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2025-07-22
Project: (230139)

Jack Ready
Project Manager, Transportation
Engineering and Asset Management, Public Works
Norfolk County
12 Gilbertson Drive
Simcoe, ON N3Y 3N3

Dear Mr. Ready:

RE: NORFOLK COUNTY TRAFFIC SIGNAL OPERATIONS REVIEW
TRAFFIC SIGNAL WARRANT REVIEW FOR ST. JOHN'S ROAD AT BLUELINE ROAD AND COCKSHUTT ROAD

Norfolk County (County) retained Paradigm Transportation Solutions Limited (Paradigm) to conduct an all-way stop control and traffic signal warrant analysis for the St. John's Road intersections with Blueline Road and Cockshutt Road. The County wishes to assess whether higher forms of traffic control are warranted based on the criteria set out in the Ontario Traffic Manual (OTM). The October 2023 letter was updated in July 2025 to address an error in the calculation of the Traffic Control Signal Warrant for Justification 3.

This letter report:

- Provides an overview of the study area examined for the warrant analysis;
- Details the data collection;
- Reviews the sight line conditions at each intersection;
- Summarizes the intersection collision history;
- Outlines the basis for the all-way stop control and traffic signal warrant calculations;
- Assesses the operational performance of each intersection under two-way stop, all-way stop and traffic signal control; and
- Provides recommendations for traffic control at each intersection.

Study Area

Overview

Figure 1 and **Figure 2** illustrate the intersections of St. John's Road at Blueline Road and Cockshutt Road, respectively.

Reference was made to the Norfolk County Official Plan for roadway classification[1]. All roads operate under the jurisdiction of the County. No active transportation facilities (sidewalks or bike lanes) are provided.

- **St. John's Road (Norfolk County Road 3)** is an east-west arterial roadway providing a two-lane rural cross-section (one lane in each direction). The posted maximum speed limit is 80 km/h. The roadway has a relatively flat grade and minimal horizontal curvature.
- **Blueline Road** is a north-south local roadway providing a two-lane rural cross-section (one lane in each direction). The posted maximum speed limit is 80 km/h. The roadway has a relatively flat grade and minimal horizontal curvature.
- **Cockshutt Road (Norfolk County Road 5)** is a north-south arterial roadway providing a two-lane rural cross-section (one lane in each direction). The posted maximum speed limit is 80 km/h. Cockshutt Road slopes downward to the south at the intersection with St. John's Road and has minimal horizontal curvature.

Under existing conditions, the St. John's Road intersections with Blueline Road and Cockshutt Road are unsignalized. St. John's Road is considered the major road, while Blueline Road and Cockshutt Road are considered minor roads. Stop control is provided on the minor road northbound and southbound approaches. At Blueline Road, an overhead flashing beacon, flashing beacons on the primary stop signs, and secondary stop signs on the left-side of the road are provided. At both intersections, single lane approaches (shared left-through-right) are provided for all movements, with right-turn tapers included on St. John's Road.

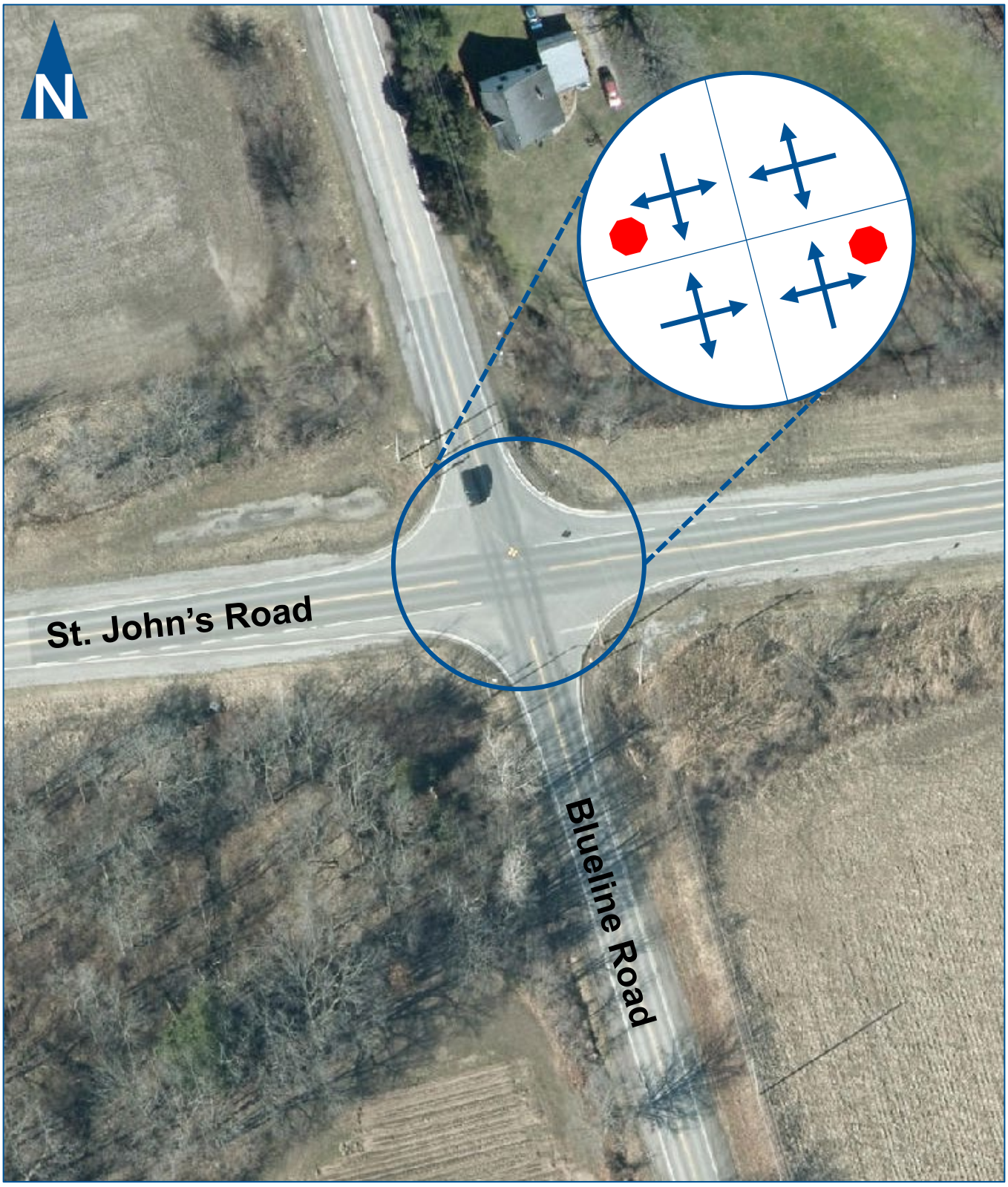
The surrounding land uses are rural, consisting of farms, woodlots and single-family detached dwellings. The LE & N Rail Trail crosses Blueline Road approximately 250 metres north of St. John's Road and crosses St. John's Road approximately 160 metres east of Blueline Road.

Traffic Data

The County provided weekday turning movement counts (TMCs) for the intersections collected on August 3, 2023, during the morning (7:00 to 9:00 AM), mid-day (11:00 AM to 2:00 PM), and afternoon (3:00 to 6:00 PM) peak periods. The data was collected in 15-minute intervals and vehicles were classified by type.

Figure 3 summarizes the existing (2023) eight-hour traffic volumes. **Attachment A** provides the detailed traffic count data for reference.

[1] Norfolk County, *Norfolk County Official Plan Schedule "E" Transportation,* (Simcoe: Norfolk County, 2018).

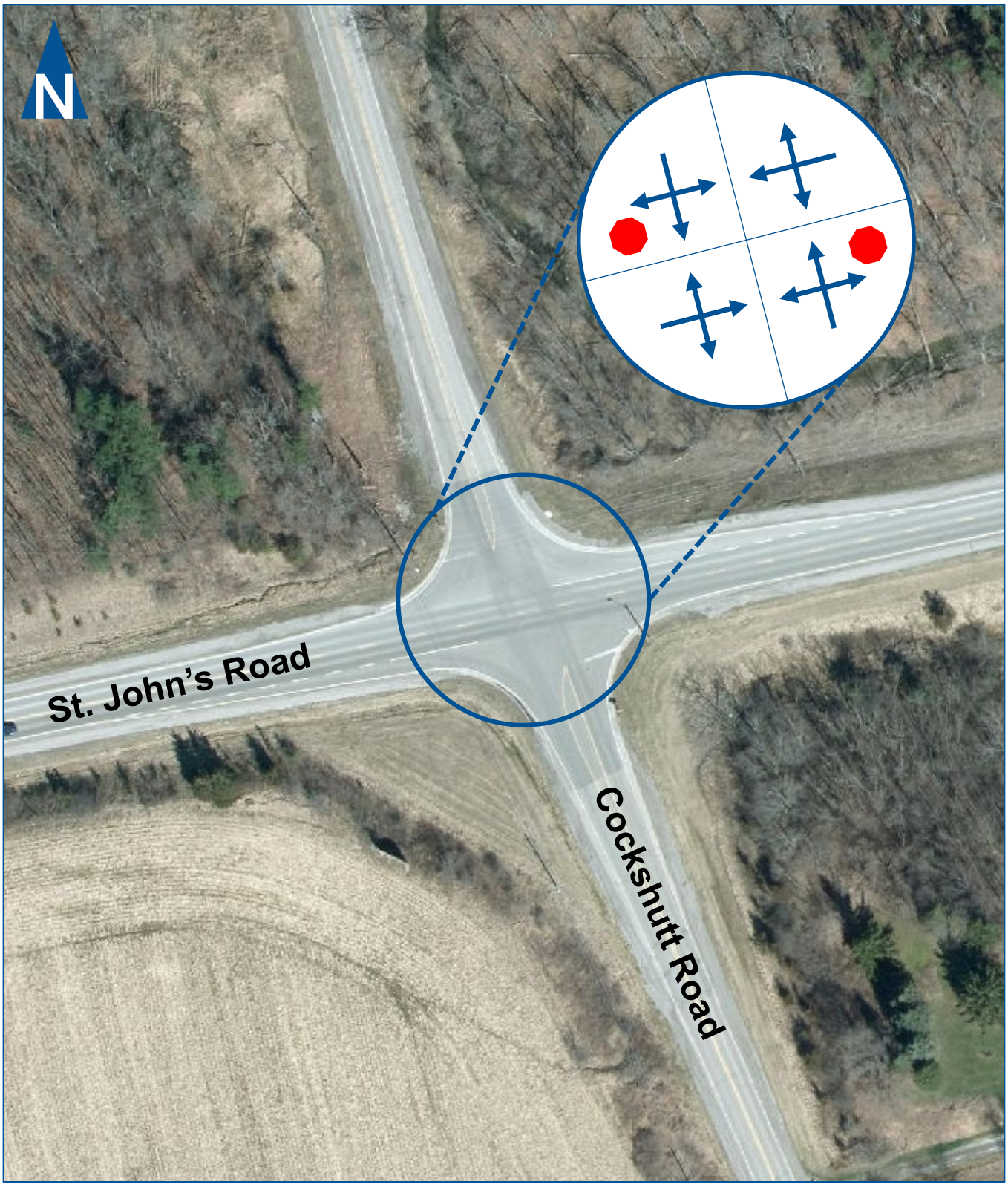


paradigm TRANSPORTATION SOLUTIONS LIMITED

St. John's Road and Blueline Road Intersection

Norfolk County Traffic Signal Warrant Review
230139

Figure 1



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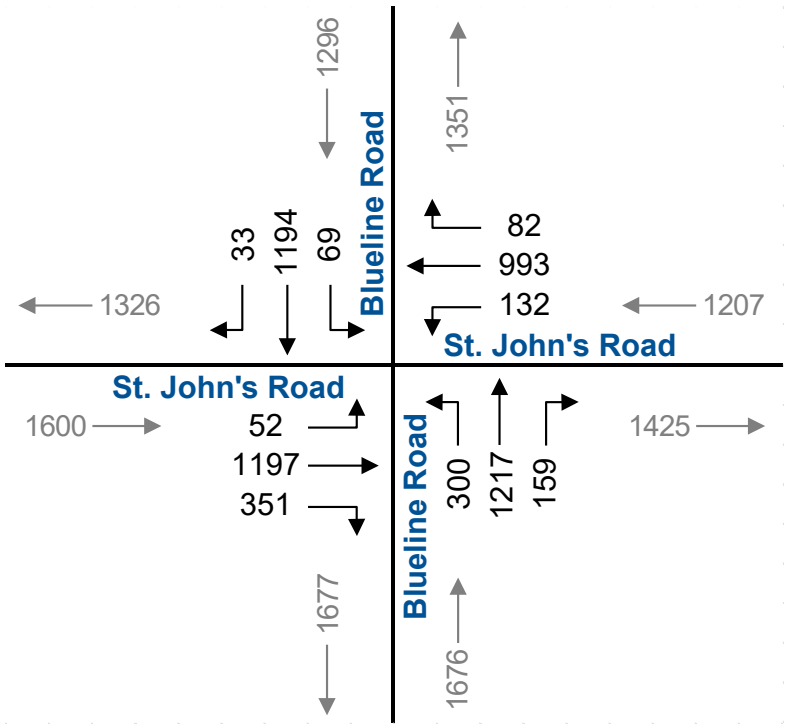
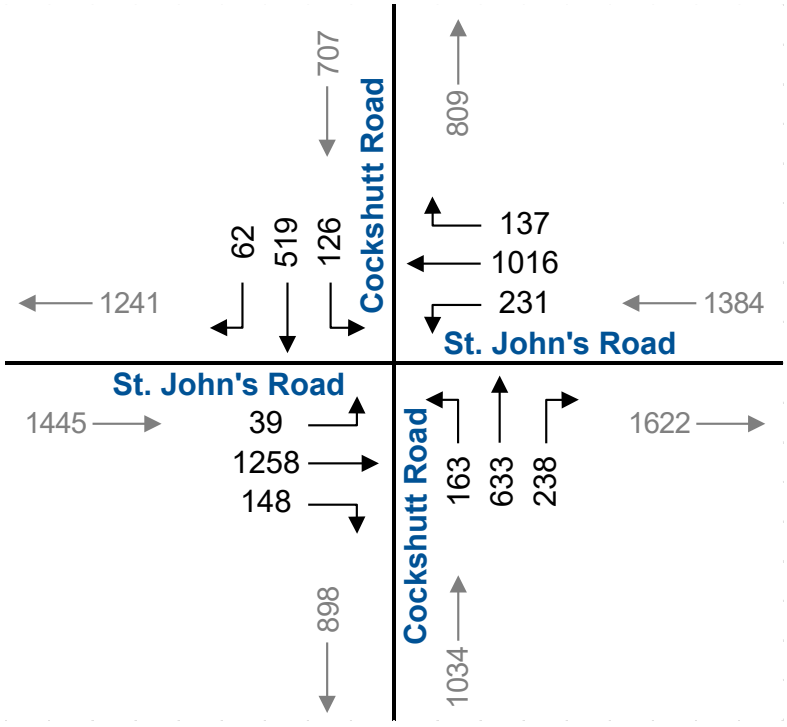
St. John's Road and Cockshutt Road Intersection





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2023 Eight-Hour Traffic Volumes

Sightline Review

Sightline assessments at the St. John's Road intersections with Blueline Road and Cockshutt Road were conducted to determine available sight distance. The assessment was carried out based on the methodology contained in the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* [2] (GDGCR). For intersections with stop control on the minor road, Case B applies. This considers three situations:

- Case B1 – Left turns from the minor road;
- Case B2 – Right turns from the minor road; and
- Case B3 – Crossing the major road from a minor-road approach.

The following object heights were used in obtaining field measurements:

- Driver Eye Height: 1.05 metres;
- Top of Car: 1.30 metres (for departure sight distance, height of approaching vehicle); and
- Vehicle Headlight or Tail/Brake Light: 0.60 metres (for approach sight distance, height of vehicle/target object).

The measurements were taken at a point 5.0 metres back from the existing edge of pavement on St. John's Road, representing the position of a driver/vehicle performing a turning movement. The sight distance requirements are based on a design speed of 100 km/h (20 km/h above the posted speed limit of 80 km/h).

Table 1 summarizes the observed and design turning sight distances at the unsignalized intersections. Table 9.9.4 and Table 9.9.6 from the TAC *GDGCR* provided the design sight distance requirements for left-turn and right-turn/crossing manoeuvres from a stop, respectively. **Table 1** indicates all minor road approaches meet the design sight distance requirements set out in the guidebook.

[2] Transportation Association of Canada, *Geometric Design Guide for Canadian Roads*, 2017.

TABLE 1: TURNING SIGHT DISTANCES

Intersection	Movement	Observed Sight Distance	Design Sight Distance	Meets Criteria
St. John's Road and Blueline Road	Northbound Left-Turn	393 m	210 m	Yes
	Northbound Right-Turn/Crossing	393 m	185 m	Yes
	Southbound Left-Turn	286 m	210 m	Yes
	Southbound Right-Turn/Crossing	286 m	185 m	Yes
St. John's Road and Cockshutt Road	Northbound Left-Turn	333 m	210 m	Yes
	Northbound Right-Turn/Crossing	333 m	185 m	Yes
	Southbound Left-Turn	284 m	210 m	Yes
	Southbound Right-Turn/Crossing	580 m	185 m	Yes

Collision Data

The County provided a summary of collisions for the period January 2015 to July 2023 for the intersections of Blueline Road and Cockshutt Road at St. John's Road. The collision history was analyzed to identify trends and potential safety concerns. At the time of writing, full collision reports were not available from the Ministry of Transportation (MTO) to assess trends and hazards in greater detail. **Attachment B** contains the collision data provided by the County.

Table 2 summarizes the collision data for the St. John's Road intersections with Blueline Road and Cockshutt Road by severity classification.

TABLE 2: COLLISION HISTORY BY SEVERITY CLASSIFICATION

Severity Classification	Number of Collisions (%)	
	St. John's Road and Blueline Road	St. John's Road and Cockshutt Road
Property Damage Only	27 (75%)	31 (76%)
Non-Fatal Injury	8 (22%)	8 (20%)
Fatal Injury	1 (3%)	1 (2%)
Other	-	1 (2%)
Total	**36**	**41**

Table 3 summarizes the collision data for the St. John's Road intersections with Blueline Road and Cockshutt Road by collision cause.

TABLE 3: COLLISION HISTORY BY COLLISION CAUSE

Collision Cause	St. John's Road and Blueline Road	St. John's Road and Cockshutt Road
Ability Impaired (Alcohol)	1 (3%)	3 (8%)
Animal – Wild or Domestic	13 (36%)	20 (49%)
Disobeyed Traffic Control	3 (8%)	1 (2%)
Driver Fatigue	1 (3%)	-
Failed to Yield Right of Way	9 (25%)	5 (12%)
Following too Closely	2 (5%)	2 (5%)
Improper Turn	1 (3%)	-
Inattentive Driver	4 (11%)	5 (12%)
Lost Control	-	1 (2%)
Mechanical Failure	1 (3%)	-
Speed	-	1 (2%)
Unknown	1 (3%)	3 (8%)
Total	**36**	**41**

The collision data indicate:

- St. John's Road and Blueline Road:
  - A total of 36 collisions occurred during the eight-and-a-half-year period, or an average of approximately four collisions per year;
  - Most collisions (27 or 75%) resulted in property damage only (PDO), eight (or 22%) in non-fatal injury collisions (8 or 22%), and only one (1 or 3%) in a fatality;
  - Animal – wild or domestic (13 or 36%) and failed to yield right-of-way (9 or 25%) were the most common causes of collisions. Inattentive driver (4 or 11%), disobeyed traffic control (3 or 8%), and following too closely (2 or 5%) were other notable actions;
  - Most collisions occurred on a Friday (8 or 22%), with the least number of collisions occurring on a Saturday (0 or 0%); and
  - Almost all collisions (32 or 89%) occurred during the daytime hours from 6:00 AM to 9:00 PM, with most during the 6:00 AM, 5:00 PM or 6:00 PM hours (4 or 11% each). Collisions occurring during the overnight, dawn and dusk hours typically involved animals.
- St. John's Road and Cockshutt Road:
  - 41 collisions occurred during the eight-and-a-half-year period, or an average of approximately five collisions per year;

- Most collisions (31 or 76%) resulted in property damage only (PDO), eight (or 20%) in non-fatal injury collisions (8 or 22%), and only one (1 or 2%) in a fatality. One collision (or 2%) was classified as other;
- Animal – wild or domestic (20 or 49%), failed to yield right-of-way (5 or 12%), and inattentive driver (5 or 12%) were the most common causes of collisions. Ability impaired (alcohol) (3 or 8%) and unknown (3 or 8%) were other notable actions;
- Most collisions occurred on a Monday (8 or 20%), with the least number of collisions occurring on a Wednesday (3 or 8%); and
- Majority of collisions (29 or 70%) occurred during the daytime hours from 6:00 AM to 9:00 PM, with most during the 5:00 AM (5 or 12%) and 6:00 AM (6 or 15%) hours. Collisions occurring during the overnight, dawn and dusk hours typically involved animals.

Overall, a select number of collisions, specifically caused by drivers "fail[ing] to yield right of way", could be addressed through changes in traffic control. These collision causes accounted for 25% and 12% of collisions at the Blueline Road and Cockshutt Road intersections with St. John's Road, respectively.

Intersection Control Analysis

All-Way Stop Warrant

OTM *Book 5 – Regulatory Signs*[3] provides guidance on the use of regulatory traffic controls, signs, and pavement markings, including warrants to determine where all-way stop control is merited. These warrants consider roadway classification, posted speed limit, intersection geometry, proximity to other traffic control devices, vehicle and pedestrian volumes, traffic distribution (percent of vehicles on the major street versus the minor street) and collision history.

The need for an all-way stop control at the St. John's Road intersections with Blueline Road and Cockshutt Road were assessed based on the criteria set-out in OTM *Book 5*. Per the guidebook, all-way stop control may be considered on collector roads and rural arterial roads where the following conditions are met:

- The total vehicle volume on all intersection approaches exceeds 375 vehicles per hour for each of the highest eight hours of the day; and,
- The combined vehicle and pedestrian volume on the minor street exceeds 150 units per hour (all vehicles plus pedestrians wishing to enter the intersection) for each of the same eight hours as the total volume; OR the combined vehicle and pedestrian volume on the minor street exceeds 120 units per hour (all vehicles plus pedestrians wishing to enter the intersection) for each of the same eight hours as the total volume, with an

[3] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 5: Regulatory Signs,* (Toronto: Queen's Printer for Ontario, 2000).

average delay to all minor street traffic (vehicles and pedestrians) of greater than 30 seconds for the entire eight hour period; and,

- The volume split does not exceed 70/30 (that is the minor street must not be less than 30% of the total volume entering the intersection) as measured over the entire eight-hour count period. Volume on the major street is defined as vehicles only. Volume on the minor street includes all vehicles plus any pedestrians wishing to cross the major roadway. For three-legged intersections a volume split of 75/25 is permissible.

Table 4 and **Table 5** provide a summary of the all-way stop warrant justification analysis for the St. John's Road intersections with Blueline Road and Cockshutt Road, respectively. Under OTM *Book 5* methodology, all-way stop control is warranted at both locations. **Attachment C** contains the all-way stop warrant worksheets.

TABLE 4: ST. JOHN'S ROAD AND BLUELINE ROAD ALL-WAY STOP CONTROL JUSTIFICATION ANALYSIS

Justification	Compliance		Met	Justified?	
				Yes	No
Total Vehicle Volume	722	Average Volume > 375/h	Yes	√	
Combined Vehicle and Pedestrian Minor Road Volume	372	Average Minor Road Volume > 150/h	Yes	√	
Volume Split	49%	Major Road Split < 70	Yes	√	
Overall	**All-way Stop is Warranted?**		**YES**		

TABLE 5: ST. JOHN'S ROAD AND COCKSHUTT ROAD ALL-WAY STOP CONTROL JUSTIFICATION ANALYSIS

Justification	Compliance		Met	Justified?	
				Yes	No
Total Vehicle Volume	571	Average Volume > 375/h	Yes	√	
Combined Vehicle and Pedestrian Minor Road Volume	218	Average Minor Road Volume > 150/h	Yes	√	
Volume Split	62%	Major Road Split < 70	Yes	√	
Overall	**All-way Stop is Warranted?**		**YES**		

Traffic Control Signal Warrant

A traffic signal warrant justification analysis was conducted in accordance with the OTM *Book 12 – Traffic Signals*[4] for the St. John's Road intersections with Blueline Road and Cockshutt Road. This involved an assessment of justification thresholds based on major and minor street

[4] Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals,* (Toronto: Queen's Printer for Ontario, 2012).

traffic volumes and the delay to the minor street for the critical eight-hour period during a day. The evaluation of whether a signal is technically justified at the intersections was made based on the following criteria:

- Justification 1 – Minimum Vehicle Volume: Signals are justified if Justification 1A and Justification 1B are 100% fulfilled. For free flow traffic with one approach lane:
  - Justification 1A – The total number of vehicles must exceed 480 vehicles during each of the eight hours; and
  - Justification 1B – The total volume on both minor approaches must exceed 120 vehicles during each of the eight hours.
- Justification 2 – Delay to Cross Traffic: Signals are justified if Justification 2A and 2B are 100% fulfilled. For free flow traffic with one approach lane:
  - Justification 2A – The total volume on both major approaches must exceed 480 vehicles during each of the eight hours; and
  - Justification 2B – The total volume of traffic crossing the major street must exceed 50 vehicles during each of the eight hours.
- Justification 3 – Volume/Delay Combination: Signals may occasionally be justified where neither Justification 1 or Justification 2 is 100% satisfied, but both justifications are at least 80% satisfied.

Table 6 and **Table 7** provide a summary of the traffic signal justification analysis for the St. John's Road intersections with Blueline Road and Cockshutt Road, respectively. Under OTM *Book 12* methodology, traffic signals are not warranted at either location based on Justification 1, 2 or 3. However, both intersections are close (within 3%) to meeting Justification 1. **Attachment D** contains the traffic signal warrant worksheets.

At St. John's Road and Blueline Road, Justification 1 is met for seven of eight hours, with the remaining hour (7:00 AM to 8:00 AM) below the threshold by 10 vehicles. At St. John's Road and Cockshutt Road, Justification 1 is met for six of eight hours, with the remaining two hours (7:00 AM to 9:00 AM) below the threshold by 48 and 81 vehicles.

The hours selected for the warrant analysis usually represent the eight highest hours of the 24-hour traffic volume, and do not have to be consecutive. It is conceivable the hours from 9:00 AM to 11:00 AM, and 2:00 PM to 3:00 PM, may have higher traffic volumes than the hours available from the traffic counts and would meet the warrant threshold for a traffic control signal. Furthermore, traffic volumes may have grown sufficiently at both intersections since 2023 to meet the warrant for traffic control signals.

TABLE 6: ST. JOHN'S ROAD AND BLUELINE ROAD TRAFFIC SIGNAL JUSTIFICATION ANALYSIS

Justification		Compliance		Met?	Justified	
					Yes	No
1. Minimum Vehicular Volume	A. Total Volume	99%	>100%, 7 of 8 hours	No		√
	B. Crossing Volume	100%	>100%, 8 of 8 hours			
2. Delay to Cross Traffic	A. Main Road	73%	>100%, 0 of 8 hours	No		√
	B. Crossing Volume	100%	>100%, 8 of 8 hours			
3. Combination	A. Min. Volume Justification 1	100%	>80%, 8 of 8 hours	No		√
	B. Delay Justification 2	78%	>80%, 3 of 8 hours			
Overall	**At least one Justification met?**			**NO**		

TABLE 7: ST. JOHN'S ROAD AND COCKSHUTT ROAD TRAFFIC SIGNAL JUSTIFICATION ANALYSIS

Justification		Compliance		Met?	Justified	
					Yes	No
1. Minimum Vehicular Volume	A. Total Volume	97%	>100%, 6 of 8 hours	No		√
	B. Crossing Volume	100%	>100%, 8 of 8 hours			
2. Delay to Cross Traffic	A. Main Road	74%	>100%, 1 of 8 hours	No		√
	B. Crossing Volume	100%	>100%, 8 of 8 hours			
3. Combination	A. Min. Volume Justification 1	100%	>80%, 8 of 8 hours	No		√
	B. Delay Justification 2	75%	>80%, 2 of 8 hours			
Overall	**At least one Justification met?**			**NO**		

Operational Analysis

Level of service (LOS) is a recognized method of quantifying the average delay experienced by drivers at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles intending to make a particular movement compared to the estimated capacity for that movement. The capacity is based on several criteria related to opposing traffic flows, intersection geometry, and at signalized intersections, signal timing.

The highest possible rating is LOS A, under which the average total delay is equal or less than 10 seconds per vehicle. When the average delay exceeds 80 seconds for signalized intersections, 50 seconds for unsignalized intersections or when the volume to capacity ratio is greater than 1.00, the movement is classed as LOS F, and remedial measures are usually implemented if they are feasible.

Capacity is evaluated in terms of the ratio of demand flow to capacity, with an at-capacity condition represented by a v/c ratio of 1.00 (i.e., volume demands equals capacity).

Per Norfolk County and MTO TIS Guidelines, the following criteria constitute critical movements for intersections:

- At signalized intersections, movements with volume to capacity (v/c) ratios greater than 0.85. Movements experiencing higher v/c ratios should be evaluated for possible operational improvements; and
- For ramp terminal approaches, v/c ratios greater that 0.75. Approaches experiencing higher v/c ratios should be evaluated for possible operational improvements.

An operational analysis was conducted for the weekday AM and PM peak hours for the St. John's Road intersections with Blueline Road and Cockshutt Road under two-way stop, all-way stop and traffic signal control. The analysis was performed using Synchro software, which implements the methods of the Highway Capacity Manual. The parameters used in the analysis include:

- Existing lane configurations;
- Heavy vehicle percentages derived from the available count data;
- Conflicting pedestrian volumes derived from the available count data;
- Signal timings based on preferred minimum interval timings detailed in OTM Book 12; and
- Synchro default values for all other inputs.

Table 8, Table 9, and **Table 10** present the operational analysis results for the intersections under two-way stop, all-way stop and traffic signal control, respectively. The results include the level of service (LOS), average delay in seconds, volume to capacity (v/c) ratio, and 95th percentile queue lengths in metres. Any critical movements are highlighted in yellow. **Attachment E** contains the Synchro analysis outputs for reference.

TABLE 8: TWO-WAY STOP CONTROL TRAFFIC OPERATIONS SUMMARY

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
St. John's Road and Blueline Road	EB	Left-Through-Right	A	2	0.02	1	A	1	0.02	1
	WB		A	0	0.00	0	A	1	0.01	1
	NB		B	13	0.25	8	C	20	0.44	18
	SB		B	13	0.26	8	D	30	0.68	40
St. John's Road and Cockshutt Road	EB	Left-Through-Right	A	1	0.02	1	A	2	0.03	1
	WB		A	1	0.0	0	A	1	0.01	1
	NB		B	12	0.12	3	C	18	0.30	10
	SB		B	12	0.12	3	C	19	0.44	18

[1] Level of Service; [2] Average vehicle delay, seconds; [3] Volume to capacity ratio; [4] 95th percentile queue, metres

TABLE 9: ALL-WAY STOP CONTROL TRAFFIC OPERATIONS SUMMARY

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
St. John's Road and Blueline Road	EB	Left-Through-Right	A	9	0.17	-	B	12	0.32	-
	WB		A	9	0.18	-	B	15	0.51	-
	NB		A	9	0.21	-	B	12	0.32	-
	SB		A	9	0.21	-	B	14	0.48	-
St. John's Road and Cockshutt Road	EB	Left-Through-Right	A	9	0.27	-	B	12	0.37	-
	WB		A	9	0.15	-	B	12	0.40	-
	NB		A	8	0.09	-	B	10	0.19	-
	SB		A	8	0.10	-	B	11	0.30	-

[1] Level of Service; [2] Average vehicle delay, seconds; [3] Volume to capacity ratio; [4] 95th percentile queue, metres

TABLE 10: TRAFFIC SIGNAL CONTROL TRAFFIC OPERATIONS SUMMARY

Intersection	Approach/ Movement		AM Peak Hour				PM Peak Hour			
			LOS[1]	Delay[2]	V/C[3]	Q[4]	LOS[1]	Delay[2]	V/C[3]	Q[4]
St. John's Road and Blueline Road	EB	Left-Through-Right	A	5	0.13	11	A	8	0.25	22
	WB		A	5	0.14	11	A	8	0.39	36
	NB		B	16	0.44	21	B	13	0.35	24
	SB		B	16	0.48	21	B	16	0.59	37
St. John's Road and Cockshutt Road	EB	Left-Through-Right	A	4	0.21	19	A	6	0.29	25
	WB		A	3	0.11	10	A	6	0.29	26
	NB		B	20	0.40	11	B	16	0.33	17
	SB		C	21	0.44	11	B	17	0.53	24

[1] Level of Service; [2] Average vehicle delay, seconds; [3] Volume to capacity ratio; [4] 95th percentile queue, metres

Operational Analysis Summary

The operational analysis summaries indicate all movements at both intersections are expected to operate at acceptable levels of service under two-way stop, all-way stop or traffic signal control. All-way stop and traffic signal control provide slightly improved operations for the minor road movements. No critical movements were identified.

Conclusions and Recommendations

The findings of the investigation as are follows:

- Adequate sight distance is provided for the minor road approaches at the St. John's Road intersections with Blueline Road and Cockshutt Road under two-way stop control;
- A select number of collisions, specifically those caused by drivers "fail[ing] to yield right of way", could be addressed through changes in traffic control;
- All-way stop control is warranted for existing volumes at the St. John's Road intersections with Blueline Road and Cockshutt Road;
- Traffic control signals are not warranted based on existing volumes at the St. John's Road intersections with Blueline Road and Cockshutt Road; and
- Both intersections and all movements are forecast to operate at acceptable levels of service under two-way stop, all-way stop or traffic signal control.

The recommendations of the investigation are as follows:

- The County should continue to monitor operating conditions at the St. John's Road intersections with Blueline Road and Cockshutt Road and update the warrant calculations for traffic control signals as traffic volumes increase. When the warrants are met, the County should consider the installation of traffic control signals subject to

available funding. If traffic control signals are installed, the County should also consider constructing left-turn lanes on St. John's Road at both intersections.

- The County may wish to consider all-way stop control as an interim traffic control measure at the St. John's Road intersections with Blueline Road and Cockshutt Road prior to installing traffic control signals. Although both intersections warrant all-way stop control based on the guidance outlined in OTM *Book 5* with existing traffic volumes, the higher operating speeds may pose safety concerns for vehicles approaching along St. John's Road.

Thank you for the opportunity to offer our services. Please contact Heather Hector at (416) 479-9684 x502 or by email at hhector@ptsl.com if you have any questions relating to this report.

Yours very truly,

PARADIGM TRANSPORTATION SOLUTIONS LIMITED

Heather Hector
M.Eng., P.Eng., PTP
Project Manager, Associate

Attachment A

Turning Movement County Data

St John's Road & Blueline Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

One Hour Peak
From: 8:00:00
To: 9:00:00

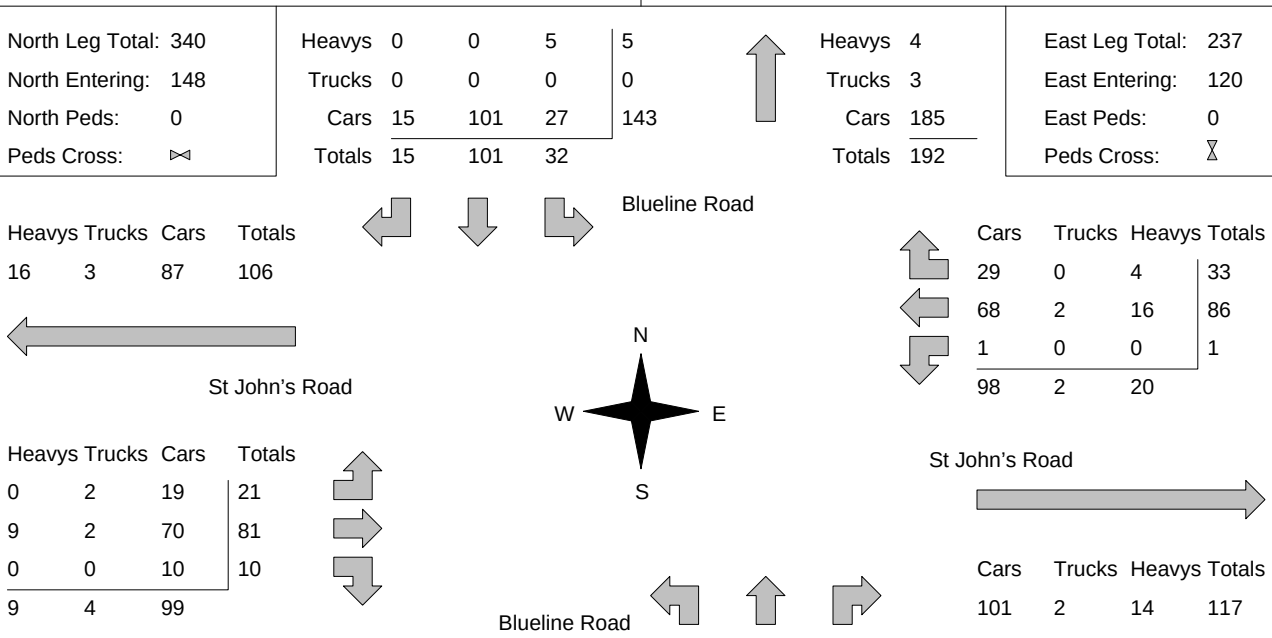
Municipality: Norfolk
Site #: 0000005303
Intersection: St John's Road & Blueline Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Blueline Road

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:30:00
To: 13:30:00

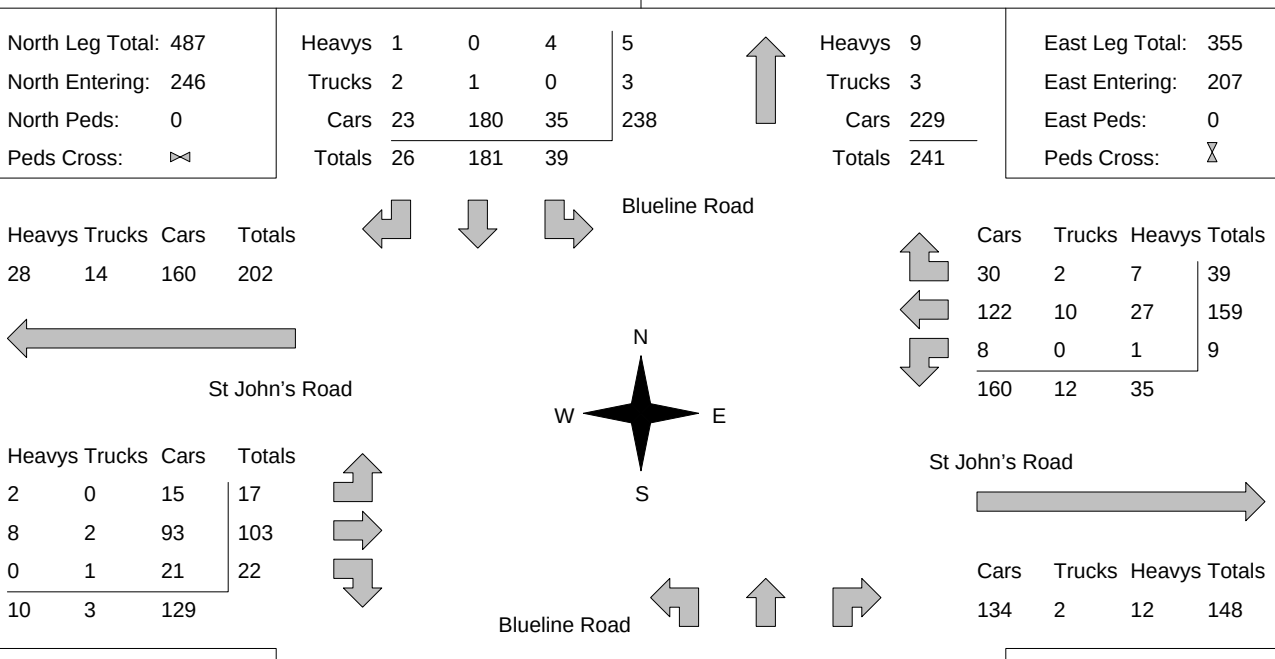
Municipality: Norfolk
Site #: 0000005303
Intersection: St John's Road & Blueline Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Blueline Road

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:30:00
To: 16:30:00

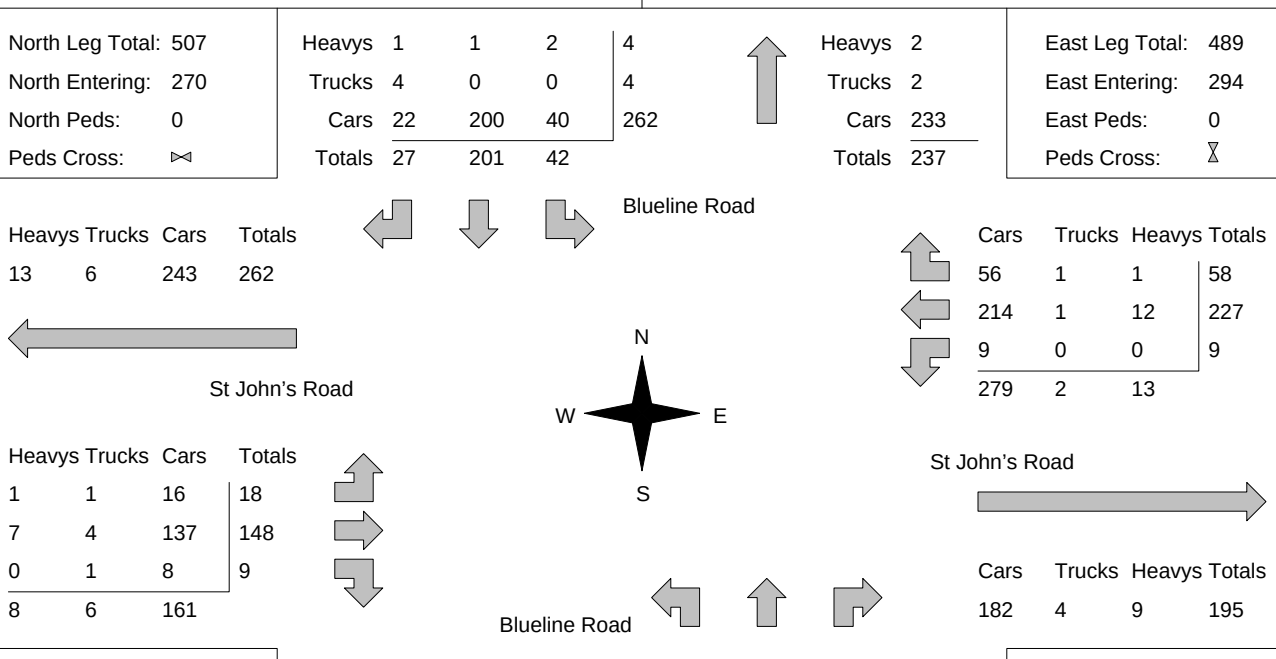
Municipality: Norfolk
Site #: 0000005303
Intersection: St John's Road & Blueline Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Blueline Road

Total Count Diagram

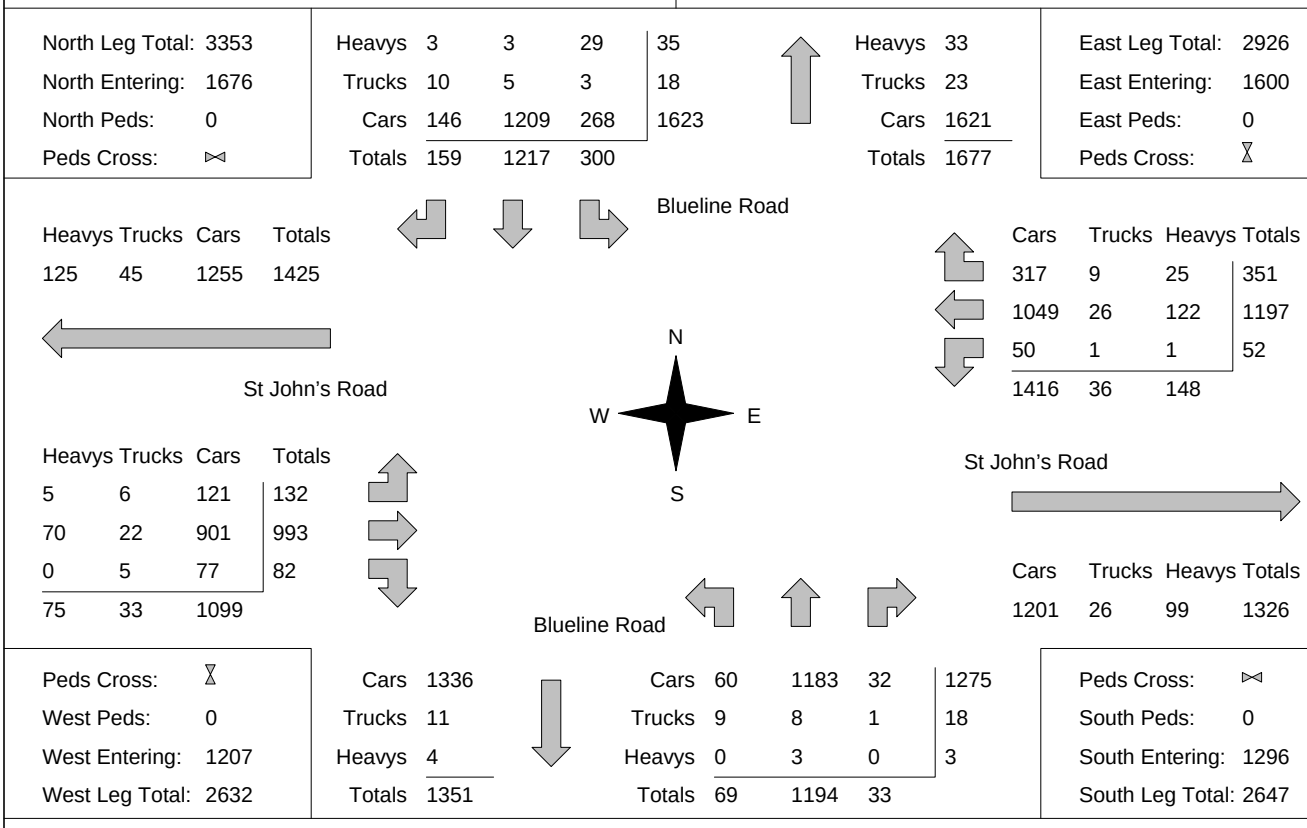
Municipality: Norfolk
Site #: 0000005303
Intersection: St John's Road & Blueline Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Blueline Road
Traffic Count Summary

Intersection: St John's Road & Blueline Road | **Count Date:** 3-Aug-2023 | **Municipality:** Norfolk

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	38	51	14	103	0	212
9:00:00	32	101	15	148	0	295
11:00:00	0	0	0	0	0	0
12:00:00	34	171	13	218	0	390
13:00:00	24	168	19	211	0	385
14:00:00	46	178	25	249	0	437
15:00:00	0	0	0	0	0	0
16:00:00	44	193	19	256	0	421
17:00:00	42	175	33	250	0	424
18:00:00	40	180	21	241	0	408
Totals:	300	1217	159	1676	0	2972

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	4	104	1	109	0
9:00:00	5	138	4	147	0
11:00:00	0	0	0	0	0
12:00:00	13	155	4	172	0
13:00:00	12	159	3	174	0
14:00:00	17	166	5	188	0
15:00:00	0	0	0	0	0
16:00:00	9	154	2	165	0
17:00:00	4	162	8	174	0
18:00:00	5	156	6	167	0
Totals:	69	1194	33	1296	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	3	81	34	118	0	258
9:00:00	1	86	33	120	0	232
11:00:00	0	0	0	0	0	0
12:00:00	14	189	42	245	0	389
13:00:00	6	147	41	194	0	345
14:00:00	8	151	35	194	0	337
15:00:00	0	0	0	0	0	0
16:00:00	5	177	44	226	0	374
17:00:00	11	188	63	262	0	445
18:00:00	4	178	59	241	0	427
Totals:	52	1197	351	1600	0	2807

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	13	127	0	140	0
9:00:00	21	81	10	112	0
11:00:00	0	0	0	0	0
12:00:00	14	114	16	144	0
13:00:00	24	113	14	151	0
14:00:00	8	114	21	143	0
15:00:00	0	0	0	0	0
16:00:00	13	126	9	148	0
17:00:00	18	160	5	183	0
18:00:00	21	158	7	186	0
Totals:	132	993	82	1207	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00
Crossing Values:	146	175	218	204	241	246	221	225

St John's Road & Cockshutt Road

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 9:00:00

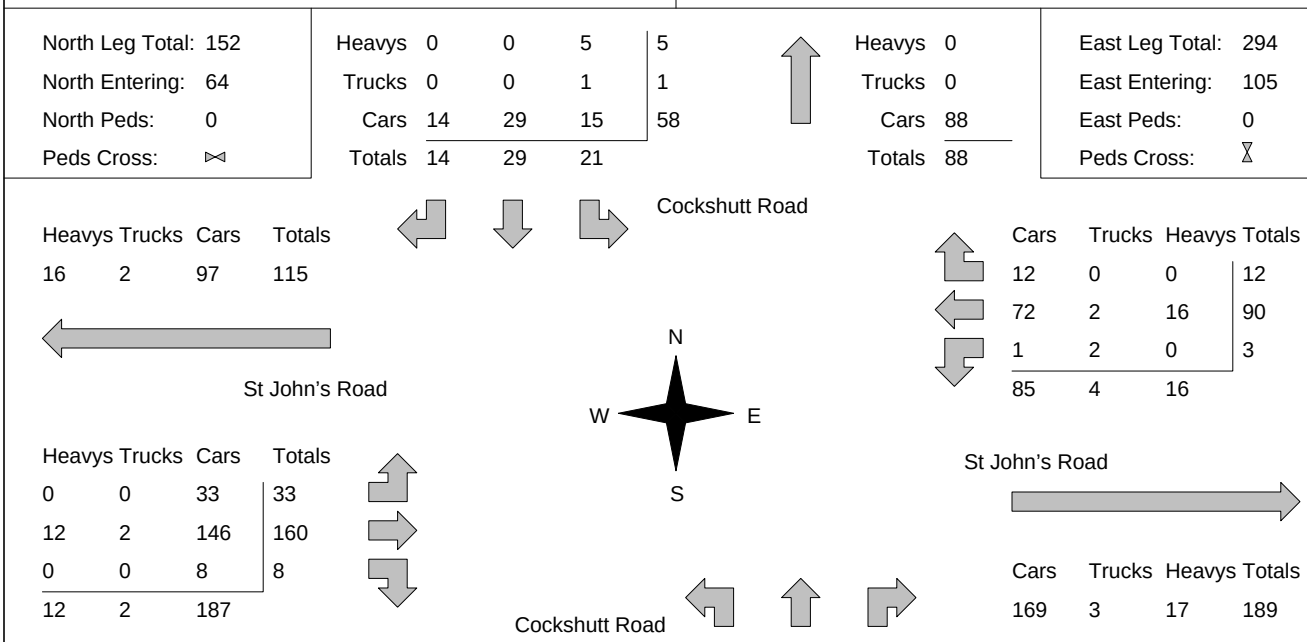
One Hour Peak
From: 7:00:00
To: 8:00:00

Municipality: Norfolk
Site #: 0000005302
Intersection: St John's Road & Cockshutt Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions:
Clear
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Cockshutt Road

Mid-day Peak Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 11:45:00
To: 12:45:00

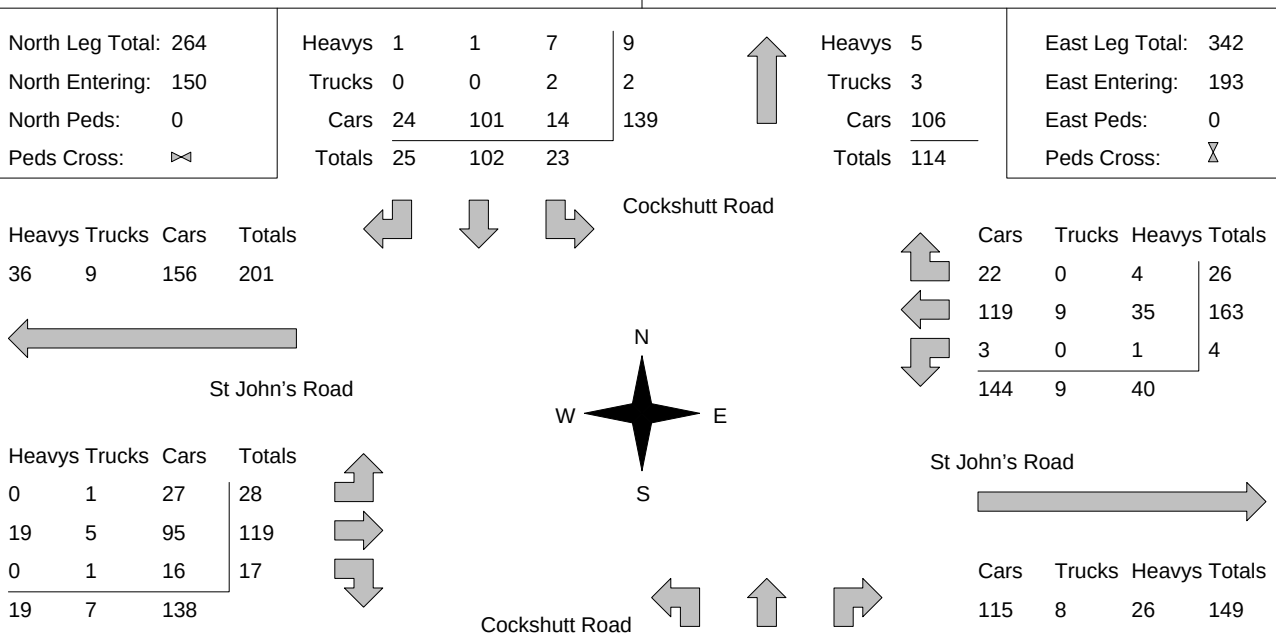
Municipality: Norfolk
Site #: 0000005302
Intersection: St John's Road & Cockshutt Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Cockshutt Road

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

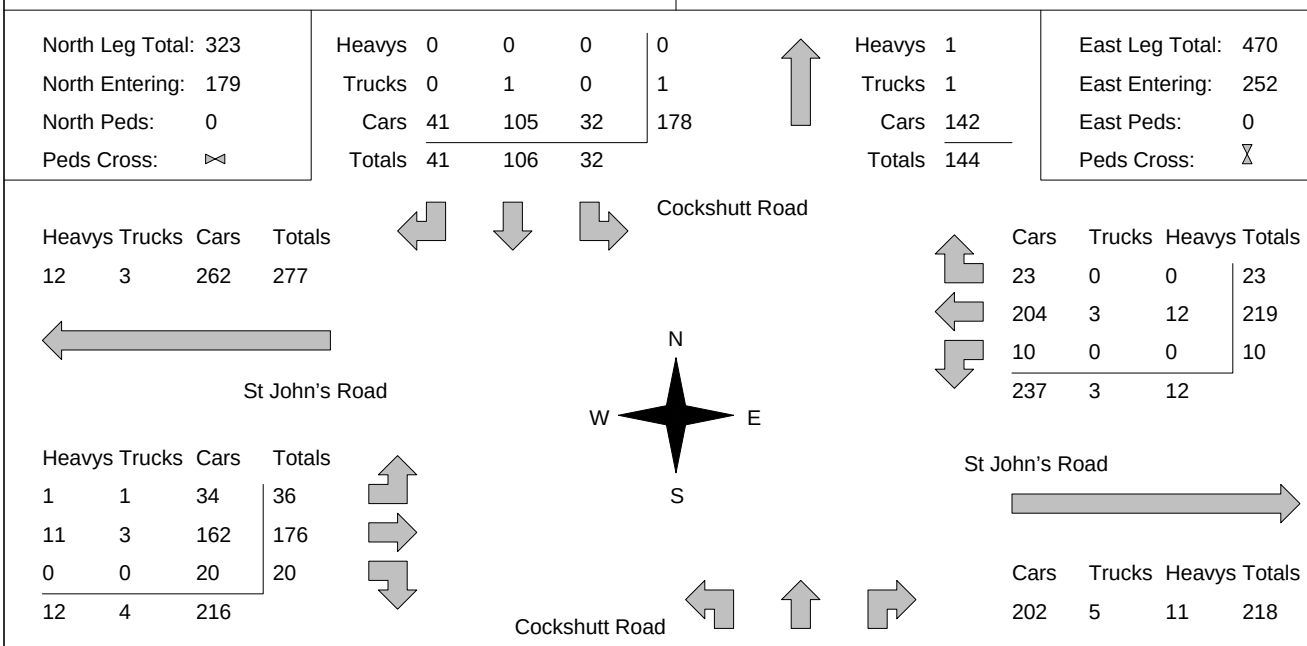
Municipality: Norfolk
Site #: 0000005302
Intersection: St John's Road & Cockshutt Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions:
Clear

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Cockshutt Road

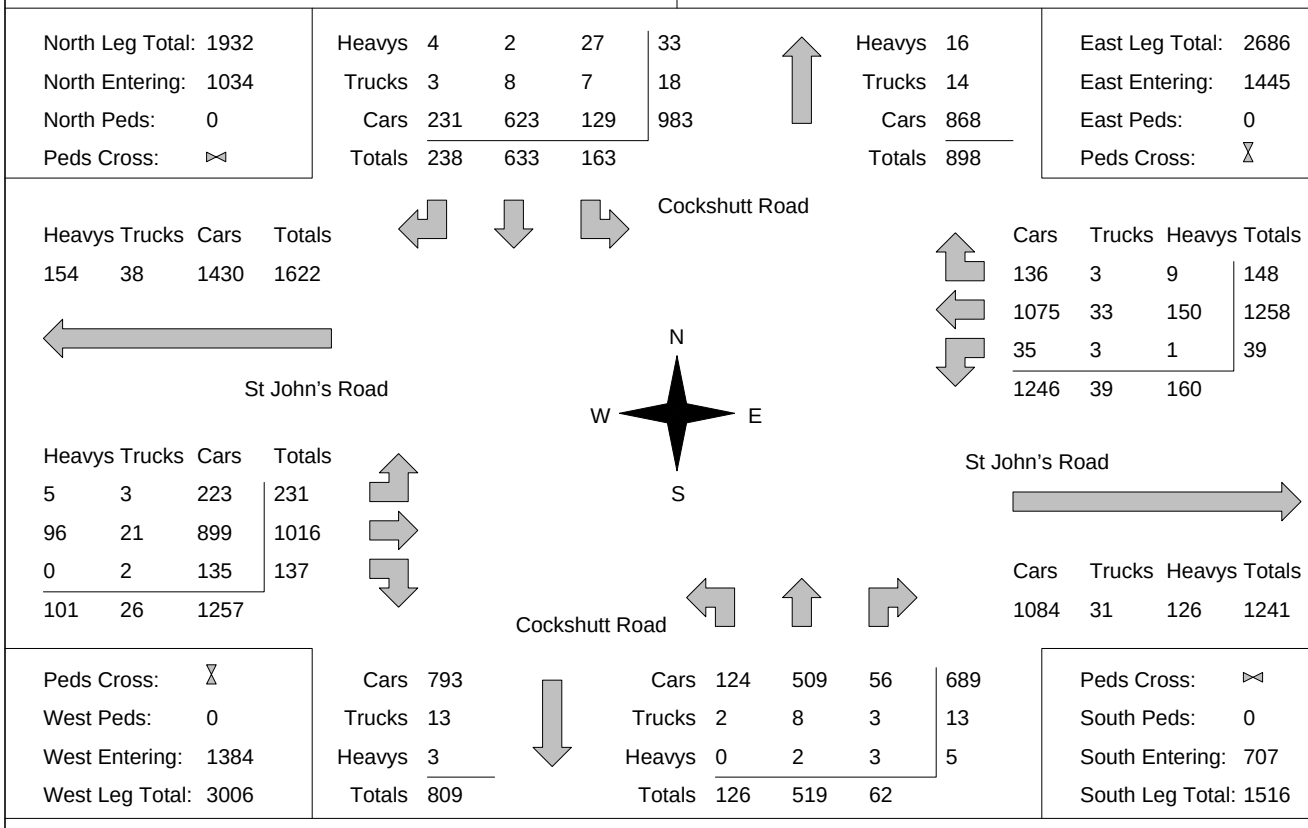
Total Count Diagram

Municipality: Norfolk
Site #: 0000005302
Intersection: St John's Road & Cockshutt Road
TFR File #: 1
Count date: 3-Aug-2023

Weather conditions: Clear
Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: St John's Road runs W/E



Comments

St John's Road & Cockshutt Road
Traffic Count Summary

Intersection: St John's Road & Cockshutt Road | **Count Date:** 3-Aug-2023 | **Municipality:** Norfolk

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	21	29	14	64	0	126
9:00:00	17	51	18	86	0	169
11:00:00	0	0	0	0	0	0
12:00:00	19	80	31	130	0	209
13:00:00	21	110	26	157	0	254
14:00:00	15	90	24	129	0	225
15:00:00	0	0	0	0	0	0
16:00:00	19	91	36	146	0	232
17:00:00	31	98	45	174	0	276
18:00:00	20	84	44	148	0	250
Totals:	163	633	238	1034	0	1741

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	11	43	8	62	0
9:00:00	17	63	3	83	0
11:00:00	0	0	0	0	0
12:00:00	14	58	7	79	0
13:00:00	15	74	8	97	0
14:00:00	20	67	9	96	0
15:00:00	0	0	0	0	0
16:00:00	16	61	9	86	0
17:00:00	18	74	10	102	0
18:00:00	15	79	8	102	0
Totals:	126	519	62	707	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	3	90	12	105	0	306
9:00:00	4	85	13	102	0	230
11:00:00	0	0	0	0	0	0
12:00:00	4	179	17	200	0	355
13:00:00	6	151	26	183	0	328
14:00:00	4	144	18	166	0	333
15:00:00	0	0	0	0	0	0
16:00:00	5	187	30	222	0	380
17:00:00	9	226	25	260	0	481
18:00:00	4	196	7	207	0	416
Totals:	39	1258	148	1445	0	2829

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	33	160	8	201	0
9:00:00	24	98	6	128	0
11:00:00	0	0	0	0	0
12:00:00	26	113	16	155	0
13:00:00	24	106	15	145	0
14:00:00	23	121	23	167	0
15:00:00	0	0	0	0	0
16:00:00	23	107	28	158	0
17:00:00	40	163	18	221	0
18:00:00	38	148	23	209	0
Totals:	231	1016	137	1384	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00
Crossing Values:	75	97	113	146	125	126	147	119

Attachment B

Collision Data

Date	Time	Self Reported	Location	Jurisdiction	Roadway Intersection	Occurrence	Traffic Report #	Officer	MVC Type	Primary Cause	Report Type	Year	Month	Day of the Week	Hour of day
15-Apr-16	2:30	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP16108208	585754	13312	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2016	April	Fri	02
08-Jul-18	4:30	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP18198371	742348	13971	Property Damage Only	Driver fatigue	Motor Vehicle	2018	July	Sun	04
21-Mar-21	6:30	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP21093665	926988	14396	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2021	March	Sun	06
25-Feb-21	6:15	Yes	ST JOHNS	NORFOLK COUNTY	BLUELINE	RM21021173	922980	13713	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2021	February	Thu	06
10-Apr-18	6:25	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP18095240	725238	11117	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2018	April	Tue	06
12-Jan-21	6:20	Yes	ST JOHNS	NORFOLK COUNTY	BLUELINE	RM21003447	916588	10984	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2021	January	Tue	06
17-Nov-21	7:00	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	E210937815	966775	14688	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2021	November	Wed	07
30-Aug-21	8:37	No	BLUELINE	NORFOLK COUNTY	ST JOHNS RD E	E210594691	950206	14944	Non-Fatal Injury	Failed to yield right of way	Motor Vehicle	2021	August	Mon	08
22-Jun-17	9:38	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP17178006	666206	11085	Property Damage Only	Failed to yield right of way	Motor Vehicle	2017	June	Thu	09
11-Nov-21	9:17	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	E210912680	965129	14177	Non-Fatal Injury	Failed to yield right of way	Motor Vehicle	2021	November	Thu	09
13-May-22	10:39	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	E220502564	1002742	14946	Non-Fatal Injury	Improper turn	Motor Vehicle	2022	May	Fri	10
27-Oct-19	11:22	No	BLUELINE	NORFOLK COUNTY	ST JOHNS RD E	LP19333057	839387	14071	Property Damage Only	Following too closely	Motor Vehicle	2019	October	Sun	11
03-Nov-21	11:53	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	E210880294	964006	13988	Property Damage Only	Mechanical failure	Motor Vehicle	2021	November	Wed	11
16-Feb-15	12:15	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP15041448	511667	11117	Property Damage Only	Failed to yield right of way	Motor Vehicle	2015	February	Mon	12
29-May-17	12:18	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP17151326	661965	11338	Non-Fatal Injury	Inattentive driver	Motor Vehicle	2017	May	Mon	12
10-Dec-20	12:54	No	ST JOHNS	NORFOLK COUNTY	BLUELINE RD	LP20382271	911174	15128	Property Damage Only	Failed to yield right of way	Motor Vehicle	2020	December	Thu	12
13-May-22	13:14	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	E220503340	1003080	15953	Fatal Injury	Disobeyed traffic control	Motor Vehicle	2022	May	Fri	13
09-Jan-23	13:00	Yes	BLUELINE	NORFOLK COUNTY	ST JOHNS	RM23005683	1055824	13713	Property Damage Only	Disobeyed traffic control	Motor Vehicle	2023	January	Mon	13
29-Sep-15	13:06	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP15289057	548469	9630	Property Damage Only	Following too closely	Motor Vehicle	2015	September	Tue	13
20-Dec-19	14:42	No	BLUELINE	NORFOLK COUNTY	ST JOHNS RD E	LP19388534	854696	14071	Property Damage Only	Ability Impaired â Alcohol	Motor Vehicle	2019	December	Fri	14
31-Jul-17	14:07	Yes	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP17221830	672631	9367	Property Damage Only	Inattentive driver	Motor Vehicle	2017	July	Mon	14
14-Oct-18	14:46	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP18309241	761949	14866	Non-Fatal Injury	Inattentive driver	Motor Vehicle	2018	October	Sun	14
11-Feb-16	15:36	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP16041631	575303	13966	Non-Fatal Injury	Failed to yield right of way	Motor Vehicle	2016	February	Thu	15
15-Nov-19	17:30	No	ST JOHNS	NORFOLK COUNTY	BLUELINE RD	LP19352897	844936	15128	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2019	November	Fri	17
24-Nov-20	17:30	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP20366684	907719	14177	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	November	Tue	17
18-May-16	17:35	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP16145697	590638	11117	Non-Fatal Injury	Disobeyed traffic control	Motor Vehicle	2016	May	Wed	17
16-Dec-20	17:00	Yes	ST JOHNS	NORFOLK COUNTY	BLUELINE RD	RM20146580	912506	13713	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	December	Wed	17
20-Oct-17	18:40	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP17309383	687523	11338	Property Damage Only	Failed to yield right of way	Motor Vehicle	2017	October	Fri	18
23-Aug-19	18:10	No	BLUELINE	NORFOLK COUNTY	ST JOHNS RD E	LP19259697	826896	14071	Property Damage Only	Failed to yield right of way	Motor Vehicle	2019	August	Fri	18
07-Apr-15	18:25	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP15091635	517549	11085	Property Damage Only	Inattentive driver	Motor Vehicle	2015	April	Tue	18
20-Dec-22	18:35	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	E221505051	1051512	15711	Property Damage Only	Failed to yield right of way	Motor Vehicle	2022	December	Tue	18
13-Dec-19	19:25	No	ST JOHNS	NORFOLK COUNTY	BLUELINE RD	LP19381880	854802	14071	Property Damage Only	Unknown	Motor Vehicle	2019	December	Fri	19
10-Jan-18	19:30	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP18008858	707870	11117	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2018	January	Wed	19
07-Jan-18	20:11	No	BLUELINE	NORFOLK COUNTY	ST JOHNS	LP18006066	709116	12187	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2018	January	Sun	20
28-Apr-16	21:30	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP16123789	587816	11338	Non-Fatal Injury	Animal - Wild or Domestic	Motor Vehicle	2016	April	Thu	21
19-Dec-16	22:00	No	ST JOHNS	NORFOLK COUNTY	BLUELINE	LP16389186	632491	11117	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2016	December	Mon	22

Row Labels	Count of Primary Cause
Animal - Wild or Domestic	13
Failed to yield right of way	9
Inattentive driver	4
Disobeyed traffic control	3
Following too closely	2
Unknown	1
Driver fatigue	1
Improper turn	1
Ability Impaired â Alcohol	1
Mechanical failure	1
Grand Total	**36**

Row Labels	Count of MVC Type
Property Damage Only	27
Non-Fatal Injury	8
Fatal Injury	1
Grand Total	**36**

Status	Date	Time	Self Reported	Location	Jurisdiction	Roadway Intersection	Occurrence	Traffic Report #	Officer	MVC Type	Primary Cause	Report Type	Year	Month	Day of the Week	Hour of day
C	31-Jul-22	0:25	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	E220884335	1019794	16059	Non-Fatal Injury	Ability Impaired â Alcohol	Motor Vehicle	2022	July	Sunday	00
C	16-Jan-19	1:00	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	LP19013984	783040	8483	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2019	January	Wednesday	01
C	01-Dec-15	5:15	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	LP15354223	561686	13542	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2015	December	Tuesday	05
C	01-Dec-15	5:20	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	LP15354409	561857	13651	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2015	December	Tuesday	05
C	26-Apr-16	5:45	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP16120544	587331	12504	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2016	April	Tuesday	05
C	12-Dec-17	5:05	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP17361205	699734	13312	Property Damage Only	Speed -- too fast for conditions	Motor Vehicle	2017	December	Tuesday	05
C	27-May-20	5:00	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP20145317	878622	15153	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	May	Wednesday	05
C	19-Jan-18	6:19	Yes	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP18016211	710282	13971	Property Damage Only	Inattentive driver	Motor Vehicle	2018	January	Friday	06
C	26-Jul-21	6:05	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	E210426546	944466	15058	Property Damage Only	Unknown	Motor Vehicle	2021	July	Monday	06
C	19-Jan-20	6:10	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP20018193	860675	14688	Property Damage Only	Unknown	Motor Vehicle	2020	January	Sunday	06
C	22-Oct-15	6:50	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP15313264	552794	13744	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2015	October	Thursday	06
C	22-Feb-18	6:35	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP18048089	717509	11117	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2018	February	Thursday	06
C	27-Jan-22	6:00	Yes	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	RM22015796	983156	172345	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2022	January	Thursday	06
C	30-Nov-15	7:30	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP15353232	561854	13651	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2015	November	Monday	07
C	08-Feb-23	7:18	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	E230154607	1062550	16103	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2023	February	Wednesday	07
C	20-Jan-20	10:59	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP20019116	860992	14944	Property Damage Only	Following too closely	Motor Vehicle	2020	January	Monday	10
C	30-Oct-22	10:50	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	E221296791	1038364	16298	Property Damage Only	Following too closely	Motor Vehicle	2022	October	Sunday	10
C	03-Nov-20	10:44	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS RD E	LP20343349	904143	15060	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	November	Tuesday	10
C	20-Jun-21	12:30	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	E210246181	942438	12571	Other	Unknown	Motor Vehicle	2021	June	Sunday	12
C	10-Aug-20	13:28	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP20244178	889004	14177	Non-Fatal Injury	Failed to yield right of way	Motor Vehicle	2020	August	Monday	13
C	19-Nov-22	13:52	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	E221379338	1044032	15248	Property Damage Only	Lost control	Motor Vehicle	2022	November	Saturday	13
C	25-Jul-19	13:00	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP19222322	820681	8010	Non-Fatal Injury	Failed to yield right of way	Motor Vehicle	2019	July	Thursday	13
C	05-Feb-16	14:50	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	LP16035385	573419	11117	Property Damage Only	Failed to yield right of way	Motor Vehicle	2016	February	Friday	14
C	15-Jun-19	14:38	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP19171474	812863	14983	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2019	June	Saturday	14
C	10-Jul-22	14:17	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	E220784908	1015984	15522	Non-Fatal Injury	Inattentive driver	Motor Vehicle	2022	July	Sunday	14
C	09-Feb-17	15:05	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP17037183	643891	13753	Property Damage Only	Inattentive driver	Motor Vehicle	2017	February	Thursday	15
C	20-Nov-20	16:25	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP20362575	906809	14688	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	November	Friday	16
C	25-Jun-19	16:52	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	LP19183062	814534	12187	Non-Fatal Injury	Failed to yield right of way	Motor Vehicle	2019	June	Tuesday	16
C	20-Nov-20	17:51	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP20362654	906812	14688	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	November	Friday	17
C	17-Jun-22	17:15	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	E220669660	1009681	14396	Non-Fatal Injury	Disobeyed traffic control	Motor Vehicle	2022	June	Friday	17
C	13-Dec-19	18:30	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP19381825	854333	11327	Non-Fatal Injury	Inattentive driver	Motor Vehicle	2019	December	Friday	18
C	23-Sep-18	18:18	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP18287526	757834	11951	Property Damage Only	Failed to yield right of way	Motor Vehicle	2018	September	Sunday	18
C	14-Jun-22	19:00	No	ST JOHNS	NORFOLK COUNTY	Cockshutt Rd	E220656211	1009028	11136	Fatal Injury	Inattentive driver	Motor Vehicle	2022	June	Tuesday	19
C	30-Sep-17	20:10	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	LP17287986	683728	11117	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2017	September	Saturday	20
C	10-Oct-20	20:00	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT RD	LP20318804	899703	14866	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	October	Saturday	20
C	14-Nov-20	20:08	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS RD E	LP20356193	905322	11951	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2020	November	Saturday	20
C	09-Aug-21	21:00	Yes	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	RM21099505	946872	10984	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2021	August	Monday	21
C	04-Feb-17	21:13	No	COCKSHUTT	NORFOLK COUNTY	ST JOHNS	LP17032810	644078	12187	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2017	February	Saturday	21
C	26-Mar-18	22:00	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	LP18080233	722903	11117	Property Damage Only	Animal - Wild or Domestic	Motor Vehicle	2018	March	Monday	22
C	25-Jul-22	22:40	No	ST JOHNS	NORFOLK COUNTY	Cockshutt Rd	E220858036	1019563	13988	Non-Fatal Injury	Ability Impaired â Alcohol	Motor Vehicle	2022	July	Monday	22
C	26-Jun-23	23:23	No	ST JOHNS	NORFOLK COUNTY	COCKSHUTT	E230837076	1090684	15893	Property Damage Only	Ability Impaired â Alcohol	Motor Vehicle	2023	June	Monday	23

Row Labels	Count of Primary Cause
Animal - Wild or Domestic	20
Failed to yield right of way	5
Inattentive driver	5
Ability Impaired â Alcohol	3
Unknown	3
Following too closely	2
Lost control	1
Disobeyed traffic control	1
Speed -- too fast for conditions	1
Grand Total	**41**

Row Labels	Count of MVC Type
Property Damage Only	31
Non-Fatal Injury	8
Fatal Injury	1
Other	1
Grand Total	**41**

Attachment C

All-Way Stop Control Warrant Justification Worksheets

ALL-WAY STOP INTERSECTION ANALYSIS

St. John's Road and Blueline Road

Existing Volumes

Arterial/Major Collector Warrant Analysis

Hour Ending	8:00	9:00	10:00	13:00	14:00	16:00	17:00	18:00	TOTAL	*AVERAGE*
Approaching: All Legs	470	527	779	730	774	795	869	835	5779	*722*
Avg Vol all legs >375/h										***YES***
Approaching: Minor	212	295	390	385	437	421	424	408	2972	*372*
Peds X-ing Major St.	0	0	0	0	0	0	0	0	0	*0*
Minor Ped/Veh X-ing	212	295	390	385	437	421	424	408	2972	*372*
Avg Veh Xing Maj>150/h										***YES***
Approaching: Major	258	232	389	345	337	374	445	427	2807	*351*
%Tot Appr on Major	55%	44%	50%	47%	44%	47%	51%	51%		*49%*
% Split on Maj<70?										***YES***

An ALL WAY STOP condition WOULD BE recommended for this location under the Collector/Rural Arterial Road Warrants.

AN ALL WAY STOP IS **WARRANTED**

An All Way Stop is Warranted Based on Traffic Volume if:

a) The total vehicle volume on all intersection approaches averages 375 vehicles per hour for eight hours of the day and,

b) a combined vehicular and pedestrian volume on the minor street averaging 150 units per hour (all vehicles plus pedestrians wishing to enter the intersection)

c) a volume split that does not exceed 70/30. Volume on the major street is defined as vehicles only. Volume on the minor street includes all vehicles plus any

ALL-WAY STOP INTERSECTION ANALYSIS

St. John's Road and Cockshutt Road

Existing Volumes

Arterial/Major Collector Warrant Analysis

Hour Ending	8:00	9:00	10:00	13:00	14:00	16:00	17:00	18:00	TOTAL	*AVERAGE*
Approaching: All Legs	432	399	564	582	558	612	757	666	4570	*571*
Avg Vol all legs >375/h										***YES***
Approaching: Minor	126	169	209	254	225	232	276	250	1741	*218*
Peds X-ing Major St.	0	0	0	0	0	0	0	0	0	*0*
Minor Ped/Veh X-ing	126	169	209	254	225	232	276	250	1741	*218*
Avg Veh Xing Maj>150/h										***YES***
Approaching: Major	306	230	355	328	333	380	481	416	2829	*354*
%Tot Appr on Major	71%	58%	63%	56%	60%	62%	64%	62%		*62%*
% Split on Maj<70?										***YES***

An ALL WAY STOP condition WOULD BE recommended for this location under the Collector/Rural Arterial Road Warrants.

AN ALL WAY STOP IS **WARRANTED**

An All Way Stop is Warranted Based on Traffic Volume if:

a) The total vehicle volume on all intersection approaches averages 375 vehicles per hour for eight hours of the day and,

b) a combined vehicular and pedestrian volume on the minor street averaging 150 units per hour (all vehicles plus pedestrians wishing to enter the intersection)

c) a volume split that does not exceed 70/30. Volume on the major street is defined as vehicles only. Volume on the minor street includes all vehicles plus any

Attachment D

Traffic Signal Control Warrant Justification Worksheets

Signal Justification Calculation
(OTM Book 12 - Justifications 1, 2, 3)

Horizon Year: 2023
Region/City/Township: Norfolk County

Major Street: St. John's Road
Minor Street: Cockshutt Road

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Free

PM Forecast Only? N

	Major Street						Minor Street						
	St. John's Road						Cockshutt Road						
	Eastbound			Westbound			Northbound			Southbound			Peds Crossing
Hour	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
7:00 - 8:00	3	90	12	33	160	8	21	29	14	11	43	8	0
8:00 - 9:00	4	85	13	24	98	6	17	51	18	17	63	3	0
11:00 - 12:00	4	179	17	26	113	16	19	80	31	14	58	7	0
12:00 - 13:00	6	151	26	24	106	15	21	110	26	15	74	8	0
13:00 - 14:00	4	144	18	23	121	23	15	90	24	20	67	9	0
15:00 - 16:00	5	187	30	23	107	28	19	91	36	16	61	9	0
16:00 - 17:00	9	226	25	40	163	18	31	98	45	18	74	10	0
17:00 - 18:00	4	196	7	38	148	23	20	84	44	15	79	8	0

	1A		1B		2A		2B	
Hour	All Approach Lanes		Minor Street Both Approaches		Major Street Both Approaches		Traffic Crossing Major Street	
Threshold	480		120		480		50	
1	432	90%	126	100%	306	64%	75	100%
2	399	83%	169	100%	230	48%	97	100%
3	564	100%	209	100%	355	74%	113	100%
4	582	100%	254	100%	328	68%	146	100%
5	558	100%	225	100%	333	69%	125	100%
6	612	100%	232	100%	380	79%	126	100%
7	757	100%	276	100%	481	100%	147	100%
8	666	100%	250	100%	416	87%	119	100%
8 Hours 100% Fulfilled?		No		Yes		No		Yes
8 Hours 80% Fulfilled?		Yes		Yes		No		Yes

Justification Results	
Justification 1 (Minimum Vehicle Volume)	No
Justification 2 (Delay To Cross Traffic	No
Justification 3 (Volume/Delay Combination)	No

Is A Signal Justfied? No

Signal Justification Calculation
(OTM Book 12 - Justifications 1, 2, 3)

Horizon Year: 2023
Region/City/Township: Norfolk County

Major Street: St. John's Road
Minor Street: Blueline Road

North/South?: N

Number of Approach Lanes: 1
Tee Intersection? N
Flow Conditions: Free

PM Forecast Only? N

	Major Street						Minor Street						
	St. John's Road						Blueline Road						
	Eastbound			Westbound			Northbound			Southbound			Peds Crossing
Hour	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	Main Road
7:00 - 8:00	3	81	34	13	127	0	38	51	14	4	104	1	0
8:00 - 9:00	1	86	33	21	81	10	32	101	15	5	138	4	0
11:00 - 12:00	14	189	42	14	114	16	34	171	13	13	155	4	0
12:00 - 13:00	6	147	41	24	113	14	24	168	19	12	159	3	0
13:00 - 14:00	8	151	35	8	114	21	46	178	25	17	166	5	0
15:00 - 16:00	5	177	44	13	126	9	44	193	19	9	154	2	0
16:00 - 17:00	11	188	63	18	160	5	42	175	33	4	162	8	0
17:00 - 18:00	4	178	59	21	158	7	40	180	21	5	156	6	0

	1A		1B		2A		2B	
Hour	All Approach Lanes		Minor Street Both Approaches		Major Street Both Approaches		Traffic Crossing Major Street	
Threshold	480		120		480		50	
1	470	98%	212	100%	258	54%	146	100%
2	527	100%	295	100%	232	48%	175	100%
3	779	100%	390	100%	389	81%	218	100%
4	730	100%	385	100%	345	72%	204	100%
5	774	100%	437	100%	337	70%	241	100%
6	795	100%	421	100%	374	78%	246	100%
7	869	100%	424	100%	445	93%	221	100%
8	835	100%	408	100%	427	89%	225	100%
8 Hours 100% Fulfilled?		No		Yes		No		Yes
8 Hours 80% Fulfilled?		Yes		Yes		No		Yes

Justification Results	
Justification 1 (Minimum Vehicle Volume)	No
Justification 2 (Delay To Cross Traffic	No
Justification 3 (Volume/Delay Combination)	No

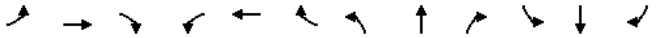
Is A Signal Justfied? No

Attachment E

Traffic Operations Reports

HCM Unsignalized Intersection Capacity Analysis
3: Blueline Road & St. John's Road

Baseline



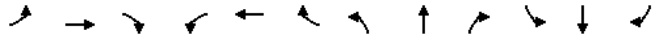
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	81	10	1	86	33	5	138	4	32	101	15
Future Volume (Veh/h)	21	81	10	1	86	33	5	138	4	32	101	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	88	11	1	93	36	5	150	4	35	110	16
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	129			99			324	270	94	332	258	111
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	129			99			324	270	94	332	258	111
tC, single (s)	4.2			4.1			7.3	6.5	6.2	7.3	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.7	4.0	3.3	3.6	4.0	3.3
p0 queue free %	98			100			99	76	100	93	83	98
cM capacity (veh/h)	1414			1507			502	627	969	478	639	948

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	122	130	159	161
Volume Left	23	1	5	35
Volume Right	11	36	4	16
cSH	1414	1507	628	614
Volume to Capacity	0.02	0.00	0.25	0.26
Queue Length 95th (m)	0.4	0.0	8.0	8.4
Control Delay (s)	1.5	0.1	12.7	12.9
Lane LOS	A	A	B	B
Approach Delay (s)	1.5	0.1	12.7	12.9
Approach LOS			B	B

Intersection Summary				
Average Delay	7.5			
Intersection Capacity Utilization	38.5%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
8: Cockshutt Road & St. John's Road

Baseline

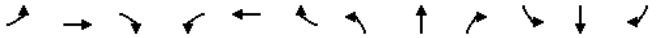


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	160	8	3	90	12	11	43	8	21	29	14
Future Volume (Veh/h)	33	160	8	3	90	12	11	43	8	21	29	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	174	9	3	98	13	12	47	9	23	32	15
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	111			183			392	368	178	394	366	104
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	111			183			392	368	178	394	366	104
tC, single (s)	4.1			4.6			7.1	6.5	6.2	7.4	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.7			3.5	4.0	3.3	3.8	4.0	3.3
p0 queue free %	98			100			98	91	99	95	94	98
cM capacity (veh/h)	1492			1149			526	550	870	472	551	956

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	219	114	68	70
Volume Left	36	3	12	23
Volume Right	9	13	9	15
cSH	1492	1149	573	571
Volume to Capacity	0.02	0.00	0.12	0.12
Queue Length 95th (m)	0.6	0.1	3.2	3.3
Control Delay (s)	1.4	0.2	12.1	12.2
Lane LOS	A	A	B	B
Approach Delay (s)	1.4	0.2	12.1	12.2
Approach LOS			B	B

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	30.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
3: Blueline Road & St. John's Road

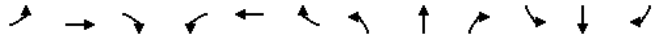


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	148	9	9	227	58	8	161	5	42	201	27
Future Volume (Veh/h)	18	148	9	9	227	58	8	161	5	42	201	27
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	161	10	10	247	63	9	175	5	46	218	29
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	310			171			642	536	166	597	510	278
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	310			171			642	536	166	597	510	278
tC, single (s)	4.2			4.1			7.2	6.5	6.2	7.1	6.5	6.4
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.6	4.0	3.3	3.5	4.0	3.5
p0 queue free %	98			99			96	61	99	83	52	96
cM capacity (veh/h)	1201			1418			220	443	884	278	457	721

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	191	320	189	293
Volume Left	20	10	9	46
Volume Right	10	63	5	29
cSH	1201	1418	428	429
Volume to Capacity	0.02	0.01	0.44	0.68
Queue Length 95th (m)	0.4	0.2	17.7	39.9
Control Delay (s)	1.0	0.3	19.9	29.6
Lane LOS	A	A	C	D
Approach Delay (s)	1.0	0.3	19.9	29.6
Approach LOS			C	D

Intersection Summary					
Average Delay	12.8				
Intersection Capacity Utilization	51.1%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
8: Cockshutt Road & St. John's Road

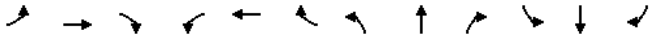


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	176	20	10	219	23	17	85	10	32	106	41
Future Volume (Veh/h)	36	176	20	10	219	23	17	85	10	32	106	41
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	191	22	11	238	25	18	92	11	35	115	45
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	263			213			655	565	202	610	564	250
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	263			213			655	565	202	610	564	250
tC, single (s)	4.2			4.1			7.1	6.5	6.4	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.5	3.5	4.0	3.3
p0 queue free %	97			99			93	78	99	89	73	94
cM capacity (veh/h)	1278			1369			276	420	795	327	420	793

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	252	274	121	195
Volume Left	39	11	18	35
Volume Right	22	25	11	45
cSH	1278	1369	406	445
Volume to Capacity	0.03	0.01	0.30	0.44
Queue Length 95th (m)	0.8	0.2	9.8	17.5
Control Delay (s)	1.5	0.4	17.6	19.2
Lane LOS	A	A	C	C
Approach Delay (s)	1.5	0.4	17.6	19.2
Approach LOS			C	C

Intersection Summary					
Average Delay	7.5				
Intersection Capacity Utilization	46.4%	ICU Level of Service		A	
Analysis Period (min)	15				

HCM Unsignalized Intersection Capacity Analysis
3: Blueline Road & St. John's Road

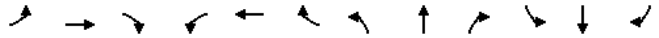


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	21	81	10	1	86	33	5	138	4	32	101	15
Future Volume (vph)	21	81	10	1	86	33	5	138	4	32	101	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	88	11	1	93	36	5	150	4	35	110	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	122	130	159	161
Volume Left (vph)	23	1	5	35
Volume Right (vph)	11	36	4	16
Hadj (s)	0.04	0.15	0.02	0.04
Departure Headway (s)	4.9	5.0	4.8	4.8
Degree Utilization, x	0.17	0.18	0.21	0.21
Capacity (veh/h)	676	666	708	702
Control Delay (s)	8.9	9.1	9.1	9.1
Approach Delay (s)	8.9	9.1	9.1	9.1
Approach LOS	A	A	A	A

Intersection Summary				
Delay		9.0		
Level of Service		A		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
8: Cockshutt Road & St. John's Road

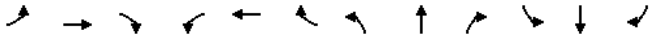


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	33	160	8	3	90	12	11	43	8	21	29	14
Future Volume (vph)	33	160	8	3	90	12	11	43	8	21	29	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	174	9	3	98	13	12	47	9	23	32	15

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	219	114	68	70
Volume Left (vph)	36	3	12	23
Volume Right (vph)	9	13	9	15
Hadj (s)	0.13	0.25	-0.04	0.10
Departure Headway (s)	4.5	4.8	4.7	4.9
Degree Utilization, x	0.27	0.15	0.09	0.10
Capacity (veh/h)	771	719	701	679
Control Delay (s)	9.2	8.6	8.2	8.4
Approach Delay (s)	9.2	8.6	8.2	8.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay		8.8		
Level of Service		A		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCM Unsignalized Intersection Capacity Analysis
3: Blueline Road & St. John's Road

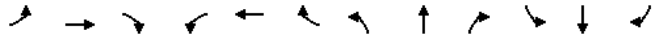


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	148	9	9	227	58	8	161	5	42	201	27
Future Volume (vph)	18	148	9	9	227	58	8	161	5	42	201	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	161	10	10	247	63	9	175	5	46	218	29

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	191	320	189	293
Volume Left (vph)	20	10	9	46
Volume Right (vph)	10	63	5	29
Hadj (s)	0.12	-0.02	0.00	0.03
Departure Headway (s)	6.1	5.7	6.0	5.8
Degree Utilization, x	0.32	0.51	0.32	0.48
Capacity (veh/h)	527	587	529	568
Control Delay (s)	12.0	14.5	11.8	14.0
Approach Delay (s)	12.0	14.5	11.8	14.0
Approach LOS	B	B	B	B

Intersection Summary				
Delay		13.3		
Level of Service		B		
Intersection Capacity Utilization		51.1%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis
8: Cockshutt Road & St. John's Road



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	36	176	20	10	219	23	17	85	10	32	106	41
Future Volume (vph)	36	176	20	10	219	23	17	85	10	32	106	41
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	191	22	11	238	25	18	92	11	35	115	45

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	252	274	121	195
Volume Left (vph)	39	11	18	35
Volume Right (vph)	22	25	11	45
Hadj (s)	0.10	0.06	0.01	-0.09
Departure Headway (s)	5.3	5.3	5.7	5.4
Degree Utilization, x	0.37	0.40	0.19	0.30
Capacity (veh/h)	630	642	555	599
Control Delay (s)	11.5	11.7	10.0	10.7
Approach Delay (s)	11.5	11.7	10.0	10.7
Approach LOS	B	B	B	B

Intersection Summary				
Delay		11.2		
Level of Service		B		
Intersection Capacity Utilization		46.4%	ICU Level of Service	A
Analysis Period (min)		15		

Queues
3: Blueline Road & St. John's Road

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	122	130	159	161
v/c Ratio	0.12	0.14	0.34	0.39
Control Delay	6.4	5.5	15.1	15.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	6.4	5.5	15.1	15.3
Queue Length 50th (m)	4.1	3.5	9.7	9.4
Queue Length 95th (m)	11.4	10.9	21.1	21.2
Internal Link Dist (m)	328.7	282.6	184.0	190.3
Turn Bay Length (m)				
Base Capacity (vph)	1269	1148	897	806
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.10	0.11	0.18	0.20

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Blueline Road & St. John's Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	81	10	1	86	33	5	138	4	32	101	15
Future Volume (vph)	21	81	10	1	86	33	5	138	4	32	101	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8			5.8			5.6			5.6	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			0.96			1.00			0.99	
Flt Protected		0.99			1.00			1.00			0.99	
Satd. Flow (prot)		1803			1545			1861			1792	
Flt Permitted		0.94			1.00			0.98			0.91	
Satd. Flow (perm)		1718			1543			1835			1640	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	88	11	1	93	36	5	150	4	35	110	16
RTOR Reduction (vph)	0	5	0	0	17	0	0	2	0	0	8	0
Lane Group Flow (vph)	0	117	0	0	113	0	0	157	0	0	153	0
Heavy Vehicles (%)	9%	2%	0%	0%	21%	12%	20%	1%	0%	16%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		23.1			23.1			8.4			8.4	
Effective Green, g (s)		23.1			23.1			8.4			8.4	
Actuated g/C Ratio		0.54			0.54			0.20			0.20	
Clearance Time (s)		5.8			5.8			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		925			830			359			321	
v/s Ratio Prot												
v/s Ratio Perm		0.07			c0.07			0.09			c0.09	
v/c Ratio		0.13			0.14			0.44			0.48	
Uniform Delay, d1		4.9			4.9			15.2			15.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.1			0.9			1.1	
Delay (s)		5.0			5.0			16.0			16.4	
Level of Service		A			A			B			B	
Approach Delay (s)		5.0			5.0			16.0			16.4	
Approach LOS		A			A			B			B	

Intersection Summary					
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.23				
Actuated Cycle Length (s)	42.9	Sum of lost time (s)		11.4	
Intersection Capacity Utilization	47.5%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
8: Cockshutt Road & St. John's Road

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	219	114	68	70
v/c Ratio	0.17	0.09	0.15	0.17
Control Delay	4.8	4.4	11.2	11.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	4.8	4.4	11.2	11.0
Queue Length 50th (m)	0.0	0.0	1.4	1.3
Queue Length 95th (m)	18.5	9.9	10.7	10.5
Internal Link Dist (m)	539.0	609.9	292.4	287.0
Turn Bay Length (m)				
Base Capacity (vph)	1505	1417	757	644
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.15	0.08	0.09	0.11

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: Cockshutt Road & St. John's Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	160	8	3	90	12	11	43	8	21	29	14
Future Volume (vph)	33	160	8	3	90	12	11	43	8	21	29	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3			6.3			5.7			5.7	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			0.98			0.98			0.97	
Flt Protected		0.99			1.00			0.99			0.98	
Satd. Flow (prot)		1749			1577			1850			1657	
Flt Permitted		0.95			0.99			0.92			0.86	
Satd. Flow (perm)		1671			1568			1720			1456	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	174	9	3	98	13	12	47	9	23	32	15
RTOR Reduction (vph)	0	2	0	0	5	0	0	8	0	0	14	0
Lane Group Flow (vph)	0	217	0	0	109	0	0	60	0	0	56	0
Heavy Vehicles (%)	0%	9%	0%	50%	20%	0%	0%	0%	0%	29%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		26.3			26.3			3.7			3.7	
Effective Green, g (s)		26.3			26.3			3.7			3.7	
Actuated g/C Ratio		0.63			0.63			0.09			0.09	
Clearance Time (s)		6.3			6.3			5.7			5.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1046			981			151			128	
v/s Ratio Prot												
v/s Ratio Perm		c0.13			0.07			0.03			c0.04	
v/c Ratio		0.21			0.11			0.40			0.44	
Uniform Delay, d1		3.4			3.2			18.1			18.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.1			0.1			1.7			2.4	
Delay (s)		3.5			3.2			19.8			20.6	
Level of Service		A			A			B			C	
Approach Delay (s)		3.5			3.2			19.8			20.6	
Approach LOS		A			A			B			C	

Intersection Summary					
HCM 2000 Control Delay	8.3	HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.24				
Actuated Cycle Length (s)	42.0	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	35.7%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
3: Blueline Road & St. John's Road

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	191	320	189	293
v/c Ratio	0.25	0.40	0.35	0.60
Control Delay	9.3	10.1	14.0	18.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.3	10.1	14.0	18.4
Queue Length 50th (m)	8.2	14.0	11.7	19.2
Queue Length 95th (m)	22.4	35.7	23.7	37.1
Internal Link Dist (m)	328.7	282.6	184.0	190.3
Turn Bay Length (m)				
Base Capacity (vph)	986	1039	929	844
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.19	0.31	0.20	0.35

Intersection Summary

HCM Signalized Intersection Capacity Analysis
3: Blueline Road & St. John's Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	148	9	9	227	58	8	161	5	42	201	27
Future Volume (vph)	18	148	9	9	227	58	8	161	5	42	201	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.8			5.8			5.6			5.6	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			0.97			1.00			0.99	
Flt Protected		0.99			1.00			1.00			0.99	
Satd. Flow (prot)		1744			1755			1877			1799	
Flt Permitted		0.95			0.99			0.98			0.91	
Satd. Flow (perm)		1662			1740			1835			1658	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	161	10	10	247	63	9	175	5	46	218	29
RTOR Reduction (vph)	0	3	0	0	14	0	0	2	0	0	8	0
Lane Group Flow (vph)	0	188	0	0	306	0	0	187	0	0	285	0
Heavy Vehicles (%)	11%	7%	11%	0%	6%	3%	13%	0%	0%	5%	1%	19%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		20.1			20.1			12.9			12.9	
Effective Green, g (s)		20.1			20.1			12.9			12.9	
Actuated g/C Ratio		0.45			0.45			0.29			0.29	
Clearance Time (s)		5.8			5.8			5.6			5.6	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		752			787			533			481	
v/s Ratio Prot												
v/s Ratio Perm		0.11			c0.18			0.10			c0.17	
v/c Ratio		0.25			0.39			0.35			0.59	
Uniform Delay, d1		7.5			8.1			12.4			13.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.3			0.4			2.0	
Delay (s)		7.7			8.4			12.8			15.5	
Level of Service		A			A			B			B	
Approach Delay (s)		7.7			8.4			12.8			15.5	
Approach LOS		A			A			B			B	

Intersection Summary					
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service		B	
HCM 2000 Volume to Capacity ratio	0.47				
Actuated Cycle Length (s)	44.4	Sum of lost time (s)		11.4	
Intersection Capacity Utilization	55.3%	ICU Level of Service		B	
Analysis Period (min)	15				
c Critical Lane Group					

Queues
8: Cockshutt Road & St. John's Road

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	252	274	121	195
v/c Ratio	0.27	0.27	0.27	0.44
Control Delay	8.0	7.9	13.9	15.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.0	7.9	13.9	15.2
Queue Length 50th (m)	10.1	11.0	6.9	10.9
Queue Length 95th (m)	24.8	26.3	16.5	24.2
Internal Link Dist (m)	539.0	609.9	292.4	287.0
Turn Bay Length (m)				
Base Capacity (vph)	1219	1315	744	728
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.21	0.21	0.16	0.27

Intersection Summary

HCM Signalized Intersection Capacity Analysis
8: Cockshutt Road & St. John's Road

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	176	20	10	219	23	17	85	10	32	106	41
Future Volume (vph)	36	176	20	10	219	23	17	85	10	32	106	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3			6.3			5.7			5.7	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.99			0.97	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1741			1765			1830			1814	
Flt Permitted		0.92			0.98			0.93			0.91	
Satd. Flow (perm)		1617			1742			1722			1662	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	191	22	11	238	25	18	92	11	35	115	45
RTOR Reduction (vph)	0	5	0	0	6	0	0	7	0	0	21	0
Lane Group Flow (vph)	0	247	0	0	268	0	0	114	0	0	174	0
Heavy Vehicles (%)	6%	8%	0%	0%	7%	0%	0%	0%	20%	0%	1%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		23.1			23.1			8.7			8.7	
Effective Green, g (s)		23.1			23.1			8.7			8.7	
Actuated g/C Ratio		0.53			0.53			0.20			0.20	
Clearance Time (s)		6.3			6.3			5.7			5.7	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		852			918			342			330	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.15			0.07			c0.10	
v/c Ratio		0.29			0.29			0.33			0.53	
Uniform Delay, d1		5.8			5.8			15.1			15.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.2			0.6			1.5	
Delay (s)		6.0			6.0			15.6			17.2	
Level of Service		A			A			B			B	
Approach Delay (s)		6.0			6.0			15.6			17.2	
Approach LOS		A			A			B			B	

Intersection Summary					
HCM 2000 Control Delay	10.0	HCM 2000 Level of Service		A	
HCM 2000 Volume to Capacity ratio	0.36				
Actuated Cycle Length (s)	43.8	Sum of lost time (s)		12.0	
Intersection Capacity Utilization	49.7%	ICU Level of Service		A	
Analysis Period (min)	15				
c Critical Lane Group					