Appendix E

Network Screening & Collision Analysis

Town of Collingwood

Type of Document:
Technical Report

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Draft Memorandum

Date:	June 12th, 2024	**Client:**	Town of Collingwood
Project Name:	Collingwood Master Mobility Transportation Plan	**Project No.:**	BRM-23015411-A0
To:	Ed Dujlovic, P.Eng., Project Manager, Town of Collingwood	**From:**	Harrison McGrath, Project Manager, EXP Services Inc.
Written By:	The EXP Transportation Team	Draft Memorandum	
Subject:	Network Screening and Collision Analysis		

1. Introduction

The Town of Collingwood (the "Town") has retained EXP to prepare a Master Mobility and Transportation Plan (MMTP) document to provide the Town with a comprehensive strategy to deal with current and future transportation issues. As part of the MMTP, a network safety screening analysis will be conducted using available historical collision data to identify locations within the Town's road network with the potential for reduction in collision frequency, severity, and collisions involving vulnerable road users.

The network screening analysis and collision analysis memorandum will include the following components.

- Collision history analysis.
- Network screening analysis to compare midblock and intersection locations.
- Development of a priority list of locations for further investigation.

The methodology presented in this memorandum was undertaken to present any collision trends or patterns within the Town and to identify priority locations for further safety investigation, such as an In-Service Road Safety Audit. The analysis was guided by and took into careful consideration the *Vision Zero* approach to road safety. The results of this study will provide valuable information for the development of the final MMTP.

1.1. Approach

Over the past decade, several jurisdictions across Ontario have developed road safety plans to adopt *Vision Zero*. The objective of the *Vision Zero* approach is to eliminate deaths and serious injuries resulting from traffic collisions on the road network. The philosophy behind this is a departure from traditional road safety approaches. *Vision Zero* principles can be summarized as follows:

- Human life should be prioritized over all other objectives within the road system.

- Collisions resulting in fatalities and serious injuries are preventable. *Vision Zero* emphasizes a particular focus on preventing the occurrence of these collisions.
- Road users will make mistakes, but the road network should be designed so that when mistakes do occur, death and/or serious injury are not result.
- The human body is fragile and vulnerable to injury. Higher vehicle speeds increase the risk of someone being seriously injured or killed in a collision. This is particularly significant when it comes to vulnerable road users such as pedestrians and cyclists.

Vision Zero often goes together with the safe systems approach, which emphasizes that the responsibility for road safety is shared among designers, planners, builders, policy makers, maintenance personnel, and enforcement, as well as all road users. Since humans will make mistakes while using the road network, it must be designed to protected them from death or serious injury when human error occurs.

2. Collision Analysis

A detailed collision analysis was conducted for the Town's road network for the approximately six-and-a-half-year period from January 2017 to early August 2023[1] to identify any collision patterns or trends that can be observed. Collision data was provided by the Town in XML file format, containing data from individual Motor Vehicle Collision Reports (MVCR). Only collisions that occurred on road network were considered for the analysis. Collisions classified as occurring in a parking lot, off-highway, and on a frozen lake or river were not included.

A total of 1,643 were included in the collision analysis. This amounts to a frequency of approximately 248.9 collisions per year within the town over the analysis period. Of these, 230 resulted in an injury, including one fatal collision. **Figure 1** illustrates the number of collisions that occurred by year and severity.

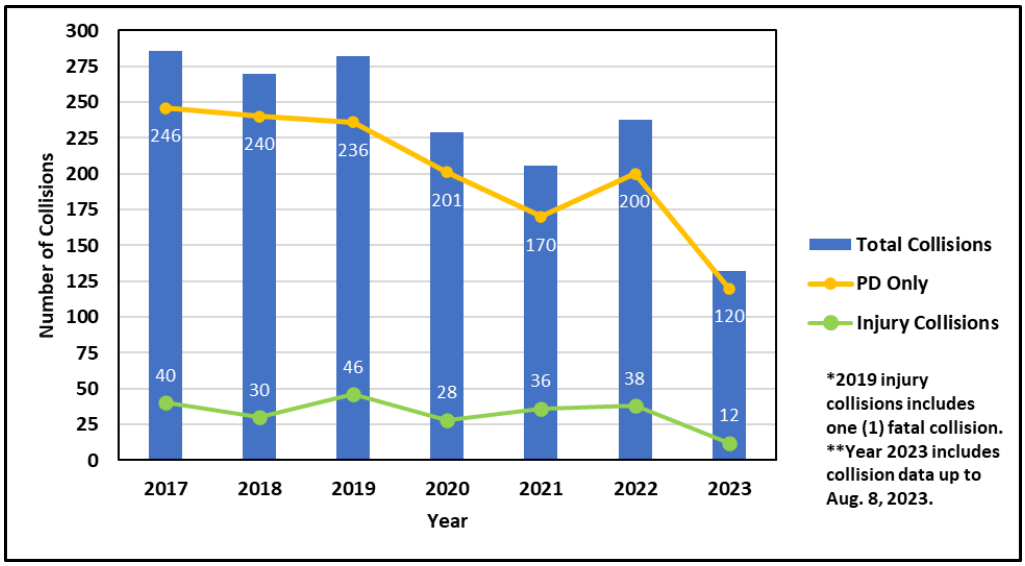


Figure 1 - Total Collisions by Year and Severity

A GIS heat map that shows road collision frequency throughout the Town is illustrated in **Map 1**. From **Map 1**, it can be observed that collisions are most frequent at the Town's major intersections and on arterial roads such as First Street, Hurontario Street and segments of Highway 26, High Street, and Hume Street. Further

[1] For calculation purposes, the number of years used in the analysis period is 6.6 years.

discussion of the collision frequency and collision rates at specific locations will be provided as part of the network screening analysis in **Section 3**.

Type of Collisions

Figure 2 breaks down the collisions within the Town based on collision type. Rear end collisions are the most common, they make up 27% of the total collisions followed by turning movement collisions with 19% and angle collisions with 17%. These three types make up approximately 63% of the total collisions within the study area. The remaining are single motor vehicle (SMV), sideswipe, approaching, or other collisions.

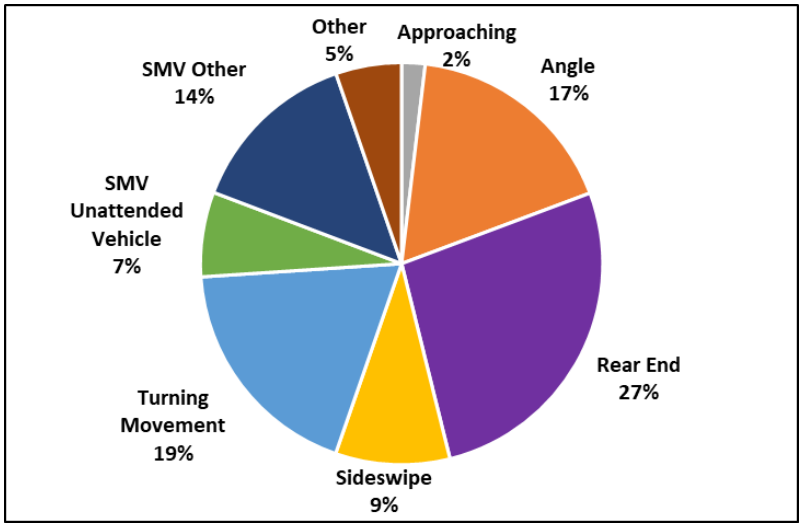


Figure 2 - Collision Type by Percentage

Of the 1,643 total collisions, 890 (54%) were classified as occurring at an intersection (or being intersection related). **Figure 3** breaks down collisions that occurred at intersections by type. Rear end (32%), angle (28%), and turning movement collisions (22%) are more prevalent at intersections. Together, they comprise approximately 82% of all collisions that occurred at intersections.

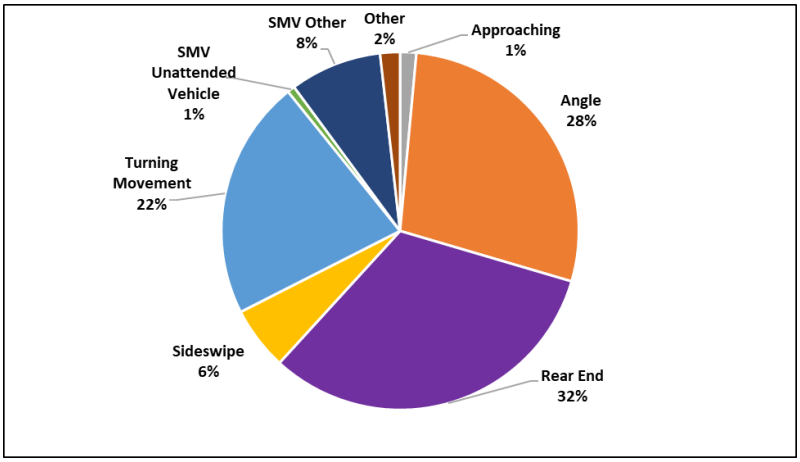


Figure 3 - Collision Type by Percentage (Intersection Collisions)

Severity of Injuries

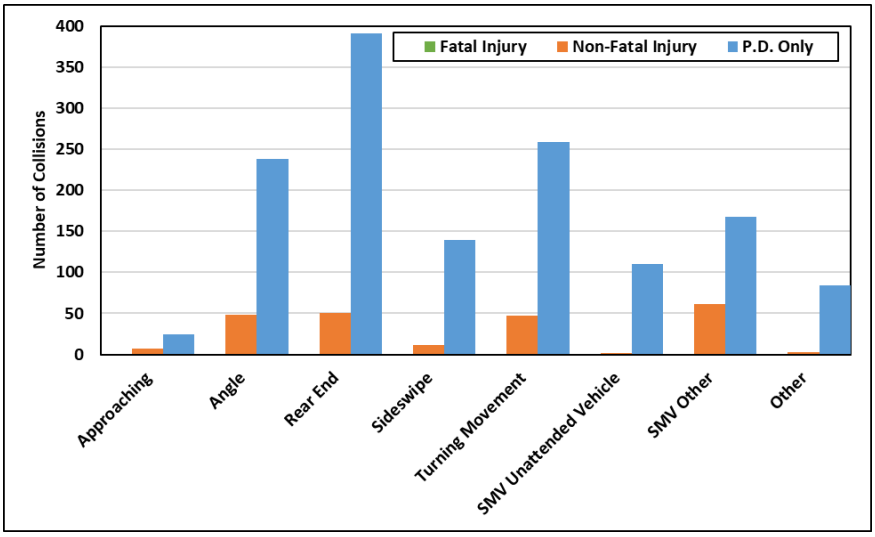


Figure 4 breaks down the collisions within the study area based on collision type and severity. Of the 1,643 total collisions, 229 (14%) resulted in a non-fatal injury and one resulted in a fatality[2]. The figure shows SMV collisions to be the type that most frequently results in an injury with 61, followed by rear end with 50, angle with 48, and turning movement with 47. Additionally, SMV and approaching collisions are the most likely to result in an injury with 27% and 22% of those types of collisions respectively resulting in an injury. Note that collisions involving pedestrians are considered to be SMV collisions.

Map 2 presents a GIS heat map showing the frequency of collisions resulting in injury throughout the Town. The pattern observed is largely the same as that for total collisions, with collisions resulting in injury most frequently at the Town's major intersections and along arterial roads.

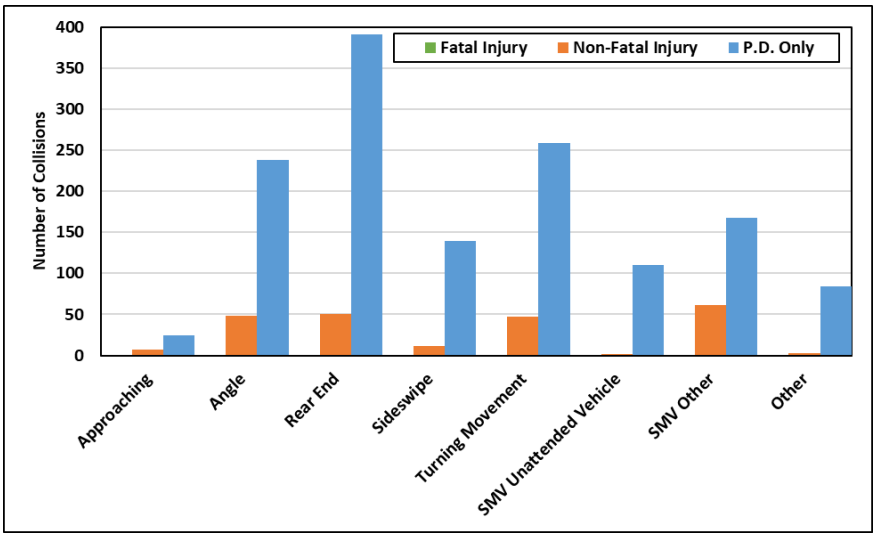
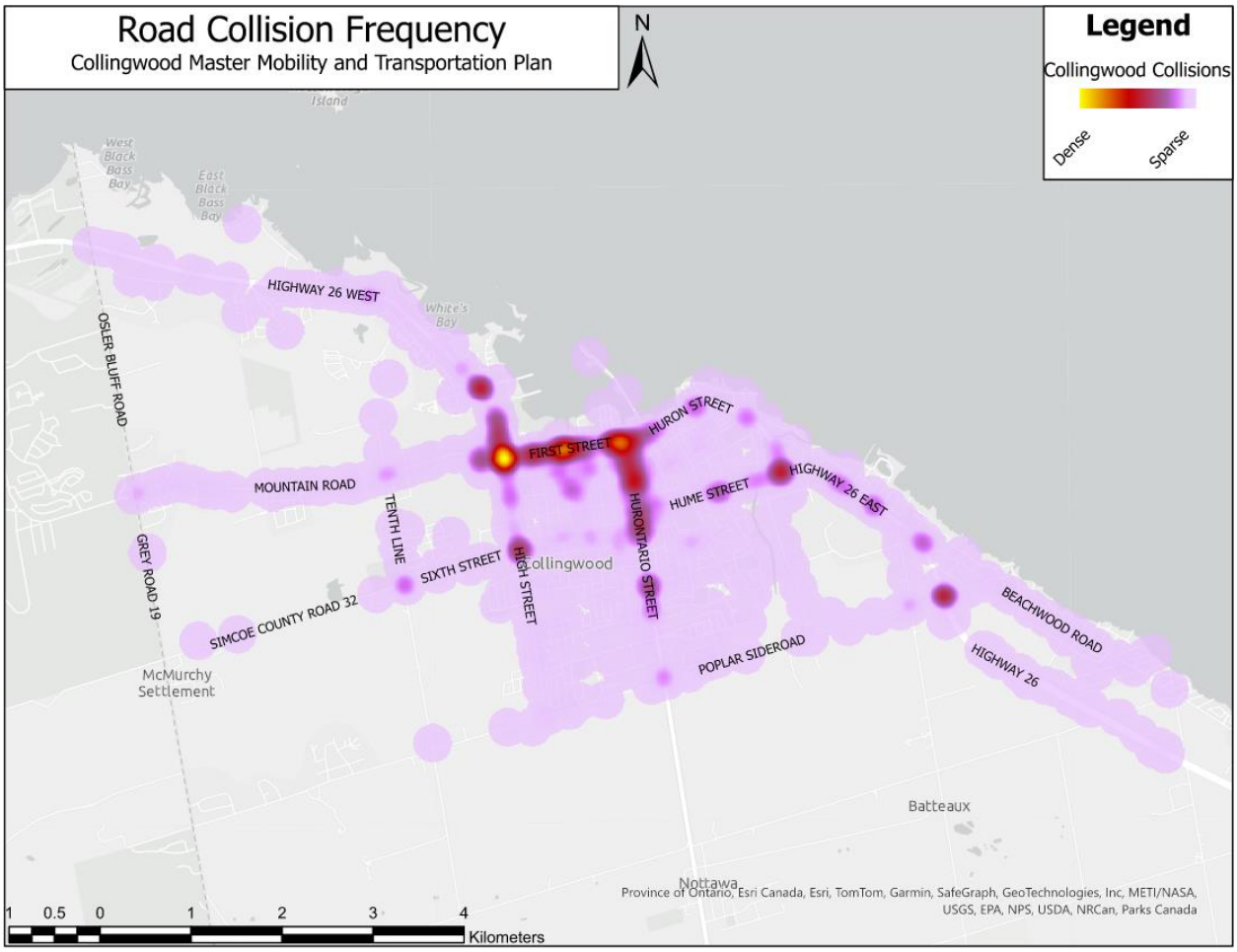


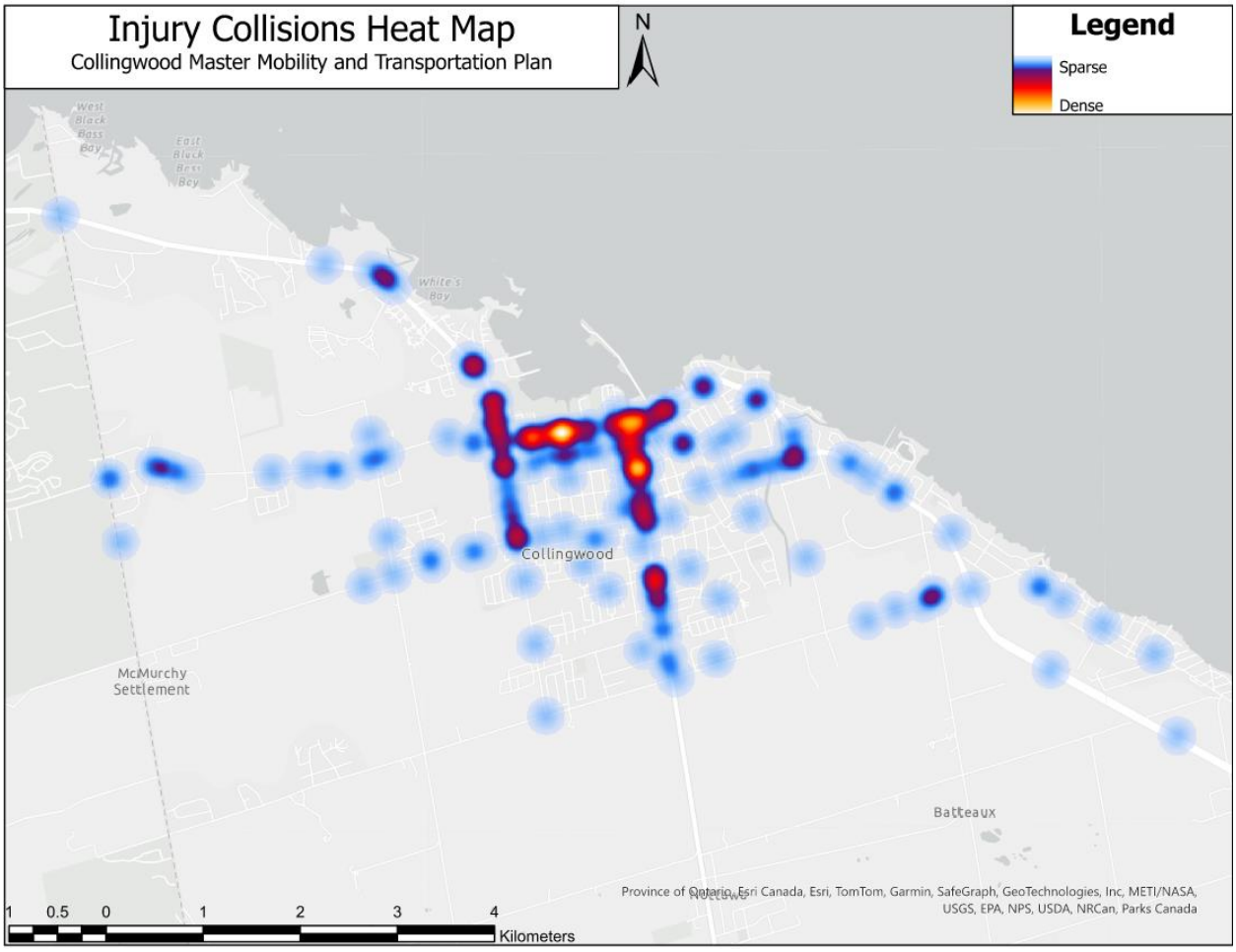
Figure 4 - Collision Severity by Collision Type

[2] The recorded fatal injury collision was classified as a sideswipe collision.

Map 1 – Road Collision Frequency (can move to appendix if required)



Map 2 – Road Collision Injury Frequency – Heat (can move to appendix if required)



Lighting Conditions

Figure 5 illustrates the lighting conditions at the time of the accident. In total, 18% of collisions occurred when it was dark, dawn, or dusk while the remaining 82% occurred during daylight hours.

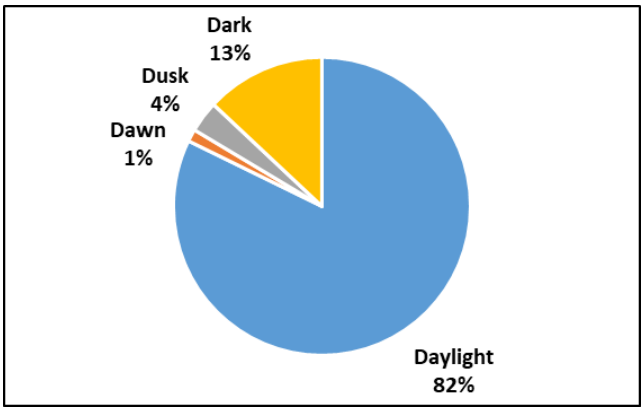


Figure 5 - Total Collisions by Lighting Condition

Further investigation, presented in

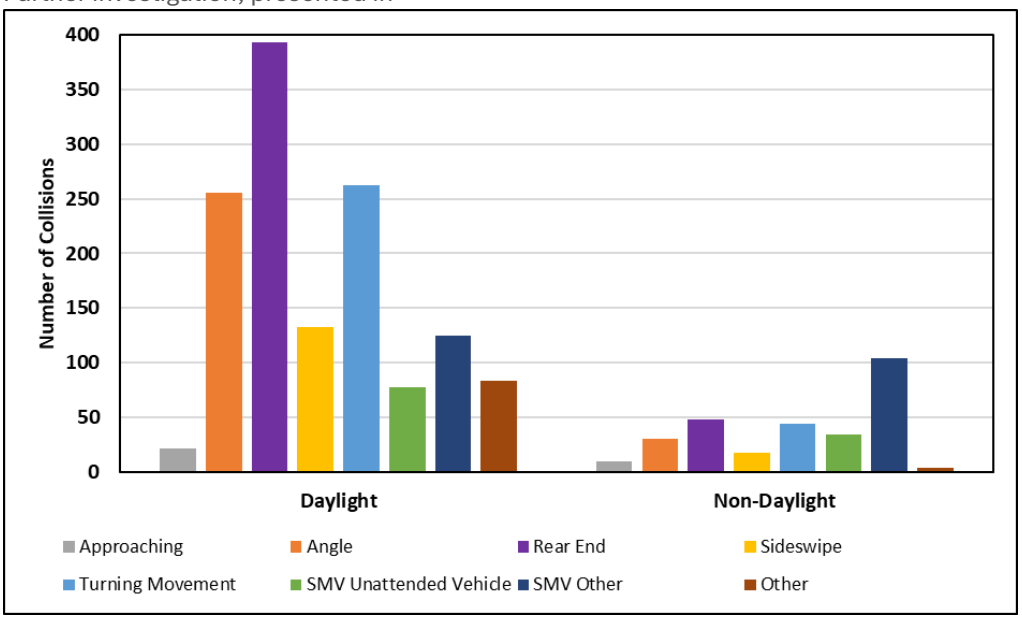


Figure 6, was conducted to evaluate the relationship between collision type and lighting location.

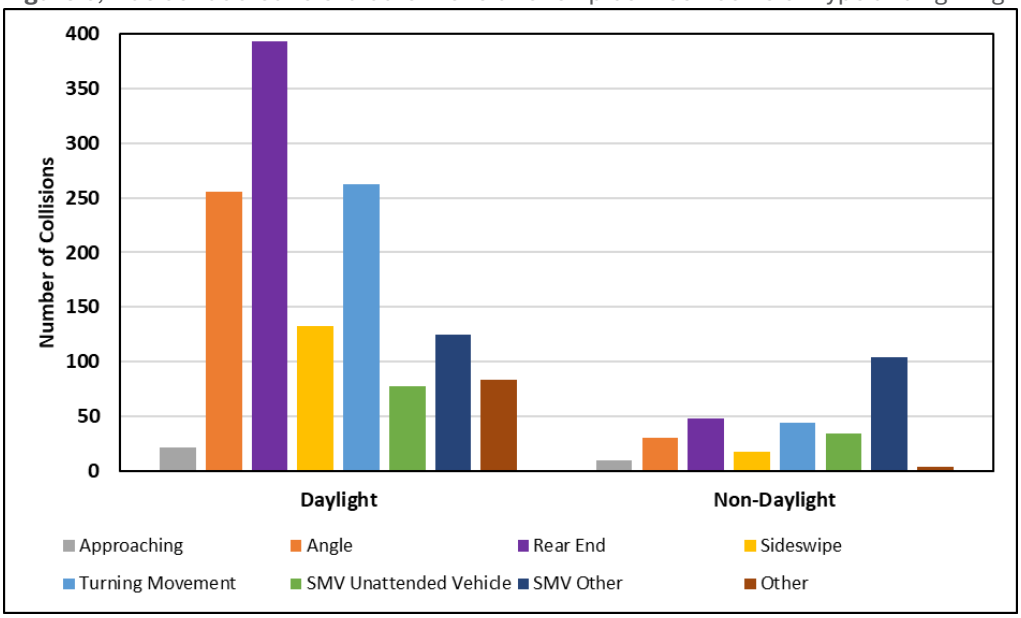


Figure 6 shows that a much larger proportion of the single motor vehicle collisions (45%) occurred in non-daylight conditions compared to proportion for all collisions (18%). This can also be observed for approaching collisions with 10 out of 31 collisions (32%) occurring during non-daylight conditions. Therefore, lighting may be considered a contributing factor for these types of collisions.

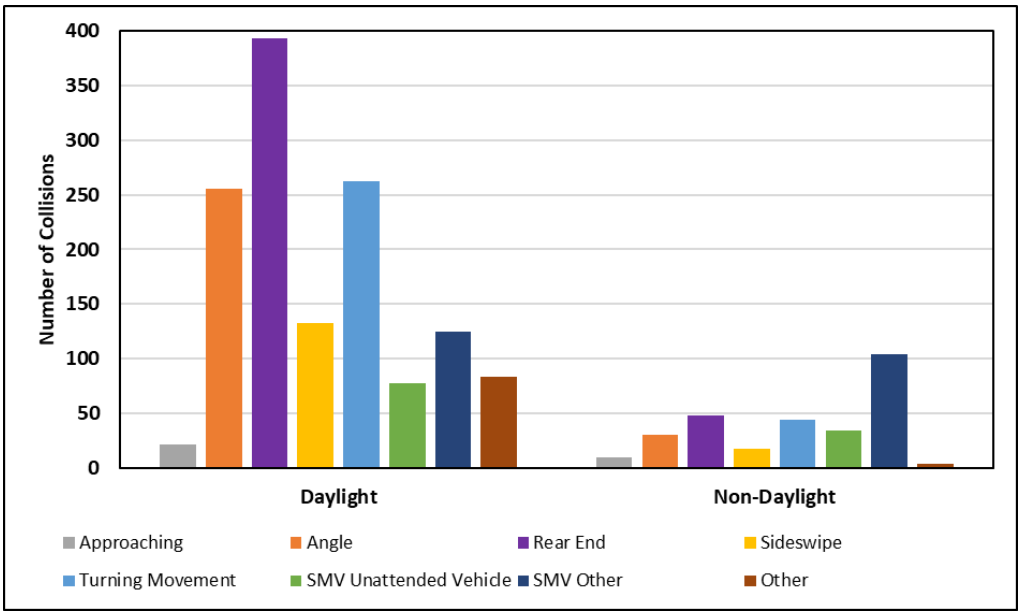


Figure 6 - Collision Type by Lighting Conditions

Environmental Conditions

Figure 7 presents the percentage of collisions by environmental conditions at the time of the accident. In total, 77% (1,270) of collisions occurred when it was clear and 22% (358 collisions) occurred in rain, snow, or icy conditions. **Figure 8** presents collision type by environmental conditions at the time of the accident. It shows that the percentage of approaching (32%), SMV other (28%) and rear end collisions (26%) that occur during non-clear/inclement weather are higher than the average of 23% (of total collisions that occur during

non-clear environmental conditions). Therefore, environmental conditions may be more likely to be a contributing factor to those types of collisions.

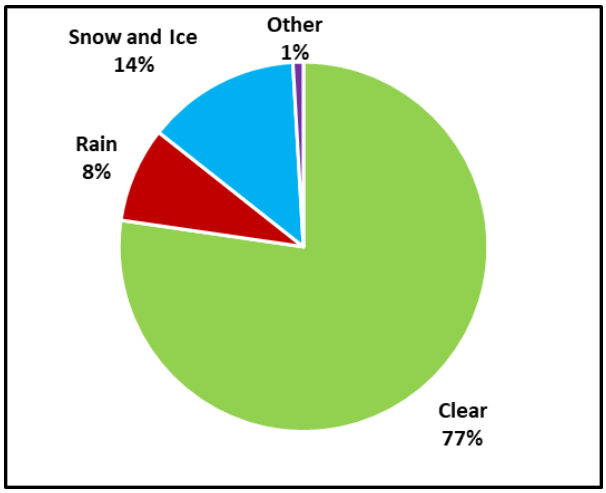
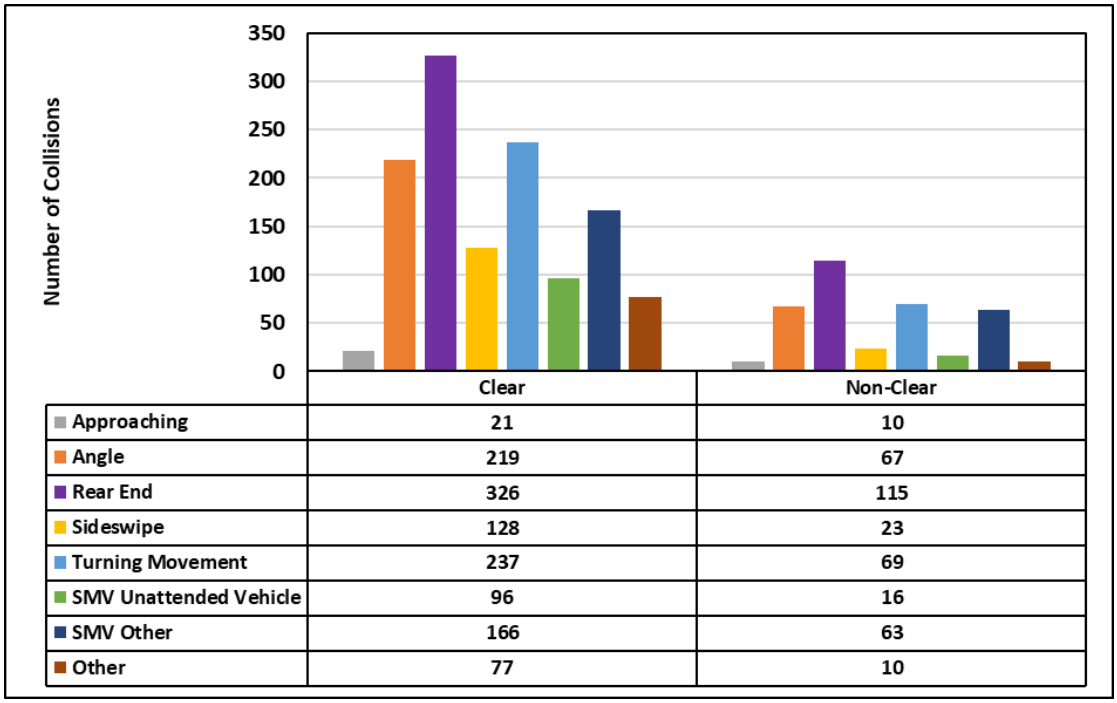


Figure 7 - Total Collision by Environmental Conditions



	Clear	Non-Clear
Approaching	21	10
Angle	219	67
Rear End	326	115
Sideswipe	128	23
Turning Movement	237	69
SMV Unattended Vehicle	96	16
SMV Other	166	63
Other	77	10

Figure 8 - Collision Type by Environmental Conditions

Time of Day and Year

Figure 9 illustrates collisions by month of the year. Since data for the entirety of 2023 was not available, only years 2017 to 2022 are shown. The figure shows that December is the month with the most collisions. In general, the rate of collisions is higher in the winter months (November to February) and the summer months (July and August). A potential explanation for this is that it gets darker earlier and there is an increased likelihood of inclement weather during the winter and there is more seasonal traffic in the summer.

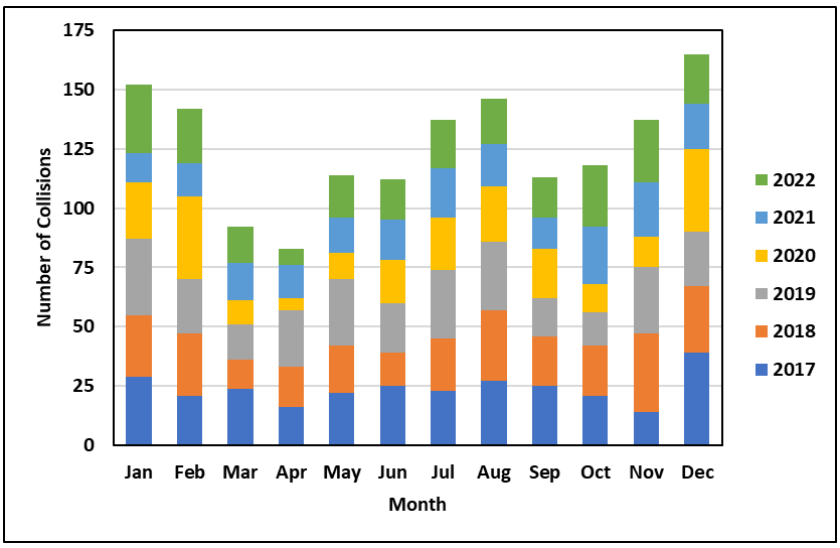


Figure 9 - Collision by Month of the Year

Figure 10 presents collisions by day of the week. The day with the most collisions is Friday with 19% of the total and the lowest is Sunday with 9%. The rest of the days of the week are between 12% and 16% of the total collisions.

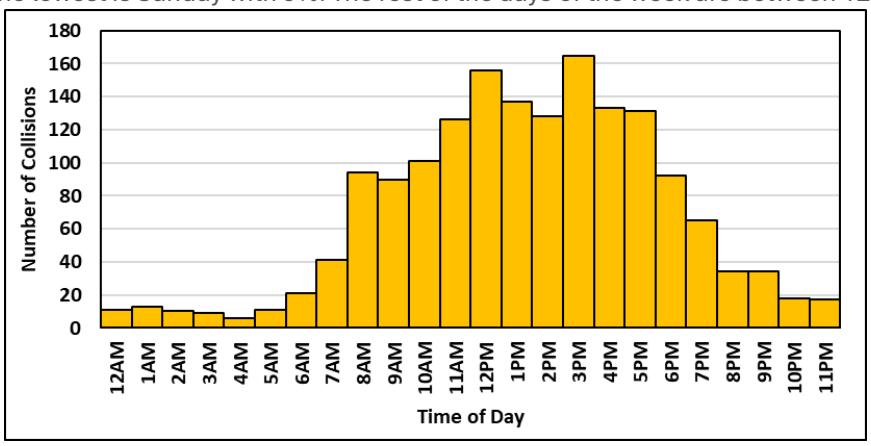


Figure 11 illustrates a histogram of collisions by time of day. As expected, most collisions occur during business hours, with the highest period being between 3pm and 4pm.

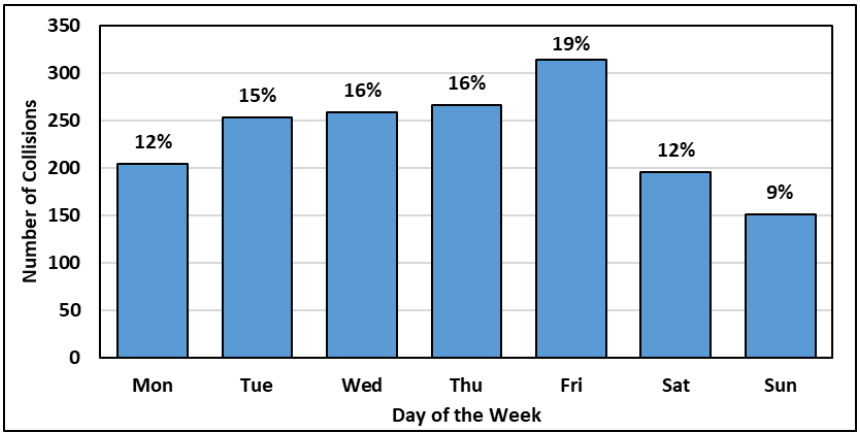


Figure 10 - Collisions by Day of the Week

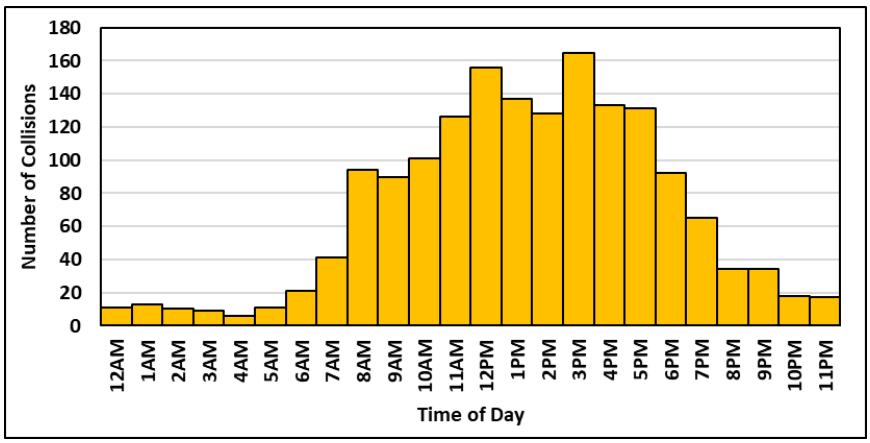
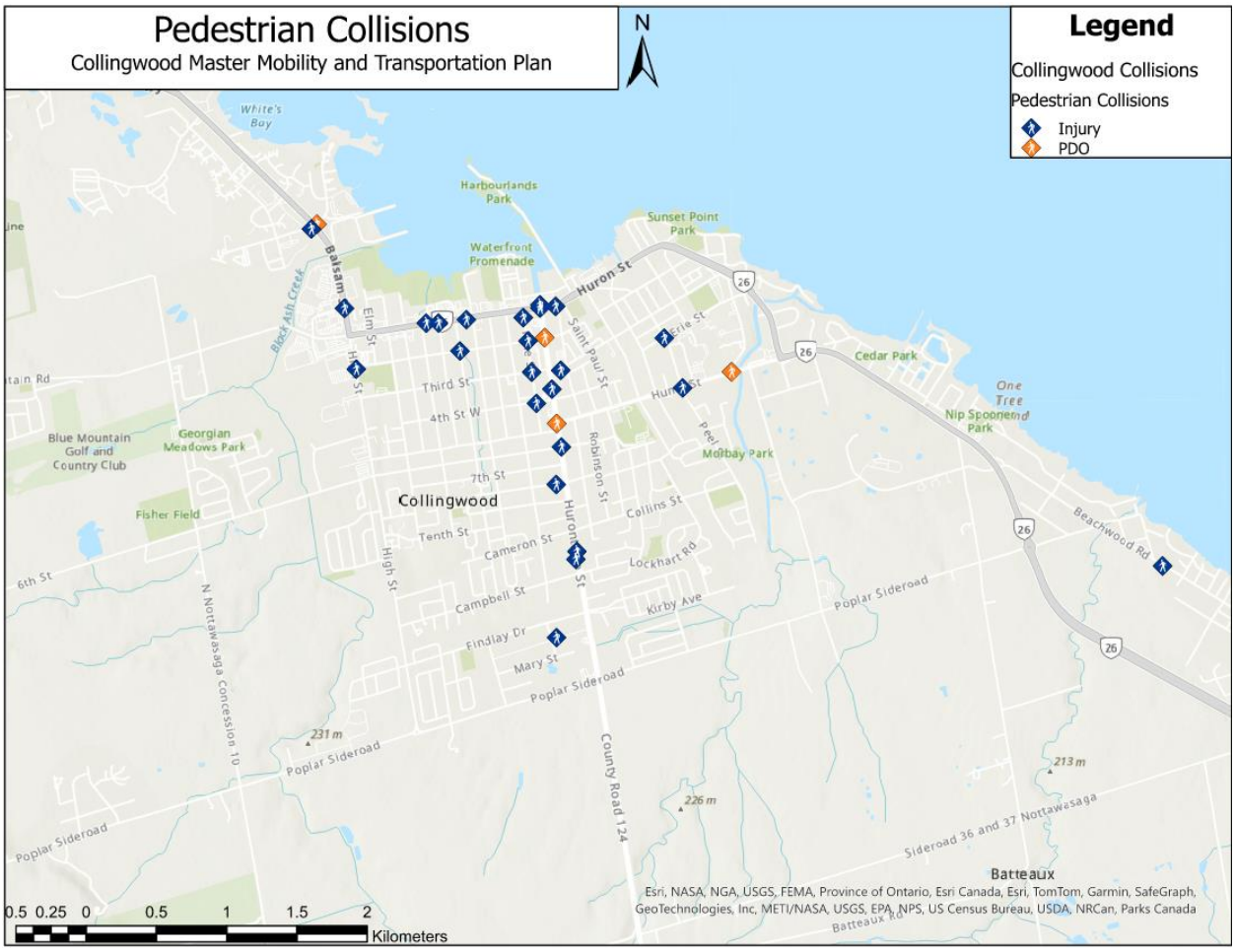
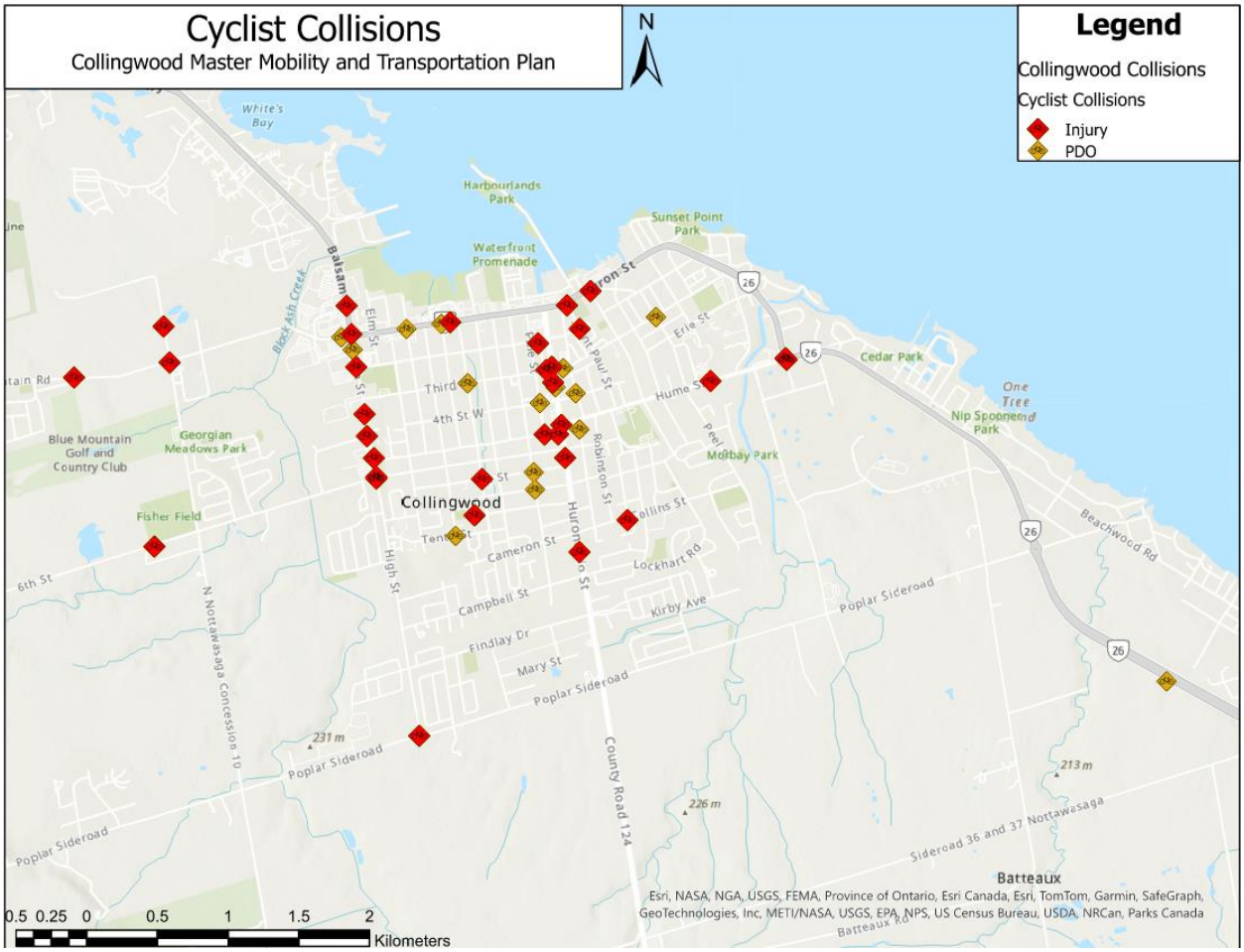


Figure 11 - Collision by Time of Day

Map 3 – Pedestrian collision distribution (can move to appendix if required)



Map 4 – Cyclist collision distribution (can move to appendix if required)



Pedestrian and Cyclist Collisions

Of the 1643 reported collisions considered for analysis, 28 involved a pedestrian. **Map 3** and **Map 4** illustrate the distribution of pedestrian and cyclist collisions throughout the Town. This is a frequency of approximately 4.2 pedestrian collisions per year. Of the 28 collisions involving a pedestrian, 24 (86%) resulted in an injury and 18 (64%) occurred at an intersection. There were three locations identified as having more than one pedestrian collision during the analysis period, all with two collisions. These are:

- The intersection of Balsam Street/Highway 26 & Harbour Street. This is a signalized intersection with signalized pedestrian crossings across all legs.
- The intersection of First Street/Huron Street & Hurontario Street. This is a signalized intersection with signalized pedestrian crossings across all legs.
- The road segment along Hurontario Street between Cameron Street/Collins Street and Poplar Sideroad.

Of the 1643 reported collisions considered for analysis, 49 involved a cyclist. This results in a frequency of approximately 7.4 collisions involving a cyclist per year throughout the Town. Of the 49 collisions, 32 collisions (65%) resulted in an injury and 28 collisions (57%) occurred at an intersection. When investigating the locations where collisions involving cyclists occurred, two road segments stood out. These were High Street between First Street and Sixth Street with eight collisions and Hurontario Street between First Street and Poplar Sideroad with seven collisions during the analysis period. According to the Town's *Cycling Plan (2019)* there are limited existing cycling facilities along these segments, consisting of multi-use sidewalks on High Street from First Street to approximately 60m north of Third Street and on Hurontario Street from Poplar Sideroad to approximately 220m north.

2.1. Collision Analysis Summary

Based on the results of the collision analysis the following can be observed.

- An average of approximately 248.9 collisions per year occurred throughout the Town during the analysis period.
- The most predominant collision types over the analysis period were rear end collisions followed by turning movement, angle, and SMV collisions. For collisions at intersections, the proportion of rear end, turning movement, and angle collisions increased.
    - Generally, rear end collisions may be caused by congestion, high travel speeds, inadequate clearance time, high number of access points, and driver distraction. Rear end collisions may also involve motorists following the vehicle ahead of them too closely.
    - Turning and angle collisions may be caused by congestion, high number of access points (as motorists try to turn into a driveway), inadequate sight distance, and driver distraction.
    - SMV collisions are generally attributed to the driver losing control of the vehicle, being impacted by a wild animal, or the driver condition.
- Of the 1,643 reported collisions included in the analysis 229 (14%) resulted in a non-fatal injury and one resulted in a fatality.
- The collision analysis indicated that about 82% of collisions occurred in daylight conditions and 77% of the collisions occurred in clear weather.
- The analysis indicates that adverse environmental conditions such as darkness and wet or snowy environmental conditions may be a contributing factor to approaching (head-on) and single motor vehicle collisions.

- The rate of collisions is higher in the winter months (November to February) and the summer months (July and August).
- There were 28 collisions that involved a pedestrian and 49 collisions that involved cyclists during the analysis period. The proportion of these collisions that resulted in an injury is significantly higher. This highlights that pedestrians and cyclists are vulnerable road users whose safety while using the transportation network must be carefully considered and prioritized.

3. Network Screening

The objective of the network screening analysis is to identify sites with the potential to reduce future collision frequency and severity. The results serve as a starting point for future investigation and are not indicative of any specific deficiency or safety issue. The next step is for the Town to conduct a safety review at specific locations and identify appropriate countermeasures. Considering *Vision Zero*, the evaluation and prioritization of locations will focus on collision severity and collisions involving vulnerable road users (pedestrians and cyclists).

3.1. Methodology

For the analysis outlined in this memorandum, the following methodology was used.

i) Identification of the locations to be screened. Intersections and road segment locations throughout the Town were considered.

ii) Selection of performance measures. The primary measures considered were fatal/injury collision frequency and frequency of collisions involving vulnerable road users. Additionally, collision frequency and collisions rates were calculated and reviewed at each location.

iii) Evaluation of performance measures to compare and rank locations. This is followed by the compilation of a prioritization list of intersections and road segments for potential improvements and further investigation.

3.2. Identification of Locations

Intersection and road segment locations throughout the Town were considered for network screening. These locations include, at a minimum, all arterial roads throughout the Town and all intersections[3] with a collision frequency of greater than 1.5 collisions per year during the analysis period[4]. Additional locations were considered based on a review of the total collision heat map (**Map 1**) and the injury collision heat map (**Map 2**), both presented in Section 2.

In total, 19 intersections and 37 road segments throughout the Town were included as part of the network screening analysis. Note that the road segments include collisions at the intersections in between the bounding roads. A complete list of intersections and road segments included as part of the analysis is provided in **Appendix A.** These locations contain 1,303 of the 1,643 (79%) total collisions and 195 of the 230 (85%) collisions resulting in an injury or fatality that occurred during the analysis period.

3.3. Performance Measures

Considering *Vision Zero* and the desire to prioritize active transportation users, the primary performance measures selected for this network screening analysis are fatal/injury collision frequency and frequency of

[3] Note some these locations were evaluated as part of road segments.

[4] As noted in Section 2, the number of years used in the analysis period is 6.6 years.

collisions involving vulnerable road users (the number of these collisions that occurred over the analysis period).

Average collision frequency and collision rate were also calculated as part of the analysis. Average collision frequency (in collisions per year) is the total number of collisions divided by years in the analysis period, in this case 6.6 years.

Collision rate is a performance measure that considers traffic volumes and is calculated differently for intersections and road segments. While considering traffic volumes is helpful for analysis, collisions rates can sometimes prioritize locations with low traffic volumes and relatively low collision frequency. The average annual daily traffic (AADT) data used for the collision rate calculations came from GIS data provided by the Town. Where data was unavailable, Streetlight 2019 AADT data was used.

For intersections, the amount of traffic entering the intersection over the analysis period is calculated as shown in the **Equation 1**, where MEV is million vehicles entering and TEV is the total vehicles entering per day taken as the average daily traffic of each leg of the intersection divided by two (so that vehicles are not double counted). Next, the intersection collision rate (in collisions per million vehicles entering the intersection) is calculated as shown in **Equation 2**.

$$\textbf{Equation 1}: \quad MEV = \frac{TEV\ per\ day\ x\ 365\ x\ number\ of\ years}{1{,}000{,}000}$$

$$\textbf{Equation 2}: \quad Intersection\ Collision\ Rate = \frac{Number\ of\ Collisions\ in\ the\ n\ Year\ Period}{MEV\ for\ the\ n\ Year\ Period}$$

For road segments, the amount of traffic along the segment over the analysis period, in million vehicle kilometres (MVK), is calculated as shown in **Equation 3**, where AADT is annual average daily traffic, and the segment length is in kilometres. Next, the segment collision rate (in collisions per million vehicle kilometres) is calculated as shown in **Equation 4**.

$$\textbf{Equation 3}: \quad MVK = \frac{AADT\ x\ segemnt\ length\ x\ 365\ x\ number\ of\ years}{1{,}000{,}000}$$

$$\textbf{Equation 4}: \quad Segment\ Collision\ Rate = \frac{Number\ of\ Collisions\ in\ the\ n\ Year\ Period}{MVK\ for\ the\ n\ Year\ Period}$$

Collision rates at the selected intersection and road segments throughout the Town are presented in **Map 4**.

3.4. Evaluation and Prioritization of Locations

The selected performance measures were calculated as described in the previous section. To focus on fatal/injury collisions and collisions involving vulnerable road users, the following criteria was used to select locations for the prioritization list.

1. Include all locations with three or more collisions involving a pedestrian or cyclist over the analysis period.
2. Rank locations according to frequency of fatal/injury collisions and select approximately ten locations.

It was determined that locations with a low collision frequency (less than one collision per year) or no recorded injury collisions over the analysis period would not be considered for the ranking, since the lower number of collisions do not present a pattern indicative of a potential safety issue. Note that this does not mean that safety issues are not present at these locations. Locations outside of the of the Town's jurisdiction according to Schedule '6L of the Official Plan, were also not considered for the prioritization list such as Poplar Sideroad (County Road 32) and portions of Highway 26 under the jurisdiction of the Ministry of Transportation (MTO).

Table 1 shows the top 20 road segment locations and **Table 2** shows all 19 intersections ranked according to fatal/injury collision frequency. Locations with three or more collisions involving a pedestrian or cyclist are highlighted. More detailed tables showing input data are provided in **Appendix A**. Examining **Table 1,** the following can be noted:

- Eleven road segment locations are recommended to be prioritized for further investigation. These are the locations with the most fatal/injuries collisions (the cut-off for road segments being eight or more over the analysis period), as well as locations with three or more collisions involving a pedestrian or cyclist.
- The locations ranked highest are mostly arterial roads, with four of the top six location ranked according to fatal/injury collisions forming the 'L' shape of Huron Street, First Street and Balsam Street that comprises the main commercial area of the Town as well as the route vehicles would take to travel through the Town on Highway 26. It is also the corridor in the Town with the highest traffic volumes.
- Second Street between High Street and Hurontario Street stands out as a local road within the top five locations ranked according to fatal/injury collisions.
- High Street between First Street and Sixth Street had the most collisions involving vulnerable road users with six (the next highest was three), including five collisions involving cyclists.
- The following segments were ranked outside the top ten road segments in terms of collision severity but had three or more collisions involving vulnerable road users, therefore meeting the criteria to be a prioritized location. Note that Ontario Street and Third Street are the same road on either side of Hurontario Street and are collector roads that lead to the downtown area.
    - Ontario Street from Hurontario Street and Pretty River Pkwy,
    - Hurontario Street from Third Street/Ontario Street and Hume Street,
    - Third Street from Hurontario Street and High Street.
- There are some differences of a location's rank based on collision frequency versus collision rate. A potential factor leading to this are that these are segments with low AADT, which means even a small number of collisions can result in relatively high collision rate[5].

Examining **Table 2,** the following can be noted:

- Eight road intersection locations are recommended to be prioritized for further investigation. These are the locations with the most fatal/injuries collisions (the cut-off for intersections being three or more over the analysis period), as well as locations with three or more collisions involving a pedestrian or a cyclist.
- The locations with the most total collisions are not necessarily the intersections with the most fatal/injury collisions.
- Two intersections, High Street & Sixth Street and Hurontario & Hume Street, had the most collisions involving vulnerable road users, with three each.
- The first 12 intersections ranked are signalized intersections. Very few fatal/injuries collisions occur at the two roundabouts on the list.
- The top three ranked intersections are on Hurontario Street.

The results show that the locations with the most fatal/injury collisions and vulnerable road user collisions occur on arterial roads, in particular on Hurontario Street and the portion of Highway 26 (Huron Street, First Street, and Balsam Street), that runs through the main commercial area of the Town. Second Street between High Street and Hurontario Street is an outlier as a local road, which may be indicative of a potential safety issue. Additionally, High Street stands out as a location with a high frequency of cyclist collisions.

[5] For example, see Tenth Line between Mountain Road and Sixth Street in **Appendix A**.

Table 1 - Road Segment Summarized Network Screening Results

Street Name	Street From	Street To	Road Class	AADT	# of Col.	Col. Freq. (per yr.)	Col. Rate	Fatal/ Injury Col.	Ped. Col.	Cyclist Col.	Rank (Severity)	Meets Criteria
First St	Cedar St	Hurontario St	Arterial	27,000	107	16.2	2.246	13	1	1	**1**	Yes
First St	Hwy 26 W	Cedar St	Arterial	27,000	74	11.2	1.782	12	1	1	**2**	Yes
Huron St	Hurontario St	Ontario St	Arterial	20,000	55	8.3	0.788	12	1	2	**2**	Yes
High St	First St	Sixth St	Arterial	16,000	50	7.6	1.279	11	1	5	**4**	Yes
Second St	High St	Hurontario St	Local	4,000	44	6.7	3.352	10	2	1	**5**	Yes
Hwy 26 W	Harbour St W	First St	Arterial	20,000	61	9.2	1.507	9	1	1	**6**	Yes
Mountain Rd	Grey Rd 19	Tenth Line	Arterial	7,500	32	4.8	0.630	9		1	**6**	Yes
Hurontario St	Collins St	Poplar Sideroad	Arterial	15,000	26	3.9	0.677	8	2	1	**8**	Yes
Hurontario St	First St	Third St	Arterial	15,000	39	5.9	2.430	6	1	1	**9**	
Hume St	Peel St	Pretty River Pkwy	Arterial	14,000	28	4.2	1.129	6	1	1	**9**	
Poplar Sideroad[6]	Hurontario St	Hwy 26	Arterial	8,800	15	2.3	0.226	6	0	0	**9**	No
Ontario St	Hurontario St	Pretty River Pkwy	Collector	4,800	30	4.5	1.807	5	1	2	**12**	Yes
Hwy 26 W	Waterfalls Lane	Harbour St W	Arterial	20,000	26	3.9	0.341	5	0	0	**12**	
Hwy 26 E	Pretty River Pkwy	Beachwood Rd	Arterial	21,000	55	8.3	0.598	5	0	0	**12**	
Hurontario St	Third St	Hume St	Arterial	15,000	23	3.5	1.647	4	1	2	**15**	Yes
Hurontario St	Hume St	Collins St	Arterial	15,000	34	5.2	1.214	4	1	1	**15**	
Fifth St	High St	Hurontario St	Local	2,500	16	2.4	1.971	3	0	2	**17**	
Third St	High St	Hurontario St	Collector	4,000	28	4.2	2.139	3	1	2	**17**	Yes
Sixth St	Tenth Line	High St	Arterial	8,200	8	1.2	0.307	3	0	0	**17**	
Mountain Rd	Old Mountain Rd	Tenth Line	Arterial	7,500	14	2.1	0.719	2	0	0	**20**	

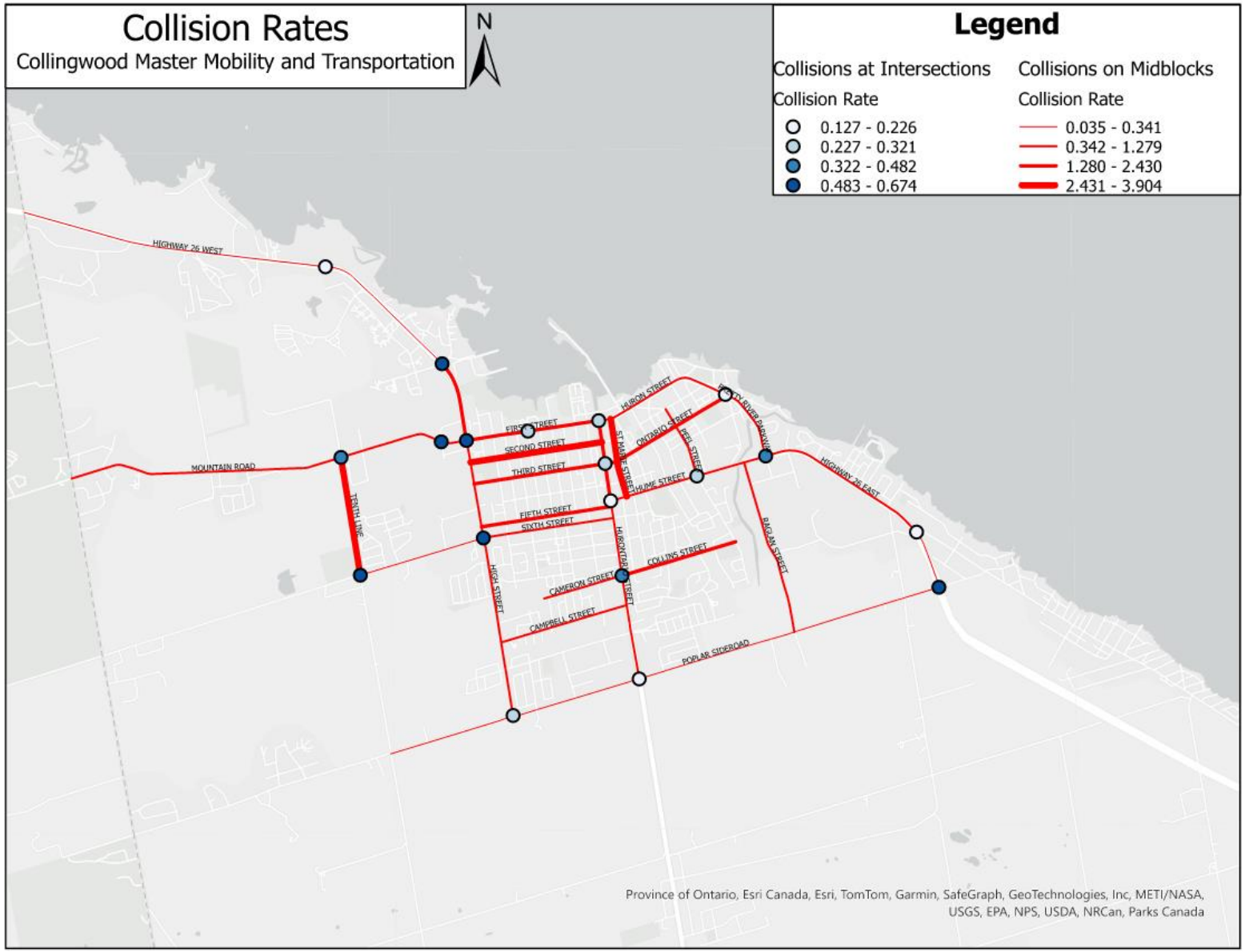
[6] Poplar Sideroad (County Road 32) is under the jurisdiction of the County of Simcoe.

Table 2 - Intersections Summarized Network Screening Results

Road 1	Road 2	Traffic Control	# of Col.	Col. (Freq.)	Col. Rate	Fatal/ Injury Col.	Ped. Col.	Cyclist Col.	Rank (Severity)	Meets Criteria
First St	**Hurontario St**	Signalized	21	3.2	0.281	6	2	0	**1**	Yes
Hurontario St	**Collins St**	Signalized	18	2.7	0.431	5	0	0	**2**	Yes
Hurontario St	**Third St**	Signalized	15	2.3	0.321	5	0	0	**2**	Yes
First St	**Balsam St**	Signalized	53	8.0	0.563	4	0	1	**4**	Yes
Balsam St	**Harbour St W**	Signalized	32	4.8	0.596	4	2	0	**4**	Yes
High St	**Sixth St**	Signalized	26	3.9	0.551	4	0	3	**4**	Yes
First St	**Cedar St**	Signalized	18	2.7	0.264	3	1	1	**7**	Yes
Hume St	**Pretty River Pkwy**	Signalized	26	3.9	0.390	2	0	2	**8**	
First St Ex	**Cambridge St**	Signalized	16	2.4	0.572	2	0	0	**8**	
Hurontario St	**Hume St**	Signalized	11	1.7	0.208	2	1	2	**8**	Yes
Hurontario St	**Poplar Sideroad**[6]	Signalized	10	1.5	0.178	2	0	1	**8**	No
Mountain Rd	**Tenth Line**	Signalized	9	1.4	0.482	2	0	1	**8**	
Sixth St	**Tenth Line**	All-Way Stop	14	2.1	0.674	1	0	0	**13**	
Hume St	**Peel St**	Signalized	12	1.8	0.311	1	1	0	**13**	
Pretty River Pkwy	**Ontario St**	Signalized	8	1.2	0.140	1	0	0	**13**	
High St	**Poplar Sideroad**[6]	Roundabout	7	1.1	0.318	1	0	0	**13**	No
Hwy 26[7]	**Poplar Sideroad**[6]	Roundabout	36	5.5	0.596	0	0	0	**17**	No
Hwy 26[8]	**Beachwood Rd**[9]	Signalized	13	2.0	0.203	0	0	0	**17**	No
Hwy 26	**Waterfalls Lane**	Signalized	11	1.7	0.224	0	0	0	**17**	

[7] Highway 26 at Poplar Sideroad (County Road 32) is under the jurisdiction of MTO.
[8] Highway 26 at Beachwood Road is under the jurisdiction of MTO.
[9] Beachwood Road at Highway 26 is under the jurisdiction of MTO.

Map 4 – Collision Rates (can move to appendix if required)



4. Recommendations

The network screening analysis results will provide valuable information to the ongoing development of the Master Mobility Transportation Plan in terms of identifying locations within the road network with potential safety issues and where vulnerable road users may be more at risk. It may also serve as reference point if the Town decides to formally adopt the *Vision Zero* and safe system approaches to road safety in the future.

The results serve as a starting point for future investigation. The next step is for the Town to conduct a safety review at specific locations and identify appropriate countermeasures, if applicable. For some locations, a cost-effective solution may not exist.

Based on the results of the network screening analysis, the following are the top eleven road segment locations throughout the Town, in no particular order of priority, that should be prioritized for further investigation.

- Balsam Street (Highway 26 West) from Harbour Street West to First Street,
- First Street from Cedar Street to Hurontario Street,
- First Street from Balsam Street (Highway 26 West) to Cedar Street,
- High Street from First Street to Sixth Street,
- Huron Street from Hurontario Street to Ontario Street,
- Hurontario Street from Collins Street/Cameron Street to Poplar Sideroad,
- Hurontario Street from Third Street/Ontario Street and Hume Street,
- Mountain Road from Grey Road 19/Grey Road 21 to Tenth Line,
- Ontario Street from Hurontario Street and Pretty River Pkwy,
- Second Street from High Street to Hurontario Street,
- Third Street from Hurontario Street and High Street.

The following are the top eight intersection locations throughout the Town, in no particular order of priority, that should be prioritized for further investigation.

- Balsam Street (Highway 26 West) and Harbour Street West,
- First Street and Hurontario Street,
- First Street and Balsam Street (Highway 26 West)/High Street,
- First Street and Cedar Street,
- High Street and Sixth Street,
- Hurontario Street and Collins Street/Cameron Street,
- Hurontario Street and Third Street/Ontario Street,
- Hurontario Street and Hume Street.

Of the locations identified, Second Street stood out as a local road (most locations identified are arterials roads) and High Street stood out as a road with a higher number of collisions involving cyclists. It should be noted that some road segments targeted for further investigation are bounded by intersections included on the list of intersections. For efficiency, the Town could explore the possibility combining the study of adjacent locations, depending on available resources.

Appendix A – Network Screening Analysis Results

Network Screening Analysis Results - Intersections

ID#	Road 1	Road 2	Traffic Control	Number of Legs	North Approach ADT	South Approach ADT	East Approach ADT	West Approach ADT	Combined ADT (TEV)	MEV	No. of Collisions	Collision Frequency (per year)	Collision Rate (Col. Per Mil. Km)	Fatal/ Injury Collisions	Pedestrian Collisions	Cyclist Collisions	Rank (Freq.)	Rank (Collison Rate)	Rank (Severity)	Vulnerable Road User Collisons	Location to be Priortized
3	FIRST STREET	HURONTARIO STREET	Signalized	3	0	15000	20000	27000	31000	74.679	21	3.2	0.281	6	2		6	13	1	2	Yes
12	HURONTARIO STREET	COLLINS STREET	Signalized	4	15000	15000	2500	2200	17350	41.796	18	2.7	0.431	5			7	8	2	0	Yes
11	HURONTARIO STREET	THIRD STREET	Signalized	4	15000	15000	4800	4000	19400	46.735	15	2.3	0.321	5			10	10	2	0	Yes
1	FIRST STREET	BALSAM STREET	Signalized	4	20000	16000	27000	15221	39111	94.217	53	8.0	0.563	4		1	1	5	4	1	Yes
5	BALSAM STREET	HARBOUR STREET WEST	Signalized	4	20000	20000	2300	2300	22300	53.721	32	4.8	0.596	4	2		3	3	4	2	Yes
9	HIGH STREET	SIXTH STREET	Signalized	4	16000	7000	8000	8200	19600	47.216	26	3.9	0.551	4		3	4	6	4	3	Yes
2	FIRST STREET	CEDAR STREET	Signalized	4	150	2400	27000	27000	28275	68.114	18	2.7	0.264	3	1	1	7	14	7	2	Yes
6	HUME STREET	PRETTY RIVER PARKWAY	Signalized	4	20000	350	21000	14000	27675	66.669	26	3.9	0.390	2		2	4	9	8	2	
4	FIRST STREET EX	CAMBRIDGE STREET	Signalized	4	350	150	15221	7500	11611	27.970	16	2.4	0.572	2			9	4	8	0	
7	HURONTARIO STREET	HUME STREET	Signalized	3	15000	15000	14000	0	22000	52.998	11	1.7	0.208	2	1	2	14	16	8	3	Yes
13	HURONTARIO STREET	POPLAR SIDEROAD	Signalized	4	15000	15000	8800	7750	23275	56.069	10	1.5	0.178	2		1	16	18	8	1	
14	MOUNTAIN ROAD	TENTH LINE	Signalized	4	150	350	7500	7500	7750	18.670	9	1.4	0.482	2		1	17	7	8	1	
15	SIXTH STREET	TENTH LINE	All-Way Stop	4	350	3000	8200	5700	8625	20.778	14	2.1	0.674	1			11	1	13	0	
8	HUME STREET	PEEL STREET	Signalized	4	2000	2000	14000	14000	16000	38.544	12	1.8	0.311	1	1		13	12	13	1	
17	PRETTY RIVER PARKWAY	ONTARIO STREET	Signalized	4	20000	20000	2500	4800	23650	56.973	8	1.2	0.140	1			18	19	13	0	
10	HIGH STREET	POPLAR SIDEROAD	Roundabout	3	7000	0	7750	3500	9125	21.982	7	1.1	0.318	1			19	11	13	0	
18	HIGHWAY 26	POPLAR SIDEROAD	Roundabout	4	21000	20000	350	8800	25075	60.406	36	5.5	0.596	0			2	2	17	0	
19	HIGHWAY 26	BEACHWOOD ROAD	Signalized	4	21000	21000	9250	1900	26575	64.019	13	2.0	0.203	0			12	17	17	0	
16	HIGHWAY 26	WATERFALLS LANE	Signalized	3	750	0	20000	20000	20375	49.083	11	1.7	0.224	0			14	15	17	0	

Network Screening Analysis Results - Road Segments

ID	Street Name	Street From	Street To	Road Class	Segment Length (km)	# of Lanes	Traffic Count	MVK	No. of Collisions	Collision Frequency (per year)	Collision Rate (Col. Per Mil. Km)	Fatal/ Injury Collisions	Pedestrian Collisions	Cyclist Collisions	Rank (Freq.)	Rank (Collision Rate)	Rank (Severity)	Vulnerable Road User Collisons	Location to be Priortized
20	FIRST STREET	CEDAR STREET	HURONTARIO STREET	Arterial	0.73	5	27000	47.634	107	16.2	2.246	13	1	1	1	5	1	2	Yes
25	FIRST STREET	HIGHWAY 26 WEST	CEDAR ST	Arterial	0.64	5	27000	41.535	74	11.2	1.782	12	1	1	2	9	2	2	Yes
7	HURON STREET	HURONTARIO ST	ONTARIO STREET	Arterial	1.45	4	20000	69.769	55	8.3	0.788	12	1	2	4	20	2	3	Yes
28	HIGH STREET	FIRST STREET	SIXTH STREET	Arterial	1.01	4	16000	39.087	50	7.6	1.279	11	1	5	6	13	4	6	Yes
1	SECOND STREET	HIGH STREET	HURONTARIO STREET	Local	1.36	2	4000	13.128	44	6.7	3.352	10	2	1	7	2	5	3	Yes
33	HIGHWAY 26 WEST	HARBOUR STREET WEST	FIRST STREET	Arterial	0.84	5	20000	40.473	61	9.2	1.507	9	1	1	3	11	6	2	Yes
13	MOUNTAIN ROAD	GREY ROAD 19	TENTH LINE	Arterial	2.81	2	7500	50.814	32	4.8	0.630	9		1	10	27	6	1	Yes
16	HURONTARIO STREET	COLLINS STREET	POPLAR SIDEROAD	Arterial	1.06	2	15000	38.393	26	3.9	0.677	8	2	1	15	24	8	3	Yes
29	HURONTARIO STREET	FIRST STREET	THIRD STREET	Arterial	0.44	2	15000	16.048	39	5.9	2.430	6	1	1	8	4	9	2	
26	HUME STREET	PEEL STREET	PRETTY RIVER PARKWAY	Arterial	0.74	3	14000	24.794	28	4.2	1.129	6	1	1	12	16	9	2	
22	POPLAR SIDEROAD	HURONTARIO STREET	HIGHWAY 26	Arterial	3.13	2	8800	66.364	15	2.3	0.226	6			23	32	9	0	
6	ONTARIO STREET	HURONTARIO STREET	PRETTY RIVER PARKWAY	Collector	1.44	2	4800	16.602	30	4.5	1.807	5	1	2	11	8	12	3	Yes
18	HIGHWAY 26 WEST	WATERFALLS LANE	HARBOUR STREET WEST	Arterial	1.58	3	20000	76.230	26	3.9	0.341	5			15	30	12	0	
34	HIGHWAY 26 EAST	PRETTY RIVER PARKWAY	BEACHWOOD ROAD	Arterial	1.82	5	21000	91.945	55	8.3	0.598	5			4	28	12	0	
37	HURONTARIO STREET	THIRD STREET	HUME STREET	Arterial	0.39	2	15000	13.962	23	3.5	1.647	4	1	2	18	10	15	3	Yes
27	HURONTARIO STREET	HUME STREET	COLLINS STREET	Arterial	0.78	2	15000	28.010	34	5.2	1.214	4	1	1	9	14	15	2	
19	FIFTH STREET	HIGH STREET	HURONTARIO STREET	Local	1.35	2	2500	8.118	16	2.4	1.971	3		2	22	7	17	2	
12	THIRD STREET	HIGH STREET	HURONTARIO STREET	Collector	1.36	2	4000	13.088	28	4.2	2.139	3	1	2	12	6	17	3	Yes
30	SIXTH STREET	TENTH LINE	HIGH STREET	Arterial	1.32	2	8200	26.019	8	1.2	0.307	3			28	31	17	0	
8	MOUNTAIN ROAD	OLD MOUNTAIN ROAD	TENTH LINE	Arterial	1.08	2	7500	19.468	14	2.1	0.719	2			24	22	20	0	
14	SIXTH STREET	HIGH STREET	HURONTARIO STREET	Collector	1.35	2	8000	25.963	27	4.1	1.040	2			14	18	20	0	
23	HIGH STREET	SIXTH STREET	POPLAR SIDEROAD	Arterial	1.83	3	7000	30.905	22	3.3	0.712	2			19	23	20	0	
32	PRETTY RIVER PARKWAY	ONTARIO STREET	HUME STREET	Arterial	0.79	4	20000	38.079	24	3.6	0.630	2			17	26	20	0	
3	TENTH LINE	MOUNTAIN ROAD	SIXTH STREET	Arterial	1.22	2	350	1.031	3	0.5	2.909	1			35	3	24	0	
9	PEEL STREET	SIMCOE STREET	HUME STREET	Collector	0.76	2	2000	3.674	4	0.6	1.089	1	1		33	17	24	1	
2	CAMERON STREET	END	HURONTARIO STREET	Collector	0.83	2	2200	4.402	5	0.8	1.136	1			32	15	24	0	
15	COLLINS STREET	HURONTARIO STREET	PEEL STREET	Collector	1.21	2	2500	7.306	11	1.7	1.506	1		1	25	12	24	1	
21	RAGLAN STREET	HUME STREET	POPLAR SIDEROAD	Collector	1.82	2	2500	10.956	7	1.1	0.639	1			30	25	24	0	
11	HUME STREET	HURONTARIO STREET	PEEL STREET	Arterial	0.92	3	14000	30.980	17	2.6	0.549	1		1	21	29	24	1	
4	HIGHWAY 26 WEST	SILVER GLEN BOULEVARD	WATERFALLS LANE	Arterial	1.46	3	20000	70.132	11	1.7	0.157	1			25	34	24	0	
31	HIGHWAY 26 WEST	GREY ROAD 21	SILVER GLEN BOULEVARD	Arterial	1.69	2	20000	81.391	11	1.7	0.135	1			25	35	24	0	
24	FIRST STREET EXTENSION	HIGHWAY 26 WEST	OLD MOUNTAIN ROAD	Arterial	0.26	5	15221	9.597	8	1.2	0.834			1	28	19	#N/A	1	
10	ST MARIE STREET	HURON STREET	HUME STREET	Collector	0.81	3	2500	4.867	19	2.9	3.904			1	20	1	#N/A	1	
35	HIGHWAY 26 EAST	BEACHWOOD ROAD	POPLAR SIDEROAD	Arterial	0.56	4	21000	28.558	1	0.2	0.035				36	37	#N/A	0	
5	POPLAR SIDEROAD	TENTH LINE	HIGH STREET	Arterial	1.31	2	3500	11.024	1	0.2	0.091				36	36	#N/A	0	
36	POPLAR SIDEROAD	HIGH STREET	HURONTARIO STREET	Arterial	1.34	2	7750	25.089	4	0.6	0.159				33	33	#N/A	0	
17	CAMPBELL STREET	HIGH STREET	HURONTARIO STREET	Local	1.34	2	3000	9.686	7	1.1	0.723				30	21	#N/A	0	