

**740 Springland Drive
Ottawa, Ontario**

**Proposed Residential Development
Transportation Impact Study**

Presented to:

Greatwise Developments
333 Wilson Ave., Suite 200
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Consultants**

Engineers, Project Managers & Planners

September 2017

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1.0 INTRODUCTION

The purpose of this Transportation Impact Study (TIS) is to address the transportation and traffic impacts in relation to a development application supporting the addition of 225 residential units to the existing 761-unit apartment Complex, located at 740 Springland Drive in Ottawa.

2.0 SCOPE OF WORK

A pre-consultation meeting was held with City staff on June 7th, 2016 to present and discuss the development in order to confirm the studies required for the application. The type of traffic study and intersections were confirmed with City staff by way of an e-mail (January 2017 - Appendix “E”).

Subsequent to the pre-consultation meeting and confirmation of the scope of work for the traffic study, the City of Ottawa developed new TIA guidelines that were approved by council as of June 2017. It is understood that the new TIA guidelines are designed now to be a step-by-step process that require review/discussion and sign-off by City staff for each step prior to proceeding to the next one. However, it should be acknowledged that the development application was initiated with the City of Ottawa (pre-consultation meeting) and the scope of work confirmed before the new TIA guidelines were approved. Therefore, the scope of work established during the pre-consultation meeting and confirmed by e-mail (January 2017) was used as a basis for this study.

Despite the above, the new TIA guidelines were reviewed to incorporate the guidelines that were thought to be applicable to this development. These include traffic forecasting methodology (converting to person-trips and modal share using 2011 Trans Committee O-D survey), transit provisions within the area, multi-modal level of service for non-auto mode (pedestrians and cycling), TDM provisions and undertaking a parking study to substantiate the reduction in parking spaces for the entire development.

3.0 THE PROPOSED DEVELOPMENT

The development will be part of the existing Norberry residential complex bordered by Springland Drive to north and west and Norberry Crescent to the east and south (See Exhibit 2-1). The residential development would comprise of two 4.5-story buildings and a single 4-story building adjacent to Norberry Crescent. It is assumed for the purpose of this study that the proposed development is anticipated to be completed by the 2019 horizon year. The site currently is served by four (4) accesses, three on Norberry Crescent (Accesses 1-thru-3) and a single access on Springland Drive (Access #4), which would remain the same in the future. The existing buildings also include a one-way circular driveway for drop-offs/pick-offs. The proposed site plan now illustrates an addition of visitor parking spaces along the



PROPOSED SITE PLAN:	
NEW RESIDENTIAL AREA:	167,550 SQ.FT.
EXISTING RESIDENTIAL UNITS:	761
NEW RESIDENTIAL UNITS:	225
TOTAL:	986
BUILDING FOOTPRINT:	
EXISTING:	14 250 M2
PROPOSED:	3 565 M2
TOTAL:	17 815 M2
PARKING:	
COVERED:	156
ABOVE GRADE:	63
SURFACE:	533
TOTAL:	752
VISITOR PARKING @ 0.05/UNIT:	50
NET RESIDENTIAL:	702
RESIDENTIAL PARKING RATIO:	0.71
TOAL SITE PARKING RATIO:	0.76

SITE AREA:	BUILDING FOOTPRINT	ASPHALT SURFACE AREA	LANDSCAPED AREA
56 800 M2	17 815 M2 (31.36%)	17 965 M2 (31.63%)	21 020 M2 (37.00%)

RODERICK LAHEY
ARCHITECT INC

CONCEPT SITE PLAN
SCALE 1:1250
PLOT DATE: Monday, August 14, 2017



NORBERRY
OTTAWA

RESIDENCES
ONTARIO

Greatwise
DEVELOPMENTS

SHEET #
1
PROJ # 1218

Exhibit 2-1: Site Plan

existing circular driveways. The new 225 units would use the existing accesses and no changes are proposed to the private approaches.

4.0 EXISTING CONDITIONS

4.1 GENERAL STUDY AREA

The study area is located within the urban road network of Ottawa in the mature neighborhood of Riverside Park, just east of Riverside Drive (See Exhibit 3-1). The land use in the vicinity of the proposed site is for the most part residential.

4.2 ROADWAY CONFIGURATION

Study Area Roadways

The City of Ottawa's *Transportation Master Traffic Plan* (2013)¹ outlines the roadway classifications and operational characteristics of the supporting roadway network.

- ***Riverside Drive, Airport Parkway and Walkley Road:*** are defined as arterial roadways. Riverside Drive and the Airport Parkway are oriented in a north-south direction, while Walkley Road is oriented in the east-west direction.
- ***Brookfield Road:*** is defined as a major collector roadway;
- ***Springland Drive, Ridgewood Road and Flannery Drive (North of Springland Drive):*** are defined as *collector* roadways. Springland Drive has a posted speed limit of 40 km/hr and insures connectivity from the Norberry Residences to the arterial road network.
- ***Norberry Crescent:*** is a local road adjacent to the proposed development and connects to Springland Drive. This roadway provides for 2 lanes of travel (one-per-direction).

Study Area Intersections

The following provides a summary of the current configurations/controls of intersections within the study area:

- ***Ridgewood Avenue and Springland Drive:*** This intersection is located west of the proposed development and is configured as a three-way STOP-Control with 2 travel approach lanes (one-lane in each direction) on all 3 legs of the intersection.
- ***Springland Drive and Norberry Crescent North:*** This "T-intersection" is located north-east of the proposed development and is configured as a minor-leg STOP-Control with 2 travel approach lanes (one-lane in each direction) on all 3 legs of the intersection.
- ***Springland Drive and Norberry Crescent South:*** This "T-intersection" is located south-west of the proposed development and is configured as a minor-leg Yield-

¹ *Transportation Master Transportation Plan, November 2013 Publication 19-82, Map 5*

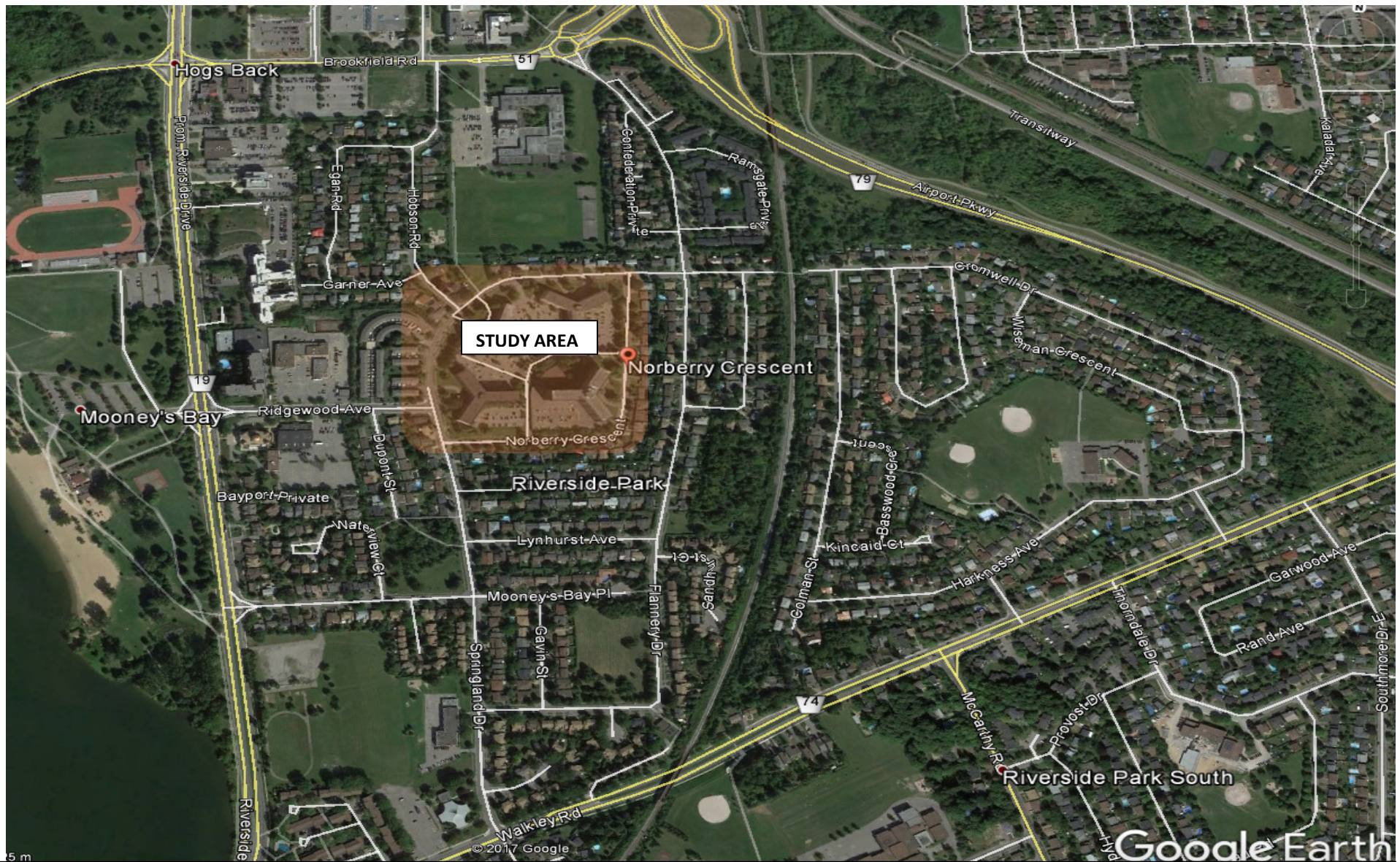


Exhibit 3-1: Study Area

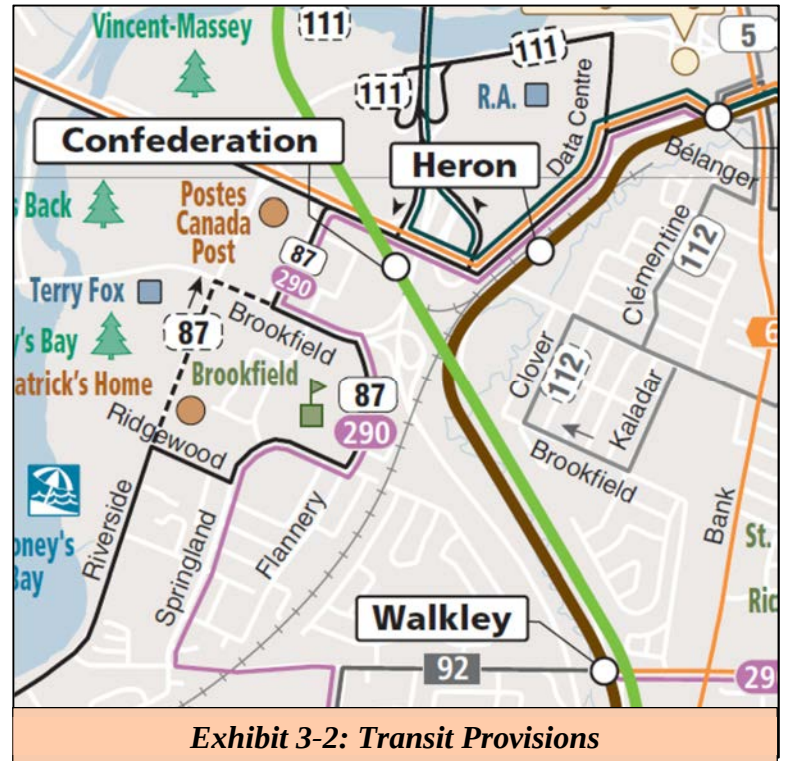
- Control with 2 travel approach lanes (one-lane in each direction) on all 3 legs of the intersection.
- *Norberry Crescent and the Site East Access (Access #1)*: This “T-intersection” is located east of the proposed development and is configured as a minor-leg STOP-Control with 2 travel approach lanes (one-lane in each direction) on all 3 legs of the intersection.
- *Norberry Crescent and the Site South Access (Access #3)*: This “T-intersection” is located south of the proposed development and is configured as a minor-leg STOP-Control with 2 travel approach lanes (one-lane in each direction) on all 3 legs of the intersection.
- *Norberry Crescent and the Site South-East Access (Access #2)*: This “T-intersection” is located south-east of the proposed development and is configured as a minor-leg STOP-Control with 2 travel approach lanes (one-lane in each direction) on all 3 legs of the intersection. This access would serve low number of vehicles as it provides access to 63 parking stalls.
- *Springland Drive and the Site North Access (Access #4)*: This “T-intersection” is located north of the proposed development and is configured as a minor-leg STOP-Control with 2 travel approach lanes (one-lane in each direction) on all 3 legs of the intersection.

Future Roadway Improvements

A review of the City of Ottawa’s Transportation Master Plan (TMP) (Nov. 2013) indicates that the adjacent Airport Road corridor (between Brookfield Road and Hunt Club Road) would be widened from 2-to-4 lanes. This is anticipated to occur between 2014-2019 horizon year.

4.3 TRANSIT SERVICES

Exhibit 3-2 (extract from System Map – OC Transpo) indicates the public bus routes within the general vicinity of the proposed development. There are five bus stops along Springland drive between the two Norberry Crescent intersections that is frequented by the regular route number 87. The proposed site is also within a km of confederation station and Huron station and is situated west of the existing O’train /Transitway corridor. Therefore, the community is currently well served in terms of transit provisions.



Future Transit Network

A review of the City of Ottawa’s Transportation Master Plan (Nov. 2013) (Map 5) does indicate that the rail corridor east of the proposed site would be extended further south of Leintrim Road to Riverside South. A future station is proposed in the vicinity of Walkley Road within 1.5 km of the proposed site. It also should be noted that Huron Road (between Riverside Road to Woodroffe Ave) is also a future bus rapid transit corridor with future transit stations.

4.4 CYCLING NETWORK

Cycling demand surveyed on May 30th, 2017 during the peak periods were determined to be low (5-to-10 cyclists per direction along Springland Drive in the vicinity of Norberry Crescent North and 2-to-4 cyclists along Norberry Crescent).

Norberry Crescent and Springland Drive have no dedicated bike facilities. Cyclists share the road with vehicular traffic. Riverside Road and Walkley Road are classified as a Spine Route in the vicinity of the proposed site.

The Multi-Modal Level of Service (MMLOS) Guidelines² were reviewed to get a general understanding of the Bicycle Level of Service (BLOS) for a mixed traffic road segment such as Norberry Crescent and Springland Drive. The guidelines indicate for 2 travel lanes (assuming operating speed of 40-to-50km/hr) and 3 or less lanes crossing at unsignalized intersections, the BLOS can be estimated to between “A” to “B”.

4.5 PEDESTRIAN ACTIVITY

Table 3.1 indicates the pedestrian traffic crossing the various study area intersections within the vicinity of the proposed development. The highest pedestrian movement was observed to occur across the south leg of the Springland Drive and Norberry Crescent North intersection, where 36 pedestrians crossed during the afternoon peak hour of travel demand.

Table 3.1: Existing Peak Hour Pedestrian Traffic

Intersections	Morning Peak Hour				Afternoon Peak Hour			
	East Leg	West Leg	North Leg	South Leg	East Leg	West Leg	North Leg	South Leg
Springland Dr/Norberry Crescent North	2	1		20				36
Norberry Crescent/South Site Access (#3)			5		2		10	
Norberry Crescent/East Site Access (#1)		7				15		
Springland Drive/North Site Access (#4)	11	8		2	7	18		2

Sidewalks are available along both Springland Drive Road and west/south side of Norberry Crescent to facilitate pedestrian movements.

The Multi-Modal Level of Service (MMLOS) Guidelines were reviewed to get a general understanding of the segment of sidewalk fronting the Norberry residential complex along Springland Drive specially where the highest pedestrian crossing was observed (in the vicinity of Springland Drive & Norberry Crescent North where a bus stop exists).

The existing conditions along Springland Drive include:

- sidewalk with a general width of 1.5m;
- a boulevard (assume 2m boulevard, although some locations width is greater than 2m);
- posted speed of 40 km/hr;
- presence of on-street parking; and
- estimated AADT of 3,500 (two-way traffic approximately 350 vph x 10 hours in the vicinity of Norberry Crescent).

² Multi-Modal Level of Service (MMLOS) Guidelines, Page 14, Exhibit 11 – BLOS Segment Evaluation Table

The Pedestrian level of service (PLOS) Segment Evaluation Table³ was referenced to provide a rough estimate of the PLOS. Based on above assumptions, the PLOS is estimated to be “C”.

4.6 COLLISION ANALYSIS

A review of the collision detail summary provided by the City of Ottawa (Appendix “B”) for the period from 2013 to 2015 inclusive, revealed a total of 5 collisions. Four collisions were mid-block on Norberry Crescent and a single collision was mid-block on Springland Drive. The collision history does not indicate a particular pattern for the study area within the 3-year horizon years analyzed.

4.7 EXISTING TRAFFIC VOLUMES

Castleglenn Consultants undertook traffic counts during the morning (7am-9am) and afternoon (3:30-6:00 pm) peak periods of travel demand on Tuesday May 30th, 2017 at the following intersections:

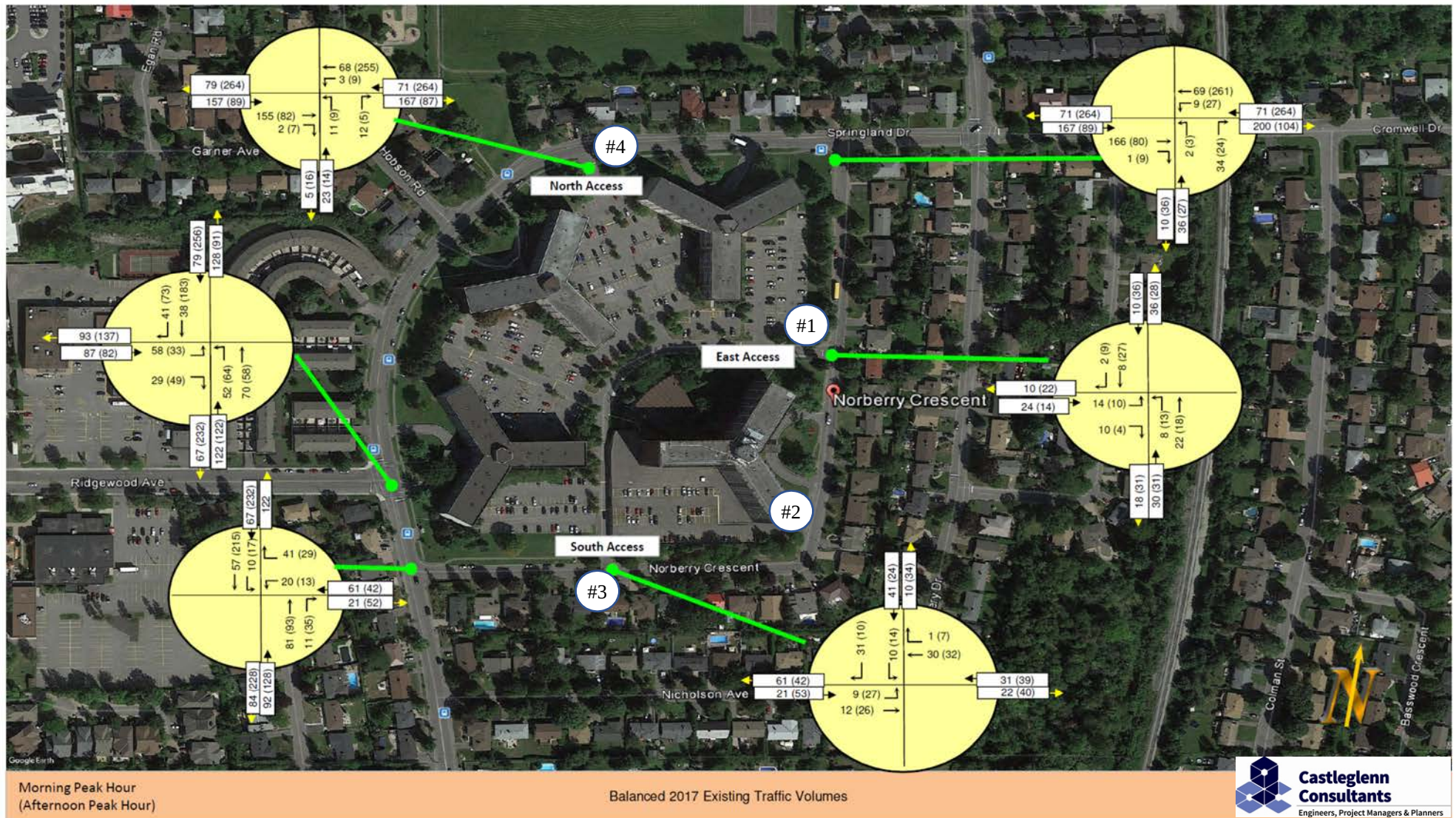
- Springland Drive/Norberry Crescent North (minor-leg Yield control);
- Norberry Crescent South/Springland Drive (minor-leg stop control);
- Ridgewood Avenue/Springland Drive (All-way stop control);
- Norberry Crescent/South Site Access (Access #3);
- Norberry Crescent / East Site Access (Access #1);
- Springland Drive/North Site Access (Access #4).

It was determined that the morning and afternoon peak hours were from 8:00 to 9:00 am and from 4:15 to 5:15 pm, respectively. Exhibit 3-2 illustrates the existing (2017) traffic volumes at the study area intersections.

4.8 EXISTING LEVELS OF SERVICE

Intersection capacity analysis was performed using Synchro 8TM traffic analysis software to determine the existing traffic operational characteristics of intersections within the study area (See Appendix “A”). Table 3.2 contains a summary of the results of the Synchro analysis of the existing (2017) travel demand conditions within the study

³ Multi-Modal Level of Service (MMLoS) Guidelines, Page 9, Exhibit 4 – PLOS Segment Evaluation Table



area. According to City of Ottawa’s TIA guidelines, a V/C ratio greater than 0.90 is considered unsatisfactory.

Table 3.2: Existing (2017) Intersection Capacity Analysis Results

<i>Intersections</i>	<i>Traffic Control</i>	Morning Peak Hour			Afternoon Peak Hour		
		<i>Overall LOS</i>	<i>Critical Approach</i>		<i>Overall LOS</i>	<i>Critical Approach</i>	
			<i>Movement</i>	<i>LOS, V/C</i>		<i>Movement</i>	<i>LOS, V/C</i>
Springland Dr/Norberry Cres. North	Yield-Control	A	NB	A, 0.05	A	NB	A, 0.04
Springland Dr/Norberry Cres. South	STOP-Control	A	WB	A, 0.07	A	WB	A, 0.06
Springland Dr / Ridgewood Ave	STOP-Control	A	NB	A, 0.16	A	SB	A, 0.32
Norberry Cres. /South Site Access (#3)	STOP-Control	A	SB	A, 0.04	A	SB	A, 0.03
Norberry Cres/East Site Access (#1)	STOP-Control	A	EB	A, 0.03	A	EB	A, 0.02
Springland Dr/North Site Access (#4)	STOP-Control	A	NB	A, 0.03	A	NB	B, 0.02

The results indicate that during both the morning and afternoon peak hours of travel demand, all of the study area intersections were determined to provide a satisfactory level of service “A”.

5.0 FORECAST TRAFFIC VOLUMES

The forecast traffic volumes presented in this study involved a superposition of several layers of traffic, which included:

- existing traffic volumes;
- site generated traffic volumes; and
- background traffic growth.

This was done for each of the two horizon years (2019 full-build-out and 5-year post development 2024) and reflects the forecast weekday peak hours of travel demand.

5.1 SITE GENERATED TRAFFIC VOLUMES

Traffic generated by the proposed development was determined by referencing “*ITE: Trip Generation Manual*” (Institute of Transportation Engineers, 8th, Edition). Table 4.1 summarizes the trip generation rates for the proposed 225-unit residential development.

Table 4.1: Trip Generation Rates

<i>Land use</i>	<i>Peak Period</i>	<i>Rate</i>	<i>Split</i>	
			<i>IN</i>	<i>OUT</i>
Mid-Rise Apartments (Land Use 223)	AM	0.30	31%	69%
	PM	0.39	58%	42%

It is considered good practice to convert the vehicle trips to person trips given that the site surveyed in the ITE trip generation manual are in suburban areas with low non-auto mode share. To convert the vehicle trips to person trips, a factor of 1.3 was used. The number of cars generated from the site has been estimated by categorizing person trips by modal share. The modal share assumptions used in this study are based on the 2011 Trans Committee O-D Survey Alta Vista area. Table 4.2 below depicts the forecast traffic generated by each travel mode for the proposed development.

Table 4.2: Residential Mode Share Split

<i>Travel Mode</i>	<i>Mode Share</i>	<i>AM</i>			<i>PM</i>		
		<i>In</i>	<i>Out</i>	<i>Total</i>	<i>In</i>	<i>Out</i>	<i>Total</i>
Auto Driver	65%	18	39	57	43	31	74
Auto Passenger	10%	3	6	9	7	5	11
Transit	20%	5	12	18	13	10	23
Non-Auto	5%	1	3	4	3	2	6
Total Person Trips	100%	27	61	88	66	48	114
Total "Residential" Auto Trips		18	39	57	43	31	74

Table 4.2 highlights the resulting traffic generation estimates for the proposed development and serves to identify the net impact of the proposed development (by applying the above transit and non-auto modal share reductions). The resulting traffic generated by the site was determined to be:

- 57 vehicles (18 inbound / 39 outbound) during the morning peak hour of travel demand; and
- 74 additional vehicles (43 inbound / 31 outbound) during the afternoon peak hour of travel demand.

The majority of site traffic volumes were assumed to use Norberry Crescent South Access (#3) and East Access (#1) given the location of the proposed buildings. The site traffic volumes were distributed using existing travel patterns at the study area intersections.

5.2 ADJACENT DEVELOPMENTS AND BACKGROUND TRAFFIC GROWTH

A review of the City of Ottawa development application website was undertaken to determine if there are any adjacent developments that would impact the study area corridors and intersections. The following developments were found to be in close proximity of the proposed site:

- *3071 Riverside Road (CTS/TIS – April 2017)*: This development would be located south of the proposed site at the south-east corner of Riverside Drive / Mooney's Bay Place. The development would see 63 townhomes, 40 apartments, 522 senior/retirement apartments, day care and approximately 1,800 m² of round retail. The access points for this development would be from Riverside Drive and therefore, the impacts on Springland Drive and the local roads are expected to be negligible.
- *2887 Riverside Drive (Transportation Overview – June 2017)*: This development would see replacing the existing Youth Services Bureau Housing with 39 supportive housing apartments and office space. The Transportation Overview concluded that this development generates less than 75 vehicles and no significant impact is expected on traffic conditions in the study area.

Despite the above, an annual growth rate of 1% per-year was applied on the existing (2017) traffic volumes along Springland Drive to account for any background growth within the study area. This is a conservative assumption considering that Riverside Park is a mature neighborhood and that opportunities for developments are very limited within the immediate study area.

5.3 FORECAST TRAFFIC VOLUMES

Appendix "C" illustrates the site generated traffic and forecast (2019 and 2024) traffic volumes within the study area.

6.0 ANALYSIS AND EVALUATION

Forecast intersection capacity analysis was undertaken using Synchro 8TM traffic analysis software to evaluate the travel demand conditions associated with the forecast traffic volumes for each horizon year (2019 and 2024) [See Appendix "D"]. Table 5.1 summarize, for each of the critical movements, the performance characteristics representing each horizon year assuming the development to be in place.

6.1 2019 & 2024 HORIZON YEAR

The intersection capacity analysis indicate that all the study area intersections continue to operate at satisfactory overall level of service LOS "A" during both peak hours of travel demand. The change in level of service from the existing to the

forecast conditions is negligible. The proposed site is anticipated to result in less than 45 vph in the peak direction of peak hour. This translates to a single vehicle every minute and a half during the peak hours of travel demand.

Table 5.1: Forecast Intersection Capacity Analysis

Intersections	Traffic Control	Morning Peak Hour			Afternoon Peak Hour		
		Overall LOS	Critical Approach		Overall LOS	Critical Approach	
			Movement	LOS, V/C		Movement	LOS, V/C
Forecast (2019) Intersection Capacity Analysis Results							
Springland Dr/Norberry Cres. North	Yield-Control	A	NB	A, 0.07	A	NB	A, 0.06
Springland Dr/Norberry Cres. South	STOP-Control	A	WB	A, 0.10	A	WB	B, 0.10
Springland Dr / Ridgewood Ave	STOP-Control	A	NB	A, 0.19	A	SB	A, 0.33
Norberry Cres. /South Site Access (#3)	STOP-Control	A	SB	A, 0.07	A	SB	A, 0.05
Norberry Cres/East Site Access (#1)	STOP-Control	A	EB	A, 0.04	A	EB	A, 0.03
Springland Dr/North Site Access (#4)	STOP-Control	A	NB	A, 0.04	A	NB	B, 0.03
Forecast (2024) Intersection Capacity Analysis Results							
Springland Dr/Norberry Cres. North	Yield-Control	A	NB	A, 0.07	A	NB	A, 0.06
Springland Dr/Norberry Cres. South	STOP-Control	A	WB	A, 0.10	A	WB	B, 0.10
Springland Dr / Ridgewood Ave	STOP-Control	A	NB	A, 0.20	A	SB	A, 0.35
Norberry Cres. /South Site Access (#3)	STOP-Control	A	SB	A, 0.07	A	SB	A, 0.05
Norberry Cres/East Site Access (#1)	STOP-Control	A	EB	A, 0.04	A	EB	A, 0.03
Springland Dr/North Site Access (#4)	STOP-Control	A	NB	A, 0.04	A	NB	B, 0.03

7.0 PARKING PROVISIONS

Castleglenn Consultants was retained to undertake a parking survey to substantiate the reduction of parking supply for the Norberry Crescent development and determine the impacts of the proposed 225 new apartment rental units upon the total parking supply.

Existing Conditions

- The site currently accommodates a total of 761 units;
- The parking supply includes a total of 759 parking spaces (741 tenant stalls and 18 visitor stalls); and
- The current tenant-per-unit ratio is 0.97 (741 stalls / 761 units);

- The current visitor parking ratio is 0.02 (18 visitor stalls / 761 units); and
- The vacancy rate (reported by the Property Manager at the time of the surveys as of September 8th, 2016) was determined to be 2.2% (or 17 units).

Parking Survey

On-site parking survey was undertaken on Thursday, September 8th, 2016 for each hour between 7:00pm-to-11:00 pm to determine the current usage of the existing parking supply at the Norberry Crescent development. The results indicated that:

- The maximum number of tenant parking stalls occupied during the parking survey was found to occur at 11pm, where 430 tenant stalls were occupied;
- Visitor parking utilization was determined to be 83% (15 occupied /18 available stalls);
- Given that there are 761 units in the existing development, the occupied tenant parking ratio per-unit was determined to be 0.58 stalls-per-unit (assuming a vacancy rate of 2.2 %).

Proposed Parking Supply

The proposed site results in addition of three buildings accommodating 225 units, resulting in a total of 986 residential units within the Norberry complex. The site proposes 702 tenant parking stalls and 50 visitor stalls totaling 752 parking stalls. This translates to a proposed tenant parking ratio of 0.71 (702/986) and a visitor ratio of 0.05 (50/986) totaling parking ratio of 0.76 (752/986). The proposed parking ratio (0.76) exceeds the current utilization rate of the parking lot (0.58).

It should be noted that the parking ratio of 0.58 observed during the September 2016 survey substantiates the auto driver model split of 65% assumed for the Alta Vista area (2011 O-D Survey).

8.0 COMMUNITY IMPACTS

The proposed site, for the most part, is surrounded by residential development and is an addition to an existing residential complex located in mature community. The proposed site would utilize the four existing accesses, three on local road Norberry Crescent (Accesses 1-thru-3) and a single access on a collector Springland Drive (Access #4); all of which are currently characterized by low traffic volumes. The road network surrounding the proposed development also consists of arterial roads (such as Riverside Drive, Walkley Road and Airport Parkway) and major collectors (such as Brookfield Road).

Given that:

- the addition to the existing residential complex results in less than 75 vehicle-per-hour (two-way);

- the site traffic is being distributed to four accesses; and
- the advent of arterial and major collectors;

the effect of vehicular traffic on adjacent local roadways is anticipated to be low.

The proposed site is also situated in close proximity to major transit stations and provides access opportunities to non-modes of transportation. Therefore, the expected motor-vehicular traffic could be minimized.

9.0 TRANSPORTATION DEMAND MANAGEMENT (TDM)

The following study area features serve the principles of TDM:

- Currently the study area is well served by the existing transit routes along Springland Drive frequented by regular route 87 that provides access to major stations like Huron. The proposed site is also in close proximity to confederation and Walkley stations and will continue to have adequate transit service in the future.
- Sidewalks are available fronting the proposed site and the existing facilities should continue to accommodate the future site pedestrian movements.
- Cyclists share the road with vehicular traffic along Springland Drive and Norberry Crescent, which were observed to be low. Major roads such as Riverside Road and Walkley Road are classified as a Spine Route in the vicinity of the proposed site.

The proposed development would be afforded with convenient access to the transit network and non-auto mode within the study area, which could serve to encourage non-auto modes of travel.

10.0 FINDINGS AND CONCLUSIONS

This Transportation Impact Study yields the following conclusions:

- The study area intersections operate at satisfactory level of service under forecast traffic conditions during both peak hours of travel demand.
- The proposed 225-unit addition to the existing residential complex results in negligible traffic impacts on the adjacent study area intersections and corridors.
- The proposed site is situated in close proximity to major transit stations and provides access opportunities to non-modes of transportation. Therefore, the expected motor-vehicular traffic could be further minimized.
- The site proposes a total parking ratio of 0.76, which exceeds the current utilization rate (0.58).

The results indicate that the City of Ottawa should be encouraged to assemble the appropriate conditions for development approval that would permit the development application to proceed.

Yours Truly,

Arman Matti

Arman Matti, P. Eng.
September 2017



Appendix A

Existing (2017) Traffic Analysis

HCM Unsignalized Intersection Capacity Analysis 4: Ridgewood Ave & Springland Dr.

Existing (2017) Traffic Analysis
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	58	29	52	70	38	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	32	57	76	41	45
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	95	133	86			
Volume Left (vph)	63	57	0			
Volume Right (vph)	32	0	45			
Hadj (s)	-0.01	0.10	-0.29			
Departure Headway (s)	4.4	4.3	4.0			
Degree Utilization, x	0.11	0.16	0.09			
Capacity (veh/h)	785	809	879			
Control Delay (s)	7.9	8.1	7.4			
Approach Delay (s)	7.9	8.1	7.4			
Approach LOS	A	A	A			
Intersection Summary						
Delay			7.9			
Level of Service			A			
Intersection Capacity Utilization			25.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Springland Drive & Norberry Cres South

Existing (2017) Traffic Analysis
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	20	41	81	11	10	57
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)	22	45	88	12	11	62
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	178	94			100	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	178	94			100	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	95			99	
cM capacity (veh/h)	811	968			1505	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	66	100	73			
Volume Left	22	0	11			
Volume Right	45	12	0			
cSH	910	1700	1505			
Volume to Capacity	0.07	0.06	0.01			
Queue Length 95th (m)	1.8	0.0	0.2			
Control Delay (s)	9.3	0.0	1.2			
Lane LOS	A		A			
Approach Delay (s)	9.3	0.0	1.2			
Approach LOS	A					
Intersection Summary						
Average Delay		2.9				
Intersection Capacity Utilization		20.9%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis6: North Access & Springland Dr

Existing (2017) Traffic Analysis
Morning Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	155	2	3	68	11	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	168	2	3	74	12	13
Pedestrians	8			11	2	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			173		260	183
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			173		260	183
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		98	98
cM capacity (veh/h)			1414		725	835
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	171	77	25			
Volume Left	0	3	12			
Volume Right	2	0	13			
cSH	1700	1414	779			
Volume to Capacity	0.10	0.00	0.03			
Queue Length 95th (m)	0.0	0.1	0.8			
Control Delay (s)	0.0	0.3	9.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.3	9.8			
Approach LOS			A			
Intersection Summary						
Average Delay		1.0				
Intersection Capacity Utilization		22.1%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Norberry Cres South/Norberry cres & South Access

Existing (2017) Traffic Analysis
Morning Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	9	12	30	1	10	31
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	13	33	1	11	34
Pedestrians					5	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	39				71	38
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	39				71	38
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	97
cM capacity (veh/h)	1578				929	1035
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	23	34	45			
Volume Left	10	0	11			
Volume Right	0	1	34			
cSH	1578	1700	1007			
Volume to Capacity	0.01	0.02	0.04			
Queue Length 95th (m)	0.1	0.0	1.1			
Control Delay (s)	3.2	0.0	8.7			
Lane LOS	A		A			
Approach Delay (s)	3.2	0.0	8.7			
Approach LOS			A			
Intersection Summary						
Average Delay			4.6			
Intersection Capacity Utilization			17.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

11: Norberry Cres./Norberry Cres North & East Access

Existing (2017) Traffic Analysis
Morning Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	14	10	8	22	8	2
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)	15	11	9	24	9	2
Pedestrians	10			8	7	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	68	28	21			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	68	28	21			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	923	1037	1594			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	26	33	11			
Volume Left	15	9	0			
Volume Right	11	0	2			
cSH	967	1594	1700			
Volume to Capacity	0.03	0.01	0.01			
Queue Length 95th (m)	0.6	0.1	0.0			
Control Delay (s)	8.8	2.0	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.8	2.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization			20.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

13: Norberry Cres North & Springland Dr

Existing (2017) Traffic Analysis
Morning Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	166	1	9	69	2	34
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	180	1	10	75	2	37
Pedestrians	1			2	20	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			0	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			202		297	203
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			202		297	203
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	95
cM capacity (veh/h)			1296		681	819
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	182	85	39			
Volume Left	0	10	2			
Volume Right	1	0	37			
cSH	1700	1296	810			
Volume to Capacity	0.11	0.01	0.05			
Queue Length 95th (m)	0.0	0.2	1.2			
Control Delay (s)	0.0	1.0	9.7			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.0	9.7			
Approach LOS			A			
Intersection Summary						
Average Delay		1.5				
Intersection Capacity Utilization		22.5%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 4: Ridgewood Ave & Springland Dr.

Existing (2017) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	33	49	64	58	183	73
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	53	70	63	199	79
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	89	133	278			
Volume Left (vph)	36	70	0			
Volume Right (vph)	53	0	79			
Hadj (s)	-0.28	0.10	-0.16			
Departure Headway (s)	4.5	4.5	4.1			
Degree Utilization, x	0.11	0.17	0.32			
Capacity (veh/h)	728	770	847			
Control Delay (s)	8.1	8.4	9.0			
Approach Delay (s)	8.1	8.4	9.0			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.7			
Level of Service			A			
Intersection Capacity Utilization			36.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Springland Drive & Norberry Cres

Existing (2017) Traffic Analysis
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	13	29	93	35	17	215
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)	14	32	101	38	18	234
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	391	120			139	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	391	120			139	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	97			99	
cM capacity (veh/h)	609	937			1457	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	46	139	252			
Volume Left	14	0	18			
Volume Right	32	38	0			
cSH	803	1700	1457			
Volume to Capacity	0.06	0.08	0.01			
Queue Length 95th (m)	1.4	0.0	0.3			
Control Delay (s)	9.8	0.0	0.7			
Lane LOS	A		A			
Approach Delay (s)	9.8	0.0	0.7			
Approach LOS	A					
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		33.7%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: North Access & Springland Dr

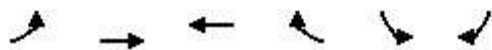
Existing (2017) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	82	7	9	255	9	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	8	10	277	10	5
Pedestrians	18			7	2	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	2			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			99		410	102
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			99		410	102
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1504		588	951
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	97	287	15			
Volume Left	0	10	10			
Volume Right	8	0	5			
cSH	1700	1504	681			
Volume to Capacity	0.06	0.01	0.02			
Queue Length 95th (m)	0.0	0.1	0.5			
Control Delay (s)	0.0	0.3	10.4			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	10.4			
Approach LOS			B			
Intersection Summary						
Average Delay		0.6				
Intersection Capacity Utilization		33.4%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Norberry Cres & South Access

Existing (2017) Traffic Analysis
Afternoon Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	27	26	32	7	14	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	28	35	8	15	11
Pedestrians			2		10	
Lane Width (m)			3.7		3.7	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	52				138	49
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	52				138	49
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				98	99
cM capacity (veh/h)	1553				836	1017
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	58	42	26			
Volume Left	29	0	15			
Volume Right	0	8	11			
cSH	1553	1700	903			
Volume to Capacity	0.02	0.02	0.03			
Queue Length 95th (m)	0.4	0.0	0.7			
Control Delay (s)	3.8	0.0	9.1			
Lane LOS	A		A			
Approach Delay (s)	3.8	0.0	9.1			
Approach LOS			A			
Intersection Summary						
Average Delay			3.6			
Intersection Capacity Utilization			19.7%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

11: Norberry Cres./Norberry Cres. North & East Access

Existing (2017) Traffic Analysis
Afternoon Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	10	4	13	18	27	9
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)	11	4	14	20	29	10
Pedestrians	15					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	97	49	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	97	49	54			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	99			
cM capacity (veh/h)	887	1012	1544			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	15	34	39			
Volume Left	11	14	0			
Volume Right	4	0	10			
cSH	920	1544	1700			
Volume to Capacity	0.02	0.01	0.02			
Queue Length 95th (m)	0.4	0.2	0.0			
Control Delay (s)	9.0	3.1	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	3.1	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			18.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

13: Norberry Cres. North & Springland Dr

Existing (2017) Traffic Analysis
Afternoon Peak Hour

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↱	↘↗	
Volume (veh/h)	80	9	27	261	3	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	10	29	284	3	26
Pedestrians					36	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.2	
Percent Blockage					3	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			133		470	128
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			133		470	128
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	97
cM capacity (veh/h)			1419		527	891
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	97	313	29			
Volume Left	0	29	3			
Volume Right	10	0	26			
cSH	1700	1419	828			
Volume to Capacity	0.06	0.02	0.04			
Queue Length 95th (m)	0.0	0.5	0.8			
Control Delay (s)	0.0	0.9	9.5			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.9	9.5			
Approach LOS			A			
Intersection Summary						
Average Delay		1.3				
Intersection Capacity Utilization		32.7%	ICU Level of Service	A		
Analysis Period (min)		15				

Appendix B

Collision Information

Collision Main Detail Summary

OnTRAC Reporting System

FROM: 2013-01-01 TO:

NORBERRY CRES, SPRINGLAND DR N to SPRINGLAND DR S

Former Municipality: Ottawa

Traffic Control: No control

Number of Collisions: 1

	DATE	DAY	TIME	ENV	LIGHT	IMPACT TYPE	CLASS	DIR	SURFACE COND'N	VEHICLE MANOEUVRE	VEHICLE TYPE	FIRST EVENT	No. PED
1	2013-08-08	Thu	13:25	Clear	Daylight	Single vehicle	P.D. only	V1 W	Dry	Reversing	Automobile, station	Unattended vehicle	0

(Note: Time of Day = "00:00" represents unknown collision time)

Wednesday, June 21, 2017

Page 1 of 1



City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2014 **To:** December 31, 2015

Location: NORBERRY CRES btwn SPRINGLAND DR & SPRINGLAND DR

Traffic Control: No control

Total Collisions: 3

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2014-Jul-12, Sat,17:10	Clear	SMV other	Non-fatal injury	Dry	North	Turning right	Automobile, station wagon	Pedestrian	1
2014-Sep-01, Mon,19:35	Clear	Rear end	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2015-Aug-08, Sat,10:45	Clear	Sideswipe	P.D. only	Dry	West	Pulling away from shoulder or curb	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Pick-up truck	Other motor vehicle	

Location: SPRINGLAND DR btwn RIDGEWOOD AVE & HOBSON RD

Traffic Control: No control

Total Collisions: 1

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
2015-Feb-04, Wed,10:34	Snow	Turning movement	P.D. only	Loose snow	North	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Passenger van	Other motor vehicle	

Location: SPRINGLAND DR N @ FLANNERY DR N

Traffic Control: Stop sign

Total Collisions: 1

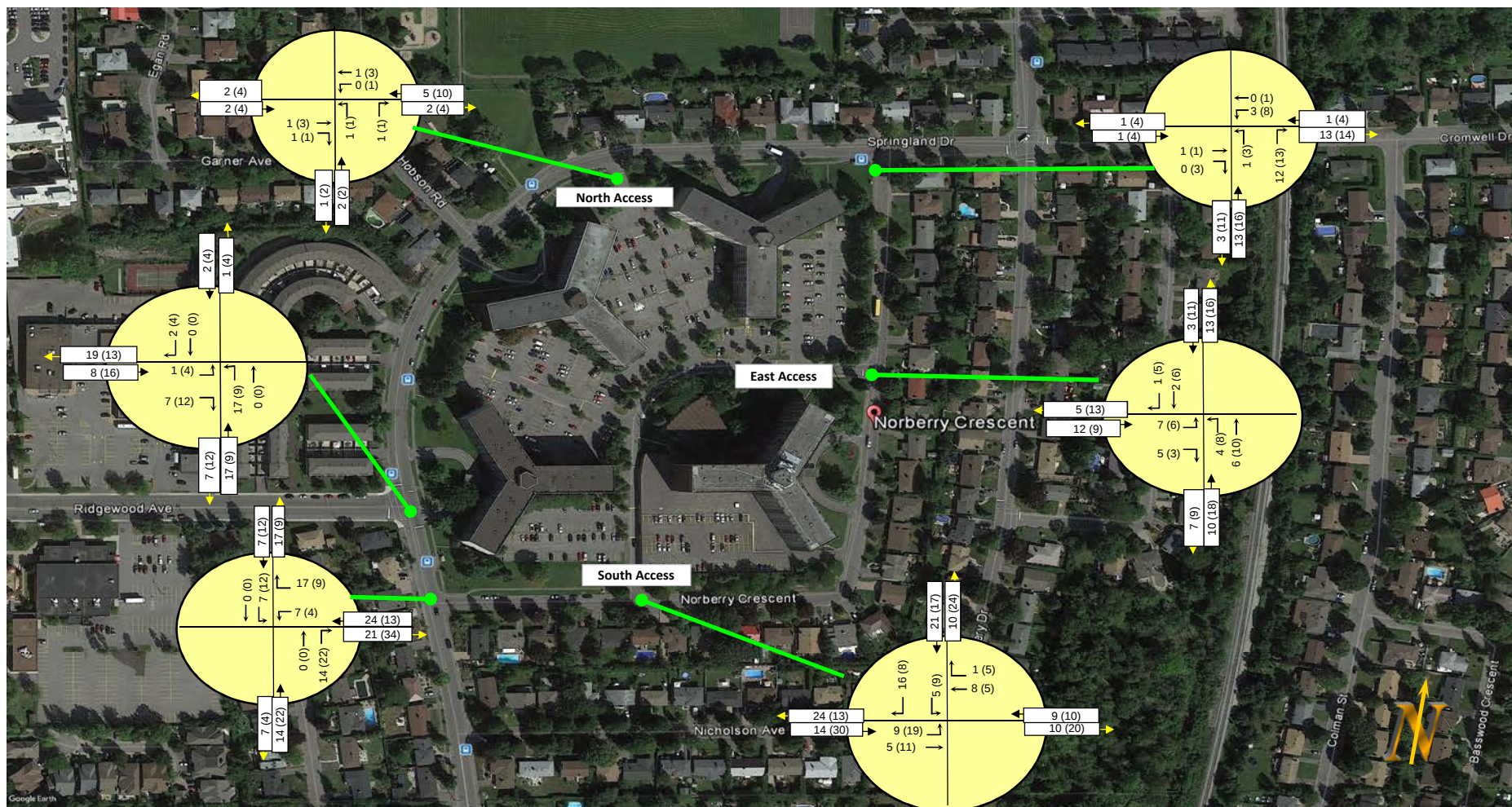
Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuvre	Vehicle type	First Event	No. Ped
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2015-Aug-31, Mon, 15:30	Clear	Angle	P.D. only	Dry	East	Turning left	Automobile, station wagon	Other motor vehicle
					South	Stopped	Passenger van	Other motor vehicle

Appendix C

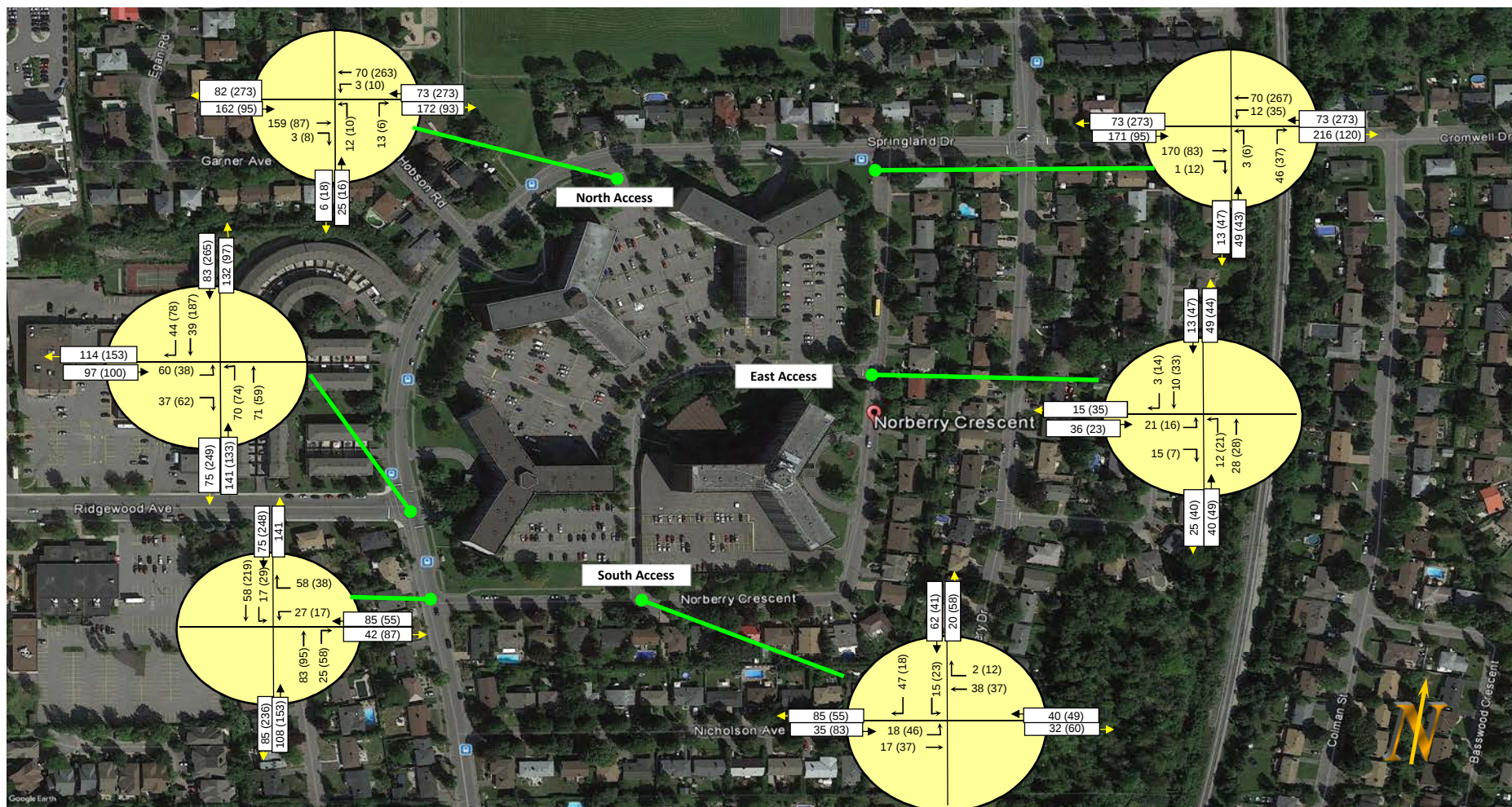
Site Generated and Forecast (2019 & 2024)

Forecast Traffic Volumes



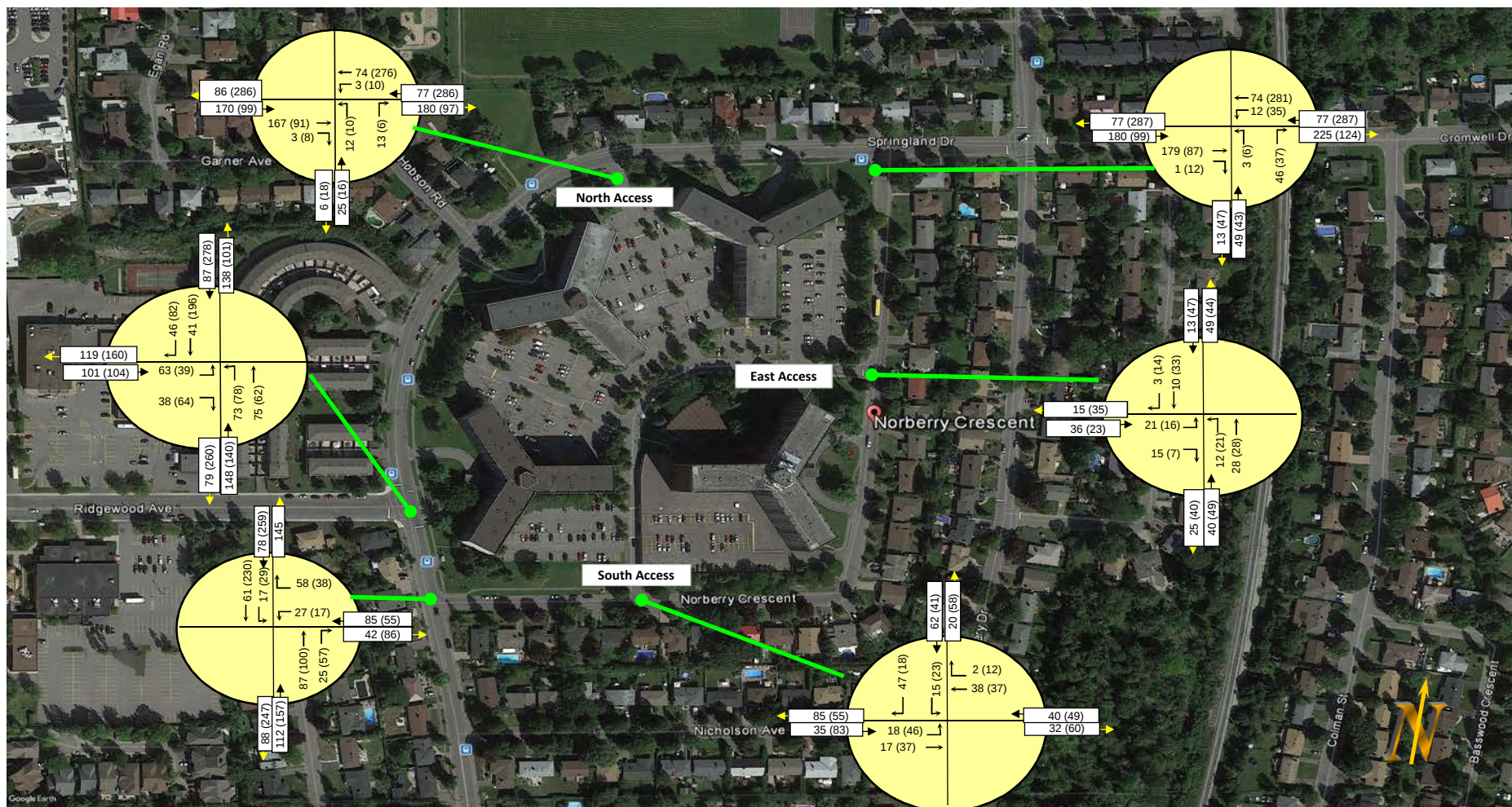
Morning Peak Hour
(Afternoon Peak Hour)

Site generated Traffic



Morning Peak Hour
(Afternoon Peak Hour)

2019 Total Traffic Volumes



Morning Peak Hour
(Afternoon Peak Hour)

2024 Total Traffic Volumes

Appendix D
Forecast (2019 & 2024)
Traffic Analysis

HCM Unsignalized Intersection Capacity Analysis 4: Ridgewood Ave & Springland Dr.

Built -Out (2019) Traffic Analysis
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	60	37	70	71	44	39
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	40	76	77	48	42
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	105	153	90			
Volume Left (vph)	65	76	0			
Volume Right (vph)	40	0	42			
Hadj (s)	-0.05	0.12	-0.27			
Departure Headway (s)	4.4	4.4	4.0			
Degree Utilization, x	0.13	0.19	0.10			
Capacity (veh/h)	779	799	848			
Control Delay (s)	8.0	8.3	7.5			
Approach Delay (s)	8.0	8.3	7.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.0			
Level of Service			A			
Intersection Capacity Utilization			26.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Springland Drive

Built -Out (2019) Traffic Analysis
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	27	58	83	25	17	58
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)	29	63	90	27	18	63
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	204	104			117	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	204	104			117	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	93			99	
cM capacity (veh/h)	779	956			1484	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	92	117	82			
Volume Left	29	0	18			
Volume Right	63	27	0			
cSH	892	1700	1484			
Volume to Capacity	0.10	0.07	0.01			
Queue Length 95th (m)	2.6	0.0	0.3			
Control Delay (s)	9.5	0.0	1.8			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	1.8			
Approach LOS	A					
Intersection Summary						
Average Delay		3.5				
Intersection Capacity Utilization		22.4%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis6: North Access & Springland Dr

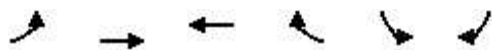
Built -Out (2019) Traffic Analysis
Morning Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	159	3	3	70	12	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	173	3	3	76	13	14
Pedestrians	8			11	2	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			178		267	187
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			178		267	187
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		98	98
cM capacity (veh/h)			1408		719	830
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	176	79	27			
Volume Left	0	3	13			
Volume Right	3	0	14			
cSH	1700	1408	773			
Volume to Capacity	0.10	0.00	0.04			
Queue Length 95th (m)	0.0	0.1	0.8			
Control Delay (s)	0.0	0.3	9.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.3	9.8			
Approach LOS			A			
Intersection Summary						
Average Delay		1.0				
Intersection Capacity Utilization		21.9%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Norberry cres & South Access

Built -Out (2019) Traffic Analysis
Morning Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	17	38	2	15	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	18	41	2	16	51
Pedestrians					5	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	48				105	47
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	48				105	47
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	95
cM capacity (veh/h)	1565				883	1023
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	38	43	67			
Volume Left	20	0	16			
Volume Right	0	2	51			
cSH	1565	1700	985			
Volume to Capacity	0.01	0.03	0.07			
Queue Length 95th (m)	0.3	0.0	1.7			
Control Delay (s)	3.8	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	3.8	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			5.0			
Intersection Capacity Utilization			19.0%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

11: Norberry Cres./Norberry Cres. (North) & East Access

Built -Out (2019) Traffic Analysis
Morning Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	17	16	27	9	3
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)	21	18	17	29	10	3
Pedestrians	10			8	7	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	93	29	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	93	29	23			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	98	99			
cM capacity (veh/h)	889	1035	1591			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	39	47	13			
Volume Left	21	17	0			
Volume Right	18	0	3			
cSH	953	1591	1700			
Volume to Capacity	0.04	0.01	0.01			
Queue Length 95th (m)	1.0	0.3	0.0			
Control Delay (s)	8.9	2.8	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.9	2.8	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			4.8			
Intersection Capacity Utilization			21.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 13: Norberry Cres. (North) & Springland Dr

Built -Out (2019) Traffic Analysis
Morning Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	170	1	12	70	3	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	185	1	13	76	3	50
Pedestrians	1			2	20	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			0	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			206		308	207
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			206		308	207
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	94
cM capacity (veh/h)			1291		669	815
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	186	89	53			
Volume Left	0	13	3			
Volume Right	1	0	50			
cSH	1700	1291	804			
Volume to Capacity	0.11	0.01	0.07			
Queue Length 95th (m)	0.0	0.2	1.6			
Control Delay (s)	0.0	1.2	9.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.2	9.8			
Approach LOS			A			
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		24.5%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 4: Ridgewood Ave & Springland Dr.

Built-Out (2019) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	38	62	74	59	187	78
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	67	80	64	203	85
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	109	145	288			
Volume Left (vph)	41	80	0			
Volume Right (vph)	67	0	85			
Hadj (s)	-0.30	0.11	-0.16			
Departure Headway (s)	4.6	4.6	4.2			
Degree Utilization, x	0.14	0.18	0.33			
Capacity (veh/h)	722	755	833			
Control Delay (s)	8.3	8.6	9.2			
Approach Delay (s)	8.3	8.6	9.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.9			
Level of Service			A			
Intersection Capacity Utilization			39.2%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Springland Drive & Northberry Cres

Built-Out (2019) Traffic Analysis
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	17	38	95	58	29	219
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)	18	41	310	63	32	238
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	642	341			373	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	642	341			373	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	94			97	
cM capacity (veh/h)	428	706			1197	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	60	373	270			
Volume Left	18	0	32			
Volume Right	41	63	0			
cSH	588	1700	1197			
Volume to Capacity	0.10	0.22	0.03			
Queue Length 95th (m)	2.6	0.0	0.6			
Control Delay (s)	11.8	0.0	1.2			
Lane LOS	B		A			
Approach Delay (s)	11.8	0.0	1.2			
Approach LOS	B					
Intersection Summary						
Average Delay		1.5				
Intersection Capacity Utilization		46.9%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 6: North Access & Springland Dr

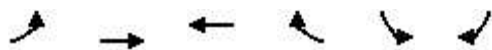
Built-Out (2019) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	87	8	10	263	10	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	95	9	11	286	11	7
Pedestrians	18			7	2	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	2			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			105		427	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			105		427	108
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1496		574	944
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	103	297	17			
Volume Left	0	11	11			
Volume Right	9	0	7			
cSH	1700	1496	673			
Volume to Capacity	0.06	0.01	0.03			
Queue Length 95th (m)	0.0	0.2	0.6			
Control Delay (s)	0.0	0.3	10.5			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	10.5			
Approach LOS			B			
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			33.9%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Northberry Cres/Norberry cres & South Access

Built-Out (2019) Traffic Analysis
Afternoon Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	46	37	37	12	23	18
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	40	40	13	25	20
Pedestrians			2		10	
Lane Width (m)			3.7		3.7	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	63				199	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	63				199	57
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				97	98
cM capacity (veh/h)	1539				761	1007
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	90	53	45			
Volume Left	50	0	25			
Volume Right	0	13	20			
cSH	1539	1700	852			
Volume to Capacity	0.03	0.03	0.05			
Queue Length 95th (m)	0.8	0.0	1.3			
Control Delay (s)	4.2	0.0	9.5			
Lane LOS	A		A			
Approach Delay (s)	4.2	0.0	9.5			
Approach LOS			A			
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization			21.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

11: Norberry Cres. & East Access

Built-Out (2019) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	7	21	28	33	14
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)	17	8	23	30	36	15
Pedestrians	15					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	135	58	66			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	135	58	66			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	840	1000	1529			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	25	53	51			
Volume Left	17	23	0			
Volume Right	8	0	15			
cSH	883	1529	1700			
Volume to Capacity	0.03	0.01	0.03			
Queue Length 95th (m)	0.7	0.3	0.0			
Control Delay (s)	9.2	3.2	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.2	3.2	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		3.1				
Intersection Capacity Utilization		19.4%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

13: Norberry Cres. & Springland Dr

Built-Out (2019) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	83	12	35	267	6	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	13	38	290	7	40
Pedestrians					36	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.2	
Percent Blockage					3	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			139		499	133
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			139		499	133
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		99	95
cM capacity (veh/h)			1412		504	886
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	103	328	47			
Volume Left	0	38	7			
Volume Right	13	0	40			
cSH	1700	1412	801			
Volume to Capacity	0.06	0.03	0.06			
Queue Length 95th (m)	0.0	0.6	1.4			
Control Delay (s)	0.0	1.1	9.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.1	9.8			
Approach LOS			A			
Intersection Summary						
Average Delay		1.7				
Intersection Capacity Utilization		33.5%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 4: Ridgewood Ave & Springland Dr.

Horizon (2024) Traffic Analysis
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	63	38	73	75	41	46
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	41	79	82	45	50
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	110	161	95			
Volume Left (vph)	68	79	0			
Volume Right (vph)	41	0	50			
Hadj (s)	-0.05	0.12	-0.30			
Departure Headway (s)	4.4	4.4	4.0			
Degree Utilization, x	0.13	0.20	0.11			
Capacity (veh/h)	762	796	850			
Control Delay (s)	8.1	8.4	7.5			
Approach Delay (s)	8.1	8.4	7.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.1			
Level of Service			A			
Intersection Capacity Utilization			27.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis 5: Springland Drive & Norberry Cres. (South)

Horizon (2024) Traffic Analysis
Morning Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	27	58	87	25	17	61
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)	29	63	95	27	18	66
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	211	108			122	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	211	108			122	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	93			99	
cM capacity (veh/h)	772	951			1478	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	92	122	85			
Volume Left	29	0	18			
Volume Right	63	27	0			
cSH	886	1700	1478			
Volume to Capacity	0.10	0.07	0.01			
Queue Length 95th (m)	2.6	0.0	0.3			
Control Delay (s)	9.5	0.0	1.7			
Lane LOS	A		A			
Approach Delay (s)	9.5	0.0	1.7			
Approach LOS	A					
Intersection Summary						
Average Delay			3.4			
Intersection Capacity Utilization			23.1%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis6: North Access & Springland Dr

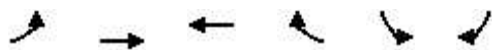
Horizon (2024) Traffic Analysis
Morning Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	167	3	3	74	12	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	182	3	3	80	13	14
Pedestrians	8			11	2	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			187		280	196
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			187		280	196
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		98	98
cM capacity (veh/h)			1397		706	821
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	185	84	27			
Volume Left	0	3	13			
Volume Right	3	0	14			
cSH	1700	1397	762			
Volume to Capacity	0.11	0.00	0.04			
Queue Length 95th (m)	0.0	0.1	0.8			
Control Delay (s)	0.0	0.3	9.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.3	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			22.8%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Norberry Cres. (South) & South Access

Horizon (2024) Traffic Analysis
Morning Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	18	17	38	2	15	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	18	41	2	16	51
Pedestrians					5	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	48				105	47
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	48				105	47
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				98	95
cM capacity (veh/h)	1565				883	1023
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	38	43	67			
Volume Left	20	0	16			
Volume Right	0	2	51			
cSH	1565	1700	985			
Volume to Capacity	0.01	0.03	0.07			
Queue Length 95th (m)	0.3	0.0	1.7			
Control Delay (s)	3.8	0.0	8.9			
Lane LOS	A		A			
Approach Delay (s)	3.8	0.0	8.9			
Approach LOS			A			
Intersection Summary						
Average Delay			5.0			
Intersection Capacity Utilization			19.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

11: East Access & Norberry Cres. (North)

Horizon (2024) Traffic Analysis
Morning Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	21	15	12	28	10	3
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)	23	16	13	30	11	3
Pedestrians	10			8	7	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	1			1	1	
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	86	30	24			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	86	30	24			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	98	99			
cM capacity (veh/h)	899	1034	1590			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	39	43	14			
Volume Left	23	13	0			
Volume Right	16	0	3			
cSH	951	1590	1700			
Volume to Capacity	0.04	0.01	0.01			
Queue Length 95th (m)	1.0	0.2	0.0			
Control Delay (s)	8.9	2.2	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.9	2.2	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay		4.6				
Intersection Capacity Utilization		21.3%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 13: Norberry Cres. (North) & Springland Dr

Horizon (2024) Traffic Analysis
Morning Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	179	1	12	74	3	46
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	195	1	13	80	3	50
Pedestrians	1			2	20	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	0			0	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			216		323	217
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			216		323	217
tC, single (s)			4.2		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			99		100	94
cM capacity (veh/h)			1280		656	805
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	196	93	53			
Volume Left	0	13	3			
Volume Right	1	0	50			
cSH	1700	1280	794			
Volume to Capacity	0.12	0.01	0.07			
Queue Length 95th (m)	0.0	0.2	1.6			
Control Delay (s)	0.0	1.2	9.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.2	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay		1.9				
Intersection Capacity Utilization		25.5%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 4: Ridgewood Ave & Springland Dr.

Horizon (2024) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	39	64	78	62	196	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	70	85	67	213	89
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	112	152	302			
Volume Left (vph)	42	85	0			
Volume Right (vph)	70	0	89			
Hadj (s)	-0.30	0.11	-0.16			
Departure Headway (s)	4.6	4.6	4.2			
Degree Utilization, x	0.14	0.19	0.35			
Capacity (veh/h)	713	750	829			
Control Delay (s)	8.4	8.7	9.4			
Approach Delay (s)	8.4	8.7	9.4			
Approach LOS	A	A	A			
Intersection Summary						
Delay			9.0			
Level of Service			A			
Intersection Capacity Utilization			40.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Springland Drive & Northberry Cres

Horizon (2024) Traffic Analysis
Afternoon Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	17	38	100	57	29	230
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)	18	41	326	62	32	250
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	670	357			388	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	670	357			388	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	94			97	
cM capacity (veh/h)	412	692			1181	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	60	388	282			
Volume Left	18	0	32			
Volume Right	41	62	0			
cSH	572	1700	1181			
Volume to Capacity	0.10	0.23	0.03			
Queue Length 95th (m)	2.6	0.0	0.6			
Control Delay (s)	12.0	0.0	1.1			
Lane LOS	B		A			
Approach Delay (s)	12.0	0.0	1.1			
Approach LOS	B					
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		48.3%		ICU Level of Service	A	
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

6: North Access & Springland Dr

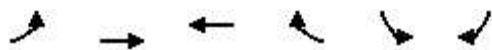
Horizon (2024) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	91	8	10	276	10	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	99	9	11	300	11	7
Pedestrians	18			7	2	
Lane Width (m)	3.7			3.7	3.7	
Walking Speed (m/s)	1.2			1.2	1.2	
Percent Blockage	2			1	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			110		445	112
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			110		445	112
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		98	99
cM capacity (veh/h)			1491		560	939
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	108	311	17			
Volume Left	0	11	11			
Volume Right	9	0	7			
cSH	1700	1491	660			
Volume to Capacity	0.06	0.01	0.03			
Queue Length 95th (m)	0.0	0.2	0.6			
Control Delay (s)	0.0	0.3	10.6			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.3	10.6			
Approach LOS			B			
Intersection Summary						
Average Delay		0.7				
Intersection Capacity Utilization		34.7%	ICU Level of Service	A		
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Northberry Cres/Norberry cres & South Access

Horizon (2024) Traffic Analysis
Afternoon Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	46	37	37	12	23	18
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	40	40	13	25	20
Pedestrians			2		10	
Lane Width (m)			3.7		3.7	
Walking Speed (m/s)			1.2		1.2	
Percent Blockage			0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	63				199	57
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	63				199	57
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				97	98
cM capacity (veh/h)	1539				761	1007
Direction, Lane #	EB 1	WB 1	SB 1			
Volume Total	90	53	45			
Volume Left	50	0	25			
Volume Right	0	13	20			
cSH	1539	1700	852			
Volume to Capacity	0.03	0.03	0.05			
Queue Length 95th (m)	0.8	0.0	1.3			
Control Delay (s)	4.2	0.0	9.5			
Lane LOS	A		A			
Approach Delay (s)	4.2	0.0	9.5			
Approach LOS			A			
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization			21.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

11: Norberry Cres. & East Access

Horizon (2024) Traffic Analysis
Afternoon Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	16	7	21	28	33	14
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)	17	8	23	30	36	15
Pedestrians	15					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.2					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	135	58	66			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	135	58	66			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	99	99			
cM capacity (veh/h)	840	1000	1529			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	25	53	51			
Volume Left	17	23	0			
Volume Right	8	0	15			
cSH	883	1529	1700			
Volume to Capacity	0.03	0.01	0.03			
Queue Length 95th (m)	0.7	0.3	0.0			
Control Delay (s)	9.2	3.2	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.2	3.2	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			3.1			
Intersection Capacity Utilization			19.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

13: Norberry Cres. & Springland Dr

Horizon (2024) Traffic Analysis
Afternoon Peak Hour

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	87	12	35	281	6	37
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	95	13	38	305	7	40
Pedestrians					36	
Lane Width (m)					3.7	
Walking Speed (m/s)					1.2	
Percent Blockage					3	
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			144		519	137
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			144		519	137
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		99	95
cM capacity (veh/h)			1407		491	881
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	108	343	47			
Volume Left	0	38	7			
Volume Right	13	0	40			
cSH	1700	1407	793			
Volume to Capacity	0.06	0.03	0.06			
Queue Length 95th (m)	0.0	0.6	1.4			
Control Delay (s)	0.0	1.1	9.8			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.1	9.8			
Approach LOS			A			
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization			34.3%	ICU Level of Service		A
Analysis Period (min)			15			

Appendix E
E-mail Communication with the City
TIS Scope of Work

Arman Matti

From: Dubyk, Wally <Wally.Dubyk@ottawa.ca>
Sent: January-12-17 10:37 AM
To: Arman Matti
Cc: Arthur Gordon
Subject: RE: 740 Springland Drive - Study Area Intersections

Arman,

Please proceed with your rationale.

Wally Dubyk
Project Manager - Transportation Review
Development Review, Central Branch
613-580-2424 x13783

From: Arman Matti [mailto:amatti@castleglenn.ca]
Sent: Thursday, January 12, 2017 9:03 AM
To: Dubyk, Wally
Cc: Arthur Gordon
Subject: 740 Springland Drive - Study Area Intersections

Wally

As it was identified in the City's study requirement list (Dated June 7, 2016 - See attached), we will undertake a TIS to satisfy the traffic requirements for 740 Springland Drive development.
This e-mail is just to confirm with you the study area intersections that will be analyzed part of the TIS.

Please see attached exhibit that shows the 6 intersections that we are proposing to analyze (intersection marked with Pins).
Please let us know if you concur?

Arman Matti, P.Eng., MPM
Transportation Engineer
Tel: 613-731-4052 ext. 108



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