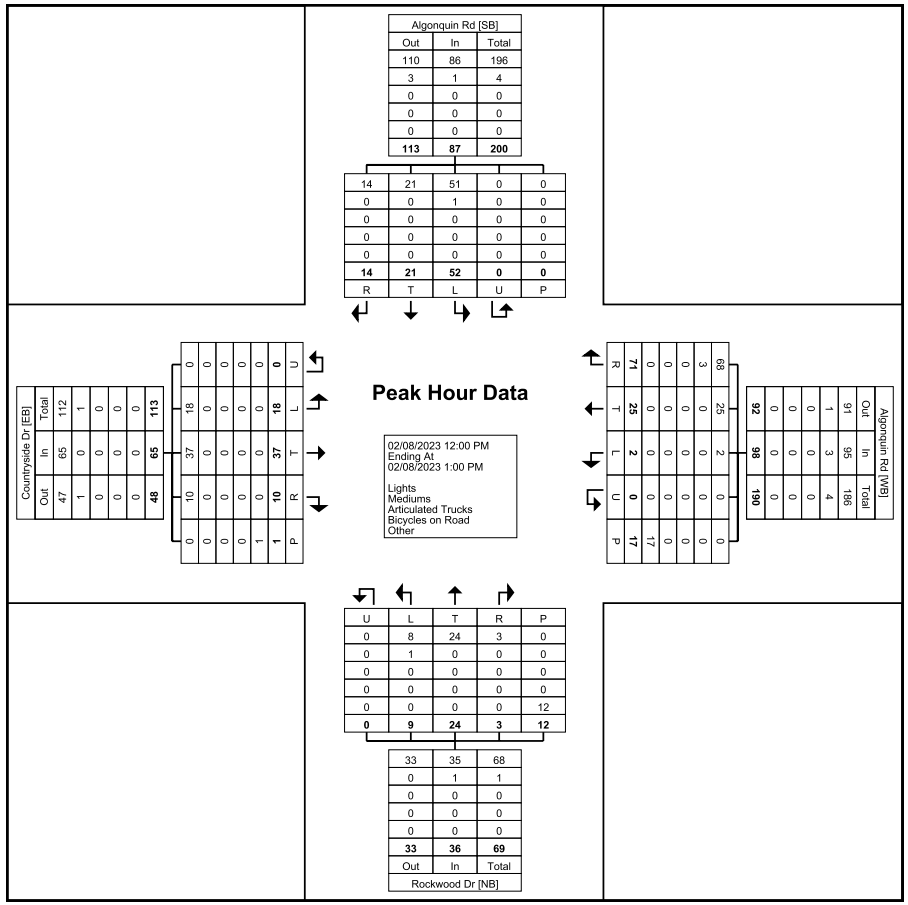
Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023

Turning Movement Peak Hour Data (12:00 PM)

Start Time	Algonquin Rd Southbound						Algonquin Rd Westbound						Rockwood Dr Northbound						Countryside Dr Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
12:00 PM	1	7	12	0	0	20	19	7	1	0	3	27	2	8	1	0	2	11	4	8	6	0	0	18	76
12:15 PM	4	6	9	0	0	19	18	11	1	0	6	30	0	4	3	0	3	7	0	11	5	0	1	16	72
12:30 PM	5	5	9	0	0	19	14	6	0	0	5	20	0	2	2	0	5	4	5	8	2	0	0	15	58
12:45 PM	4	3	22	0	0	29	20	1	0	0	3	21	1	10	3	0	2	14	1	10	5	0	0	16	80
Total	14	21	52	0	0	87	71	25	2	0	17	98	3	24	9	0	12	36	10	37	18	0	1	65	286
Approach %	16.1	24.1	59.8	0.0	-	-	72.4	25.5	2.0	0.0	-	-	8.3	66.7	25.0	0.0	-	-	15.4	56.9	27.7	0.0	-	-	-
Total %	4.9	7.3	18.2	0.0	-	30.4	24.8	8.7	0.7	0.0	-	34.3	1.0	8.4	3.1	0.0	-	12.6	3.5	12.9	6.3	0.0	-	22.7	-
PHF	0.700	0.750	0.591	0.000	-	0.750	0.888	0.568	0.500	0.000	-	0.817	0.375	0.600	0.750	0.000	-	0.643	0.500	0.841	0.750	0.000	-	0.903	0.894
Lights	14	21	51	0	-	86	68	25	2	0	-	95	3	24	8	0	-	35	10	37	18	0	-	65	281
% Lights	100.0	100.0	98.1	-	-	98.9	95.8	100.0	100.0	-	-	96.9	100.0	100.0	88.9	-	-	97.2	100.0	100.0	100.0	-	-	100.0	98.3
Mediums	0	0	1	0	-	1	3	0	0	0	-	3	0	0	1	0	-	1	0	0	0	0	-	0	5
% Mediums	0.0	0.0	1.9	-	-	1.1	4.2	0.0	0.0	-	-	3.1	0.0	0.0	11.1	-	-	2.8	0.0	0.0	0.0	-	-	0.0	1.7
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	17	-	-	-	-	-	12	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023
Page No: 9



Turning Movement Peak Hour Data Plot (12:00 PM)

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

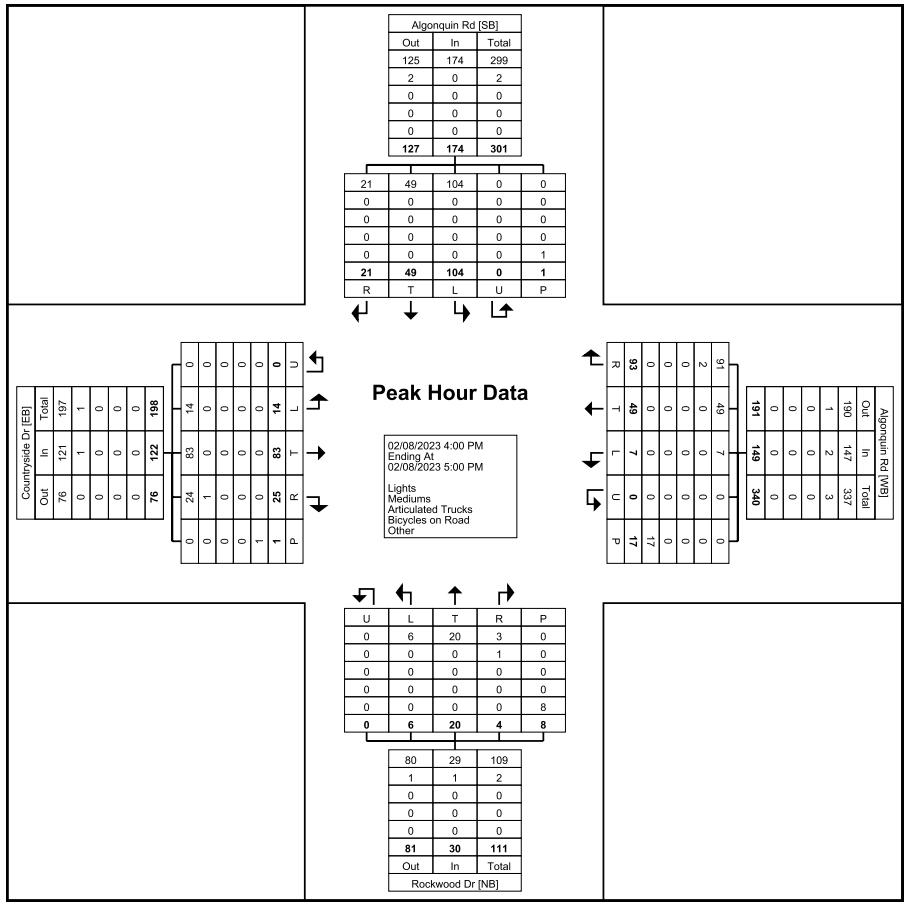
Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023

Turning Movement Peak Hour Data (4:00 PM)

Start Time	Algonquin Rd Southbound						Algonquin Rd Westbound						Rockwood Dr Northbound						Countryside Dr Eastbound						Int. Total
	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	Right	Thru	Left	U-Turn	Peds	App. Total	
4:00 PM	8	10	18	0	1	36	14	10	2	0	5	26	0	5	2	0	1	7	5	20	2	0	1	27	96
4:15 PM	4	12	27	0	0	43	24	14	3	0	4	41	3	3	2	0	2	8	7	22	6	0	0	35	127
4:30 PM	7	15	32	0	0	54	23	14	1	0	4	38	0	8	2	0	2	10	5	26	4	0	0	35	137
4:45 PM	2	12	27	0	0	41	32	11	1	0	4	44	1	4	0	0	3	5	8	15	2	0	0	25	115
Total	21	49	104	0	1	174	93	49	7	0	17	149	4	20	6	0	8	30	25	83	14	0	1	122	475
Approach %	12.1	28.2	59.8	0.0	-	-	62.4	32.9	4.7	0.0	-	-	13.3	66.7	20.0	0.0	-	-	20.5	68.0	11.5	0.0	-	-	-
Total %	4.4	10.3	21.9	0.0	-	36.6	19.6	10.3	1.5	0.0	-	31.4	0.8	4.2	1.3	0.0	-	6.3	5.3	17.5	2.9	0.0	-	25.7	-
PHF	0.656	0.817	0.813	0.000	-	0.806	0.727	0.875	0.583	0.000	-	0.847	0.333	0.625	0.750	0.000	-	0.750	0.781	0.798	0.583	0.000	-	0.871	0.867
Lights	21	49	104	0	-	174	91	49	7	0	-	147	3	20	6	0	-	29	24	83	14	0	-	121	471
% Lights	100.0	100.0	100.0	-	-	100.0	97.8	100.0	100.0	-	-	98.7	75.0	100.0	100.0	-	-	96.7	96.0	100.0	100.0	-	-	99.2	99.2
Mediums	0	0	0	0	-	0	2	0	0	0	-	2	1	0	0	0	-	1	1	0	0	0	-	1	4
% Mediums	0.0	0.0	0.0	-	-	0.0	2.2	0.0	0.0	-	-	1.3	25.0	0.0	0.0	-	-	3.3	4.0	0.0	0.0	-	-	0.8	0.8
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	1	-	-	-	-	-	17	-	-	-	-	-	8	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-

Traffic and Transportation Engineering Services
1800 Frobisher Street
PO Box 5000, STN A
Sudbury, Ontario, Canada P3A 5P3
705-674-4455

Count Name: Algonquin @ Rockwood
Site Code:
Start Date: 02/08/2023



Turning Movement Peak Hour Data Plot (4:00 PM)

Appendix B:
LOS Definitions

TATHAM ENGINEERING

41 King Street, Unit 4
Barrie, Ontario L4N 6B5

T 705-733-9037
E info@tathameng.com
tathameng.com

CAPACITY ANALYSIS AT UNSIGNALIZED INTERSECTIONS

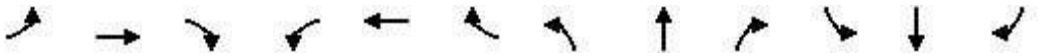
Highway Capacity Manual Methodology

The level of service at an unsignalized intersection is determined on the basis of control delay for each critical lane. This method of analysis is taken from the Highway Capacity Manual, Special Report 209, by the Transportation Research Board, 1997.

The average control delay for any particular critical movement (control delay includes initial deceleration, queue move-up time, stopped delay, and final acceleration delay) is a function of the service rate or capacity of the approach and degree of saturation. The level of service criteria for unsignalized intersections is outlined below and is related to ranges in vehicle delay.

Level of Service	Expected Delay to Minor Street Traffic	Average Control Delay 'd' (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 \leq d \leq 15$
C	Average traffic delays	$15 \leq d \leq 25$
D	Long traffic delays	$25 \leq d \leq 35$
E	Very long traffic delays	$35 \leq d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$d > 50$

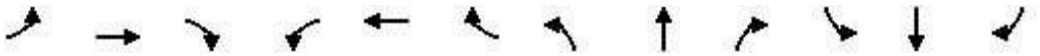
Appendix C:
Existing Operations



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	26	84	8	8	80	163	19	61	10	99	19	19
Future Volume (vph)	26	84	8	8	80	163	19	61	10	99	19	19
Peak Hour Factor	0.84	0.84	0.84	0.75	0.75	0.75	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	31	100	10	11	107	217	24	76	12	108	21	21

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	141	335	112	150
Volume Left (vph)	31	11	24	108
Volume Right (vph)	10	217	12	21
Hadj (s)	0.04	-0.35	0.01	0.09
Departure Headway (s)	5.1	4.5	5.3	5.3
Degree Utilization, x	0.20	0.42	0.16	0.22
Capacity (veh/h)	652	763	602	615
Control Delay (s)	9.3	10.6	9.3	9.8
Approach Delay (s)	9.3	10.6	9.3	9.8
Approach LOS	A	B	A	A

Intersection Summary				
Delay	10.0			
Level of Service	A			
Intersection Capacity Utilization	38.7%	ICU Level of Service	A	
Analysis Period (min)	15			

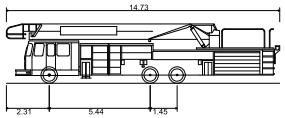


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	83	25	7	49	93	6	20	3	104	49	21
Future Volume (vph)	14	83	25	7	49	93	6	20	3	104	49	21
Peak Hour Factor	0.87	0.87	0.87	0.85	0.85	0.85	0.75	0.75	0.75	0.81	0.81	0.81
Hourly flow rate (vph)	16	95	29	8	58	109	8	27	4	128	60	26

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	140	175	39	214
Volume Left (vph)	16	8	8	128
Volume Right (vph)	29	109	4	26
Hadj (s)	-0.07	-0.33	0.01	0.08
Departure Headway (s)	4.7	4.4	4.9	4.8
Degree Utilization, x	0.18	0.21	0.05	0.28
Capacity (veh/h)	716	767	664	708
Control Delay (s)	8.7	8.6	8.2	9.6
Approach Delay (s)	8.7	8.6	8.2	9.6
Approach LOS	A	A	A	A

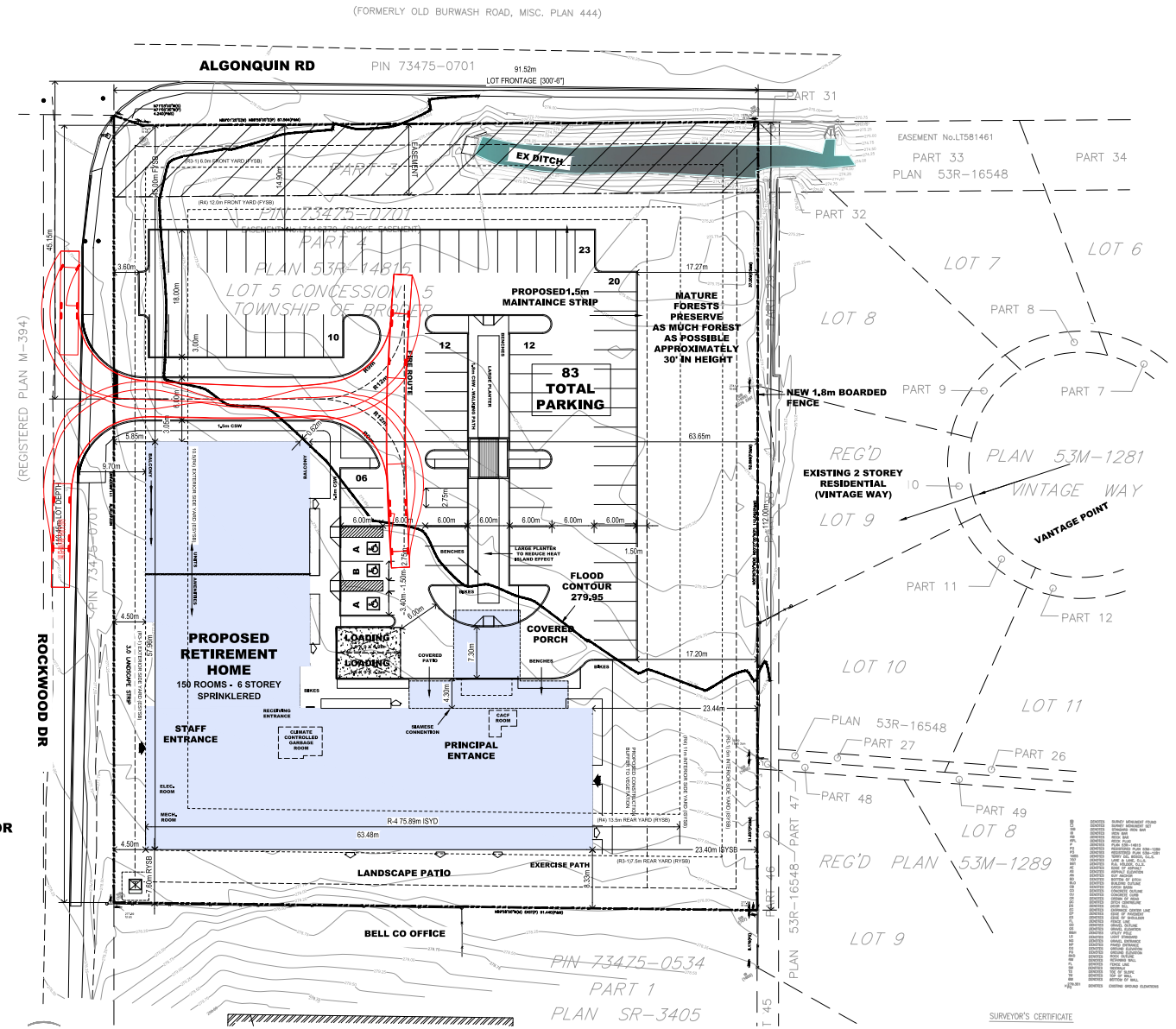
Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	34.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Appendix D:
Vehicle Turning Assessment



FIRE TRUCK

Overall Length	14.730m
Overall Width	2.600m
Overall Body Height	3.197m
Min Body Ground Clearance	0.281m
Track Width	2.540m
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	29.20°



PATH: T:\2022 PROJECTS\422518 - Rockwood & Algonquin Retirement Home - Sudbury\C3D\Site Plan\Received\
ISSUED FOR: DD- Ground Floor Programing + Typical Floor Refinements
PROJECT No.: A21-424
ISSUE DATE: July 05, 2021

1.1
REVISION

SCHEMATIC SITE PLAN
A-100

0 10' 20' 30' 50'
0 5 10 15 m
1:300 (24 X 36)

PROJECT NORTH

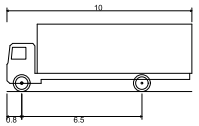
SUDBURY RETIREMENT RESIDENCE

Rockwood Dr & Algonquin Rd Sudbury, Ontario, Canada

11415537 Canada Inc
Danny Bawa
danny@bawagroup.ca
10158 Jane St., Maple ON L6A 3K1
416-831-2190

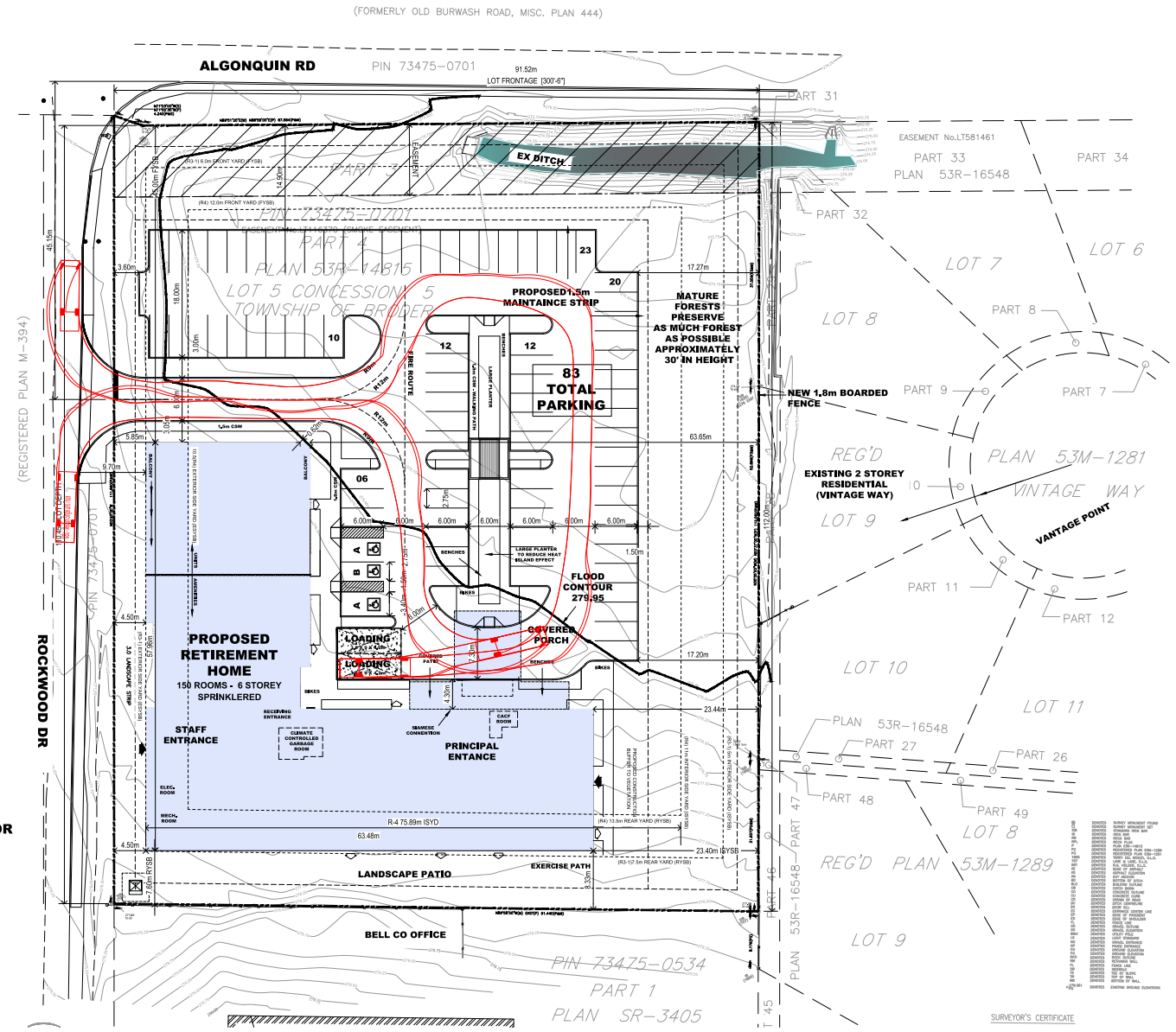
API DEVELOPMENT CONSULTANTS INC.

SAI SAPLUS ARCHITECTS



MSU - Medium Single Unit Truck

Overall Length	10.000m
Overall Width	2.600m
Overall Body Height	3.650m
Min Body Ground Clearance	0.445m
Track Width	2.600m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	11.100m



SCHEMATIC SITE PLAN
A-100

1:300 (24 X 36)

PROJECT NORTH

SUDBURY RETIREMENT RESIDENCE

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SAI SAPLUS ARCHITECTS

1.1 REVISION

PATH: T:\2022 PROJECTS\422518 - Rockwood & Algonquin Retirement Home - Sudbury\C3D\Site Plan\Received\
ISSUED FOR: DD- Ground Floor Programming + Typical Floor Refinements
PROJECT No.: A21-424
ISSUE DATE: July 05, 2021

Appendix E:
ITE Land-Use Definitions

Land Use: 252
Senior Adult Housing—Multifamily

Description

Senior adult housing–multifamily sites are independent living developments that are called various names including retirement communities, age-restricted housing, and active adult communities. The development has a specific age restriction for its residents, typically a minimum of 55 years of age for at least one resident of the household.

Residents in these communities are typically considered active and requiring little to no medical supervision. The percentage of retired residents varies by development. The development may include amenities such as a golf course, swimming pool, 24-hour security, transportation, and common recreational facilities. They generally lack centralized dining and on-site health facilities.

The dwelling units share both floors and walls with other units in the residential building. Senior adult housing—single-family (Land Use 251), congregate care facility (Land Use 253), assisted living (Land Use 254), and continuing care retirement community (Land Use 255) are related land uses.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, and the 2000s in Alberta (CAN), California, Maryland, New Hampshire, New Jersey, Ontario (CAN), and Pennsylvania.

Source Numbers

237, 272, 576, 703, 734, 970, 1060

Land Use: 254
Assisted Living

Description

An assisted living complex is a residential setting that provides either routine general protective oversight or assistance with activities necessary for independent living to persons with mental or physical limitations. The typical resident has difficulty managing in an independent living arrangement but does not require nursing home care. Its centralized services typically include dining, housekeeping, social and physical activities, medication administration, and communal transportation.

The complex commonly provides separate living quarters for each resident. Alzheimer's and ALS care are commonly offered at an assisted living facility. Living quarters for these patients may be located separately from the other residents.

Assisted care commonly bridges the gap between independent living and a nursing home. In some areas of the country, an assisted living residence may be called personal care, residential care, or domiciliary care. Staff may be available at an assisted care facility 24 hours a day, but skilled medical care—which is limited in nature—is not required. Congregate care facility (Land Use 253), continuing care retirement community (Land Use 255), and nursing home (Land Use 620) are related uses.

Additional Data

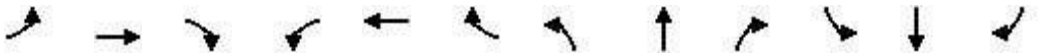
The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in Connecticut, New Jersey, New York, Oregon, Pennsylvania, Tennessee, Texas, and Utah.

Source Numbers

244, 573, 581, 611, 725, 876, 877, 912, 1016, 1029

Appendix F:
Future Operations



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	27	88	12	10	84	171	22	72	12	104	31	20
Future Volume (vph)	27	88	12	10	84	171	22	72	12	104	31	20
Peak Hour Factor	0.84	0.84	0.84	0.75	0.75	0.75	0.80	0.80	0.80	0.92	0.92	0.92
Hourly flow rate (vph)	32	105	14	13	112	228	28	90	15	113	34	22

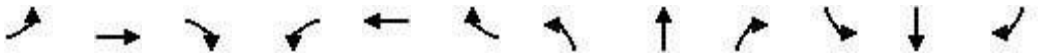
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	151	353	133	169
Volume Left (vph)	32	13	28	113
Volume Right (vph)	14	228	15	22
Hadj (s)	0.02	-0.35	0.01	0.09
Departure Headway (s)	5.3	4.6	5.5	5.5
Degree Utilization, x	0.22	0.45	0.20	0.26
Capacity (veh/h)	626	736	586	597
Control Delay (s)	9.7	11.4	9.8	10.4
Approach Delay (s)	9.7	11.4	9.8	10.4
Approach LOS	A	B	A	B

Intersection Summary				
Delay	10.6			
Level of Service	B			
Intersection Capacity Utilization	39.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	11	95	0	16	37
Future Volume (Veh/h)	0	11	95	0	16	37
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	12	103	0	17	40
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	177	103			103	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	177	103			103	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			99	
cM capacity (veh/h)	803	952			1489	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	12	103	57
Volume Left	0	0	17
Volume Right	12	0	0
cSH	952	1700	1489
Volume to Capacity	0.01	0.06	0.01
Queue Length 95th (m)	0.3	0.0	0.3
Control Delay (s)	8.8	0.0	2.3
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	2.3
Approach LOS	A		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	87	29	9	51	98	11	36	5	109	61	22
Future Volume (vph)	15	87	29	9	51	98	11	36	5	109	61	22
Peak Hour Factor	0.87	0.87	0.87	0.85	0.85	0.85	0.75	0.75	0.75	0.81	0.81	0.81
Hourly flow rate (vph)	17	100	33	11	60	115	15	48	7	135	75	27

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	150	186	70	237
Volume Left (vph)	17	11	15	135
Volume Right (vph)	33	115	7	27
Hadj (s)	-0.08	-0.33	0.02	0.08
Departure Headway (s)	4.9	4.6	5.1	4.9
Degree Utilization, x	0.20	0.24	0.10	0.32
Capacity (veh/h)	684	731	646	690
Control Delay (s)	9.1	9.0	8.6	10.2
Approach Delay (s)	9.1	9.0	8.6	10.2
Approach LOS	A	A	A	B

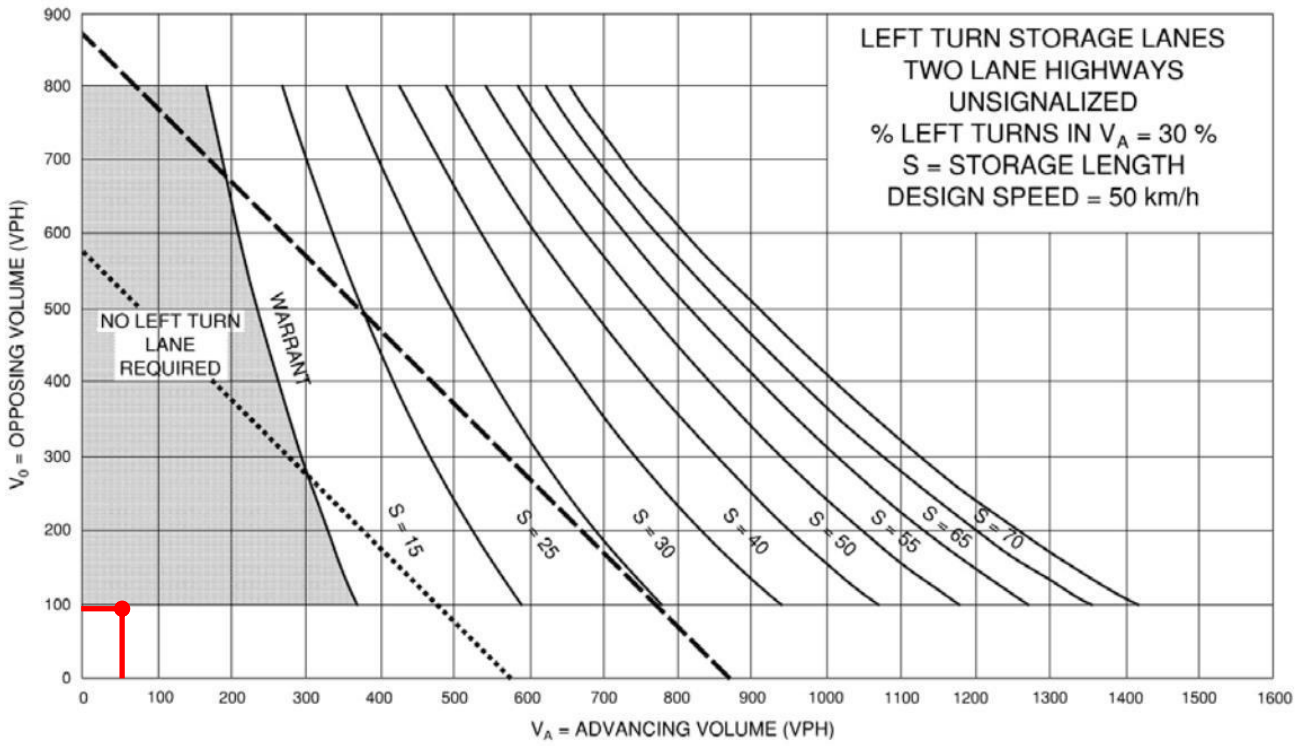
Intersection Summary				
Delay	9.4			
Level of Service	A			
Intersection Capacity Utilization	36.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	22	30	0	14	85
Future Volume (Veh/h)	0	22	30	0	14	85
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	24	33	0	15	92
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	155	33			33	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	155	33			33	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			99	
cM capacity (veh/h)	828	1041			1579	

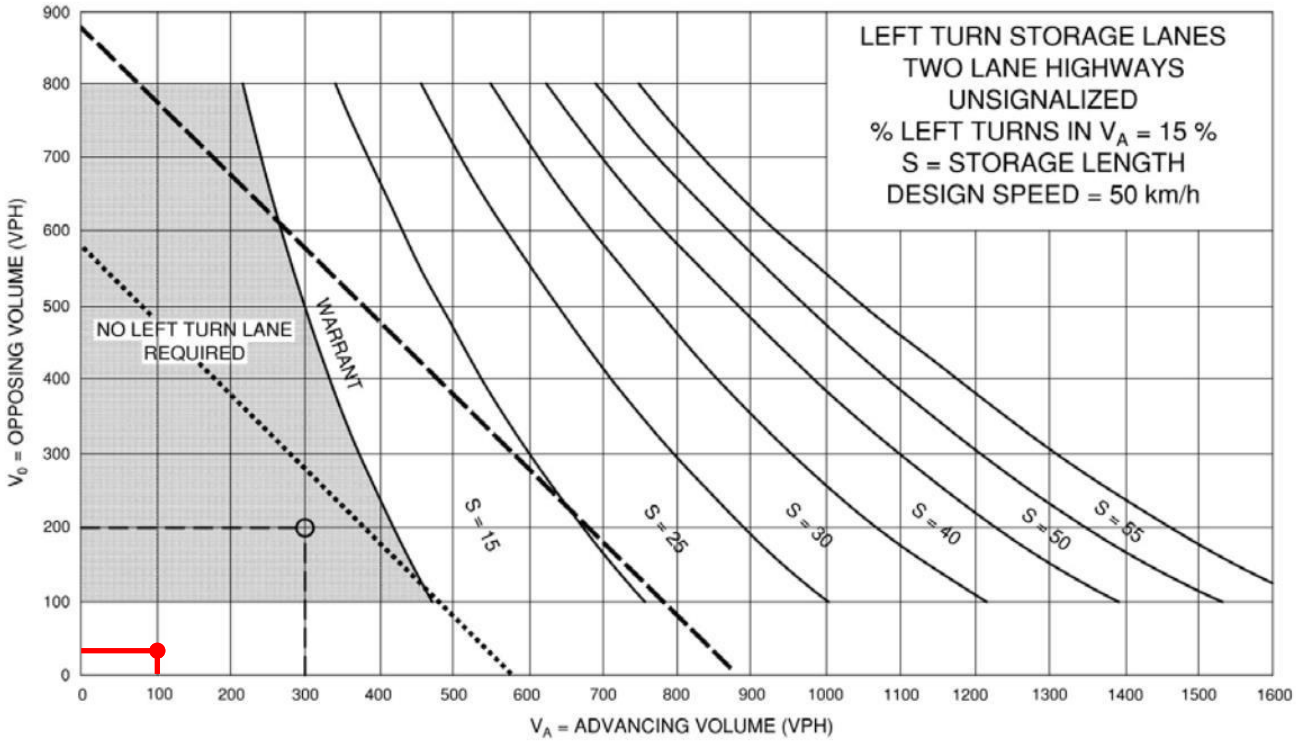
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	24	33	107
Volume Left	0	0	15
Volume Right	24	0	0
cSH	1041	1700	1579
Volume to Capacity	0.02	0.02	0.01
Queue Length 95th (m)	0.5	0.0	0.2
Control Delay (s)	8.5	0.0	1.1
Lane LOS	A		A
Approach Delay (s)	8.5	0.0	1.1
Approach LOS	A		

Intersection Summary			
Average Delay		2.0	
Intersection Capacity Utilization		21.9%	ICU Level of Service
Analysis Period (min)		15	

Appendix G:
MTO Left Turn Warrants



Weekday AM Peak Hour



Weekday PM Peak Hour