Subject: Niagara Annual Road Safety Report 2015 - 2019

Report to: Public Works Committee

Report date: Tuesday, June 15, 2021

Recommendations

1. That Report PW 32-2021, **BE RECEIVED** for information.

Key Facts

- The 2019 Niagara Annual Road Safety Report (NARSR) contains general information and collision statistics on Niagara region roads. The report primarily includes data collected for the years 2015 - 2019.
- Transportation Services have been encoding collisions for both regional and municipal roadways since January 2009 as recommended by Niagara Region Road Safety Committee to have better statistics for all collisions across the Niagara Region that will result in greater analysis and treatment. Accordingly, the collision data includes collisions on regional and local municipal roadways, with an appendix containing collision data for regional roads only.
- The statistics between the period of 2015 – 2019 show the total number of collisions in Niagara region continue to increase with an average of 5,695 collisions annually. The number of fatal and injury collisions has been consistent with an average of 736 collisions per year over the past five years. Although 2019 experienced the highest total number of collisions (6,238 collisions), the number of fatal and injury collisions was the lowest (678) in the past five years.
- Niagara region experienced one (1) collision every 89 minutes, two (2) injuries every day, one (1) fatal collision every forty (40) days, one (1) cyclist collision every two (2) days, and one (1) pedestrian collision every three (3) days.
- On average, the societal cost to the region during this reporting period exceeds $350 million per year, with the year of 2018 recording more than $380 million in societal collision costs. The year of 2016 had the highest societal cost of $428 million.
- Road safety is a shared responsibility and requires a commitment from the public and all the agencies to work together to make the roads safer for everyone. It is important that all road users understand their responsibilities when using roadways, whether they are operating a motor vehicle, riding a bicycle or walking.

- Transportation Services brought forward the Vision Zero Road Safety approach, which was approved by Regional Council in November 2019 to highlight the need and commitment to implement safer roads through many different technological and non-technological measures.
- Transportation Services is committed to implementing and working in partnership with the 12 Local Area Municipalities on the Vision Zero Road Safety Program.
- Transportation Services Staff will present Niagara Region's Vision Zero Road Safety Plan that will include a more extensive set of improvements, a collection of comprehensive, proactive and targeted initiatives, informed by data and aimed at eliminating injuries and fatalities on Niagara's roads.

Financial Considerations

Initial funding of the proposed immediate safety initiatives will be covered under the approved 2021 Transportation Services Operating Budget, including hiring a consultant to review and recommend a five-year Vision Zero Road Safety Action Plan.

The Niagara Region’s Vision Zero Program was approved by Council as part of the 2020 budget, contingent on approval by the local area municipalities (LAMS) of the required amendments to the intermunicipal agreement (IMA) in support of a financially sustainable Region-led Vision Zero Program. Programs of automated enforcement, including but not limited to, Red Light Camera and Automated Speed Enforcement, will be launched once the approval and execution of the required amendents to the IMA by all twelve LAMs and Regional Council has been completed.

Analysis

In November 2019, Regional Council adopted the Vision Zero Road Safety Program to be referred to the 2020 budget process. Next steps included Transportation Services Staff engaged in the preparation of a Vision Zero philosophy; a departure from the traditional approach of building roads or addressing concerns. To accomplish that, a thorough review of regional collision data was in progress with a key focus of prioritizing Vision Zero, based on data-driven decision-making that will include the following areas:

- Using predictive analytics to more effectively prioritize and target Niagara safety measures;
- Incorporating a social justice and equity lens;

- Implementing key performance monitoring and evaluation to measure the impact of the safety programs;
- Working with partners from Niagara Regional Police and Local Area Municipalities to acquire better data; and,
- Being active members of road safety advocate groups across Ontario and Canada, including the Transportation Association of Canada (TAC), Ontario Traffic Council (OTC), and Road Safety Committee of Ontario (ROSCO), to leverage lessons learned from other Municipalities and adopt the latest techniques with other road safety stakeholders. By continuing to work with road safety partners and monitoring trends captured in NARSR, Niagara Region will be able to develop new and innovative road safety strategies that will help save lives and keep Niagara's roads among the safest in Ontario.

Niagara Annual Road Safety Report (NARSR)

NARSR allows Niagara Region to monitor its progress in improving road safety year-by-year. The report provides valuable data and guides to areas that require more attention. As technology, vehicles, and attitudes evolve, so do transportation needs and demands. With shifting economic and demographic factors, new road safety challenges arise.

Moving forward, Transportation Services Staff will submit NARSR to Regional Council on an annual basis to provide valuable insights about long-term and emerging trends in Niagara and across other jurisdictions in North America. This report will be used as a tool for policy and program analysis and development, road safety research, public education and performance measurements.

Key components from the 2015 - 2019 collision data in Niagara Region identified the following:

#	Challenge Areas	Analysis
1	Weekdays	There is a strong correlation between the peak period of traffic and the number of collisions during weekdays. Most collisions, regardless of their severity occur in the AM peak of traffic (8:00 AM – 9:00 AM), mid-day peak of traffic (around noon), and PM peak of traffic (3:00 PM – 6:00 PM).
2	Weekend	The pattern of collisions during the weekend is different from weekdays. The number of collisions during weekends are smaller than weekdays, and the hours with the largest number of collisions are spread from 10:00 AM to 6:00 PM

#	Challenge Areas	Analysis
3	Surface Treatment	The majority of collisions (74%) occurred on dry surface conditions. Collisions that occurred on wet and snow/ice-covered road surfaces were (15.2%) and (10.5%) respectively. The percentages of fatal collisions by road surface condition is almost consistent with the percentages of total collisions; the statistics do not show that more severe collisions occur on non-dry road surface conditions
4	Intersections	Intersections constituted (50.6%) of all collisions in Niagara Region.
5	Signalized intersections	• (52.5%) of intersections collisions occurred at signalized intersections • Rear-end collisions were (46.4%) of all collisions at signalized intersections followed by angle collisions (18.3%). The rear-end collision trend is similar to other jurisdictions in Ontario, however the angle collisions being higher than in other municipalities. Red-light running could be a potential contributing factor to angle collisions.
6	Midblocks	Single motor vehicle (SMV) collisions constitute (48%) of total collisions followed by rear-end collisions (18%); promoting that several engineering countermeasures, including review of curves and left-turn lanes and increased enforcement activities, can improve road safety at midblock locations.
7	Vulnerable Road Users	• (84%) of pedestrian collisions resulted in an injury, and (2.6%) of pedestrian collisions resulted in a fatality • (68%) of cyclist collisions resulted in an injury, and (0.2%) of cyclist collisions resulted in a fatality • (69.9%) of pedestrian collisions occurred at intersections, and among those, (59.2%) occur at signalized intersections. • (68.4%) of cyclist collisions occurred at intersections among those, (46.8%) occur at signalized intersections.
8	Impaired Driving	Drug and alcohol were a contributing factor in (4.5%) of fatal and injury collisions.

#	Challenge Areas	Analysis
9	Distracted Driving	Distracted driving was a contributing factor to (25.1%) of fatal and injury collisions.
10	Aggressive Driving	Aggressive driving, including speeding, contributed to (19%) of all fatal and injury collisions.

For comparison purposes, recently available public data was obtained from a selection of Canadian jurisdictions. The table below provides fatal and injury collisions for 2018, normalized by 100,000 population. The same data for 2019 is not yet publicly available.

Table 1: Summary of Fatal and Injury Collisions for Various Canadian Cities

Region	Population	Fatal Collisions	Injury Collisions	Fatal+ Injury Collisions per 100,000 Population
Niagara Region	459,260	10	696	153.6
Halifax Region	430,601	14	745	176.3
City of Calgary	1,267,344	16	2496	198.2
City of Ottawa	1,070,338	26	2670	251.9
City of Hamilton	572,575	11	1551	272.8
Canada	37,058,856	1743	108,371	297.1

Breakdown of Collisions by Emphasis Area

On average, there were 722 injury and 13 fatal collisions per year on Niagara roads; fatal and injury pedestrian and cyclist collisions formed 13% and 9% of the total fatal and injury collisions in the region. These injuries and deaths affect the victims and their families and impact healthcare, the community, and social services.

Traffic collisions impose direct and indirect costs on society. Direct costs include property damage, emergency response services, hospital and medical care, insurance and traffic delays. Examples of indirect costs include human consequences such as victim disability, workdays lost and pain and suffering of victims and their families. The year of 2016 recorded the highest societal cost of collision with more than $433 million, while the year of 2014 was the lowest with $266 million.

Most of these collisions can be prevented through strategic and practical road safety initiatives that include, but not limited to: infrastructure planning and design changes;

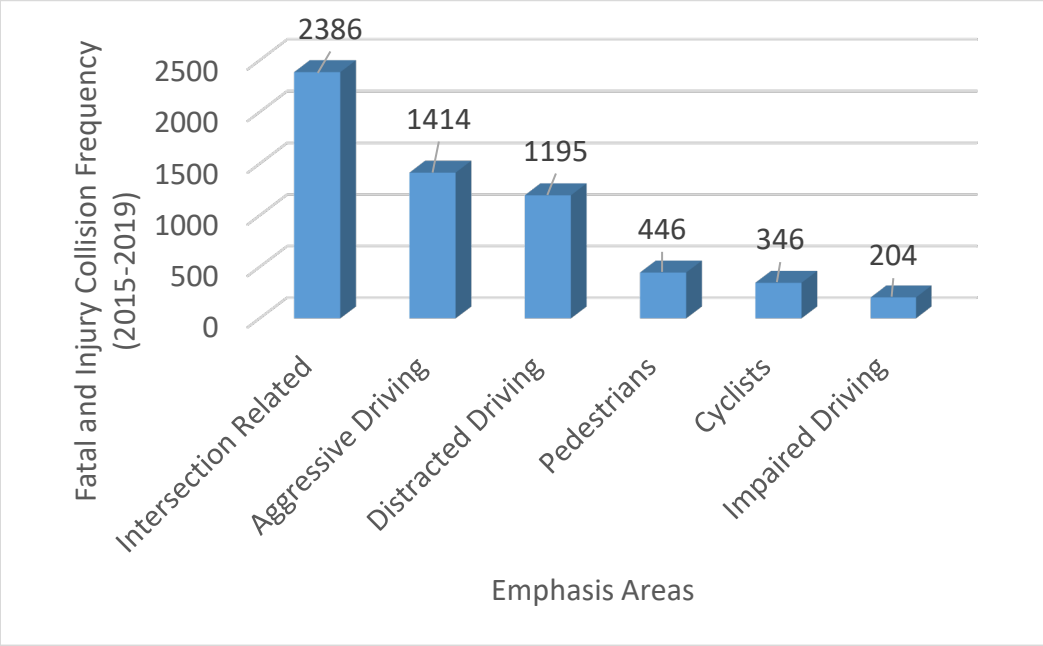
enforcement; public education; and empathy – putting one road user in the position of another to understand the consequences of their actions.

Table 2: Fatal and Injury Collisions (2015-2019)

Collision Severity	Driver/Passenger	Pedestrian	Cyclist
Fatal	55	13	1
Injury	2992	433	345
Percentage of Fatal and Injury Collision	79%	12%	9%

The following chart provides the two-year average collisions representing each of the emphasis areas identified in the Framework. There is a crossover between emphasis areas (i.e., one collision could occur at an intersection and involve aggressive driving and a pedestrian); therefore, these values do not add up to the total average number of fatal and injury collisions. Similarly, countermeasures targeting one emphasis area may impact others as well.

Graph 1: Fatal and injury collisions frequency per emphasis areas



Road Safety Update

Transportation Services Staff will continue to consult with other Niagara Region Departments on the Transportation Master Plan (TMP) and Complete Streets Design

Manual and Guidelines, with a comprehensive plan to improve road safety to include, but not limited to, the following:

- A review of best practices including Vision Zero from comparable jurisdictions;
- A review of existing Regional policies, strategies, and guidelines with respect to road safety;
- Enhanced analysis of Region-wide traffic collision data;
- Specific recommendations to improve road safety, particularly for pedestrians
- and cyclists, over short, medium, and long periods;
- An implementation plan and funding strategy, as appropriate;
- A regular reporting mechanism and tracking of progress;
- Continued consultation with the Niagara Active Transportation Committees and sub Committees, Niagara Student Transportation Boards, Niagara Catholic School Board, Niagara Regional Police, Niagara Public Health; Niagara Court Services; and,
- The creation of a Road Safety Task Force to be led by the Transportation
- Services Division.

Transportation Services implemented many initiatives over the years to address safety concerns or follow the updated regulations or best practices; such initiatives have become a regular part of the Annual Work Plan for the Division. The following is a list of some of those initiatives:

1. Completion of In-Service Safety Reviews at high-frequency collision intersections
   Work is in progress to identify short, medium and long-term countermeasures targeting all road users at seven locations in partnership with Mohawk College as per the attached map.

2. "Why Active Transportation Matter"
   As approved by the Regional Council, Transportation Services Staff initiated the annual grant program to Local Area Municipalities for Bike and Active Transportation Network improvements. As outlined in the Bikeways Master Plan, this promotes the provision for a safe, comfortable, and accessible Active Transportation (AT) network on all municipal streets. This is also a fundamental objective of Vision Zero as AT supports safety, accessibility, affordable transportation, physical activity, safe routes to school, ageing in place, and sustainable growth;

3. Addition of Ladder Crosswalks at Signalized Intersections Program;

4. Pedestrian Crossover Installation Program;

5. New Traffic Signal installation and Rehabilitation Program;

6. Audible/Accessible pedestrian signals upgrades;

7. Adopt A Road Program;

8. Dynamic speed boards;

9. School zone reviews and Safe Routes to School;

10. Pedestrian countdown signals upgrades and extended pedestrian crossing times review;

11. Enhancing road safety during the review and approval process of development applications;

12. Initiate policies and guidelines in the areas of access management, traffic impact studies;

13. Municipal 511:
    Similar to Ontario511, and in partnership with Local Area Municipalities and Niagara Emergency Services, Transportation Staff adopted Municipal 511 software for faster communication on road closures, emergency management, shared situational awareness, and reduced road works and event conflicts to ensure all road users' safety. An information report to PWC is forthcoming on this initiative;

14. SmartCity pilot project:
    Transportation Services installed Miovision SmartCity technology at two (2) regional intersections to calculate travel times between intersections, pedestrian compliance, red-light running, split trends and occupancy ratios. These intersections are actively being monitored twenty-four hours, seven days a week (24/7); and,

15. Community Safety Zones (CSZs):
    Transportation Services Staff launched twelve (12) new community safety zones in 2019 and 2020. The designation as CSZs is a tangible step to make Niagara streets safer, especially for vulnerable road users like children. This initiative has proven to lower driving speeds, when enforcement is available, and enhance safety for schoolchildren in our communities.

Preparation for Automated Enforcement Programs

Automated Speed Enforcement (ASE):

Niagara Region is negotiating the revision of the IMA with the local area municipalities following the province of Ontario's direction that all revenues generated from ASE be directed to road safety initiatives, community engagement and education.

Ontario enabled ASE in December 2019 when it passed regulations under the Safer School Zones Act to reduce speeds in school zones and community safety zones. The municipalities of Toronto, Hamilton, Brampton, York, Mississauga, Peel, Durham, Ottawa, and Waterloo have the cameras in operation.

The initial evaluation and feedback from those operational municipalities, the media and the ASE Steering Committee is that ASE is an effective strategy in: reducing vehicle speeds; reducing collisions resulting in fatalities or injuries; and reducing the overall number of collisions. This additional safety tool has been well-received by the public. It augments police enforcement, especially when placed in speed-related collision hot spots in a sustained and equitable way by broadly enforcing safe speed across all road users.

The Hospital for Sick Children is completing a safety review of 138 schools throughout Niagara Region to select sites to place the first cameras in Niagara Region Community Safety Zones; and to propose strategies for camera rotation, evaluation and expansion of the program. Agreements to operate the program with the Toronto Joint Processing Center (JPC) are in place. Transportation Staff are ready to operate the ASE cameras within 3-4 months of approval and execution of the amending agreement to the IMA. This timeframe considers the Ontario Ministry of Transportation (MTO) and Vendor outstanding agreements and time for camera delivery, installation, site testing, and coordination with MTO and JPC to launch the program.

Red Light Camera (RLC):

Red-light cameras have been in operation in Ontario since November 2000. The program and processes are well established and are well recognized by the court system for their high quality and proof of violations. Currently, eight municipalities are operating red light cameras. All parts of the process, from the equipment used to the processing of the violations, are identical for all participants. This is for legal and practical reasons.

Within the development of NARSR, it has been noted that red light running is a significant cause of severe collisions at signalized intersections. In Niagara, there are 210 four-legged signalized intersctions and 44 three-legged signalized intersections. At these intersections, 1,429 angle and 3,621 rear-end collisions were recorded as occurring between 2014 and 2018.

Accordingly, CIMA+ has been retained to identify the cost-benefit analysis, rank intersections based on their potential for collision reduction after installation of RLC and identify the key candidate approach for each intersection.

A staff report will follow with the business case to seek Council approval to enter into agreements with: MTO and JPC; and the Ontario approved RLC Vendor for the supply, installation and operation agreements. The operation of RLC in Niagara is subject to approval and execution of the amending agreement to the IMA.

Future Reports

Transportation Services Staff will bring forward the following reports that are in support of the Vision Zero Road Safety Programs and implementation as follows:

1. Approval to operate the RLC program in Niagara with supporting business case and cost-benefit analysis;
2. Status of the Complete Streets Design Manual and Guidelines;
3. Launching Municipal 511 similar to Ontario 511;
4. Status of Access Management Policies and Guidelines;
5. Five-Year Vision Zero Action Plan; and,
6. Update on the ASE program after implementation, including the interim evaluation and proposed expansion.

Relevant Consultation

To produce NARSR, Transportation Services Staff collected data from several different sources, including the Niagara Regional Police Service, Ontario Ministry of Transportation and other ministries, and the Chief Coroner's Office.

NARSR is generated from Niagara Region's TES software by extracting collision data received and verified by the Ontario Ministry of Transportation and Niagara Regional Police. Similar to other road safety leaders in the world, the development of the collision database provides the opportunity to evaluate the effectiveness of many different

countermeasures through implementation at strategic locations based on the collision data. The impact of the countermeasures being implemented today will be reflected in the data of future years as we progress towards zero.

Alternatives Reviewed

Not applicable to this report.

Relationship to Council Strategic Priorities

Alignment to Niagara Regional Council Strategic Priority

Priority 2: Healthy and Vibrant Community - Foster a high quality of life through safe, healthy, and inclusive neighbourhoods through the delivery of quality, affordable and accessible human services.

Priority 3: Responsible Growth and Infrastructure Planning - Sustainable investments in Transportation, transit and infrastructure, while aligning infrastructure planning with preservation of the natural environment.

NARSR is intended to be a living document for improving road safety in Niagara Region, and will be updated annually. Transportation Services Staff will develop and submit a Vision Zero Road Safety Action Plan to Regional Council; the Plan requires dedication, time and resources from each partner agency to ensure the goal is reached. Road safety is a shared responsibility and requires a commitment from the public and all the agencies to work together to make the roads safer for everyone. It is important that all road users understand their responsibilities when using roadways, whether they are operating a motor vehicle, riding a bicycle or walking.

As a strategy will be developed in consultation with Local Area Municipalities and a broad range of stakeholders, the Road Safety Strategic Plan will allow staff and partners to effectively deliver on Niagara Region *Community for Life* vision, to create a community that promotes mobility, walkability and various modes of Transportation within a built environment that promotes health and considers the long-term benefits for current and future generations.

Corporate Value: *Equity* - Inclusive, acting with compassion for the community

The Vision Zero Road Safety Action Plan is a critical part of building a safe and inclusive Region. It is an important mechanism to remove equity-seeking groups' barriers by prioritizing vulnerable road users. The Safe System approach will provide a transportation network with safer walking, cycling, and motor vehicle routes.

NARSR has investigated the relationship between Killed and Injury collisions (KIC) and other demographic factors, including children and older adults. The implementation of Vision Zero Road Safety Action Plan will use this analysis to target improvements where they will benefit residents most vulnerable to injury or death.

Another common concern is a perceived unequal distribution of infrastructure improvements. Vision Zero's data-driven approach focuses on unsafe road environment characteristics and KIC wherever they may be throughout the Region. Vision Zero is widely embedded in infrastructure improvements, including Complete Street Implementation and the upcoming update to the Transportation Master Plan.

Other Pertinent Reports

CDS 81-2020 Amending Agreement to the Niagara Region Courts Inter-Municipal Agreement

PW 2-2020 Implementation of Automated Speed Enforcement

PW 4-2020 Designation of Community Safety Zones around schools

PW 35-2019 Automated Speed Enforcement – Safer School Zones Act

PW 36-2019 Red Light Camera

PW 38-2019 Community Safety Zones

PW 64-2019 Vision Zero Road Safety Program

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Appendices

Appendix 1 2019 Niagara Road Safety Annual Report

Appendix 2 Corridor Map

PW 32-2021
Appendix 1

2019 Annual Collision Report

Niagara Region

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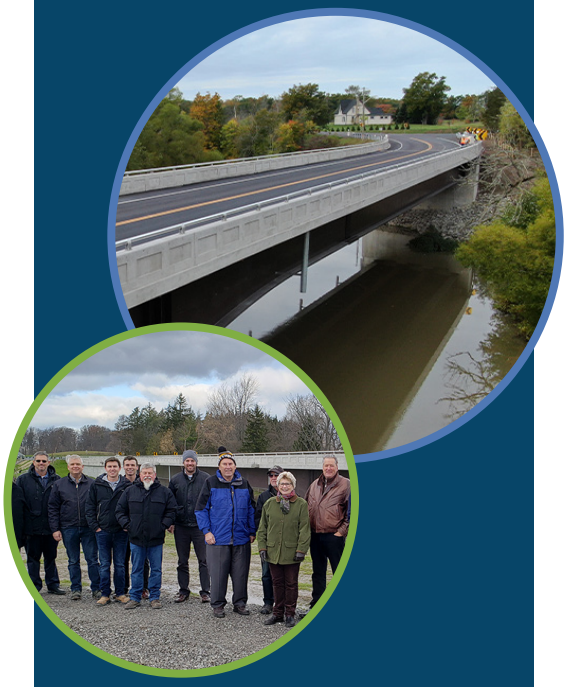
Disclaimer
The data presented in this report are based on the motor vehicle accident reports received by Niagara Region and available in the Region's database for 2015-2019 Additional in-depth analysis may be required to further verify and confirm the observations and inferences made from these data.

Executive Summary

This report presents an overview of the state of road safety in Niagara Region in 2019, based on the collision records supplied by Niagara Region's Public Works Department for the latest five years of 2015-2019. The analysis was conducted for collisions occurring on regional and municipal roads. Collisions occurring on provincial roads passing through Niagara and Niagara Parks commission roads are not in the scope of this report.

The highlights of this report are listed below:



General Collision Trends

The following general collision trends were noted:

- Niagara Region experienced around 5695 collisions per year in 2015-2019 on average.
- A review of the Region's collision data shows that the total number of collisions is continuously increasing. The number of fatal and injury collisions are consistent with an average of 736 collisions per year over the past 5 years. Although 2019 experienced the highest total number of collisions, the number of fatal and injury collisions was the lowest (678) in the past 5 years.
- The number of fatal collisions has fluctuated between 10 and 18 without any particular pattern.
- The majority of collisions (74%) occurred on dry surface conditions. Collisions occurred on wet and snow/ice covered road surfaces were 15.2% and 10.5% respectively. The percentages of fatal collisions by road surface condition is approximately consistent with the percentages of total collisions. In other words, the statistics do not suggest that more severe collisions occur on non-dry road surface conditions.
- Single Motor Vehicle (SMV) collisions constituted 47.4% of total collisions on midblocks followed by rear-end collisions (18.4%). This is an indication that further studies and analysis are necessary to improve road safety in the Region in addition to increased enforcement.
- Intersections constituted 50.6% of all collisions in Niagara Region. Among these collisions, 52.5% occurred at signalized intersections. Rear-end collisions were 46.4% of all collisions at signalized intersections followed by angle collisions (18.3%).

These observations are consistent with the Province of Ontario.

Temporal Trends

The following temporal trends were noted:

- The highest frequency of collisions occured during the months of November, December, and January. In fact, 29% (2015-2019) of total collisions took place during these three months.
- The months of April, July, and November experienced the highest frequency of fatalities based on 2015-2019 collision data. These observations are consistent with provincial statistics.
- More collisions and most fatal and injury collisions occurred during Fridays compared to any other day of week in Niagara Region. This observation holds true in the Province of Ontario. It is important to allocate more resources to the locations and times of day during Fridays to reduce collisions. The additional resources should be in the form of enforcement, educational campaigns, and engineering interventions.
- During weekdays, there is a strong correlation between the peak period of traffic and the frequency of collisions. In Niagara Region, most collisions, regardless of their severity, occur in the PM peak of traffic (2:30 PM – 6:00 PM), mid-day peak of traffic (around noon), and AM peak of traffic (8:00 AM – 9:00 AM).
- The pattern of collisions during weekends is different from weekdays. The frequency of collisions during weekends is less than weekdays and the hours with the highest frequency collisions spread from 10:00 AM to 6:00 PM.

Spatial Trends

The following spatial trends were noted:

- The intersection of Dorchester Road and Lundy's Lane in the City of Niagara Falls experienced the highest frequency of fatal and injury collisions (15 injury collisions during 2015-2019).
- The midblock (road section) along Welland Avenue between Grantham Avenue and Export Avenue under the jurisdiction of the City of St. Catharines experienced the largest number of injury collisions. (13 injury collisions during 2015-2019).

- The intersection of Church Street and Geneva Street in the City of St. Catharines experienced the highest frequency of injury pedestrian collisions.
- The highest frequency of collisions occurred in the City of St. Catharines among all municipalities in Niagara Region followed by the City of Niagara Falls with 33% and 24% of all collisions respectively. However, the highest frequency of collisions per population occurred in the municipality of Niagara on the lake, followed by Niagara region. The highest frequency of fatal collisions occurred in the City of Niagara Falls (13 fatal collisions in 2015-2019).

Vulnerable Road Users

The following trends and observations were noted for pedestrian and cyclist collisions:

- There were 93 pedestrian and 70 cyclist collisions in 2019. It appears that the number of pedestrian and cyclist collisions have decreased in the past 5 years.
- The highest frequency of pedestrian collisions occured in the month of November. One of the reasons is the short duration of daylight during this month.
- The highest frequency of cyclist collisions occured in July and generally during summer months.
- The highest frequency of pedestrian and cyclist collisions occured on Thursdays.
- 84.1% of pedestrian collisions resulted in an injury, and 2.6% of pedestrian collisions resulted in a fatality.
- 68% of cyclist collisions resulted in an injury, and 0.2% of cyclist collisions result in a fatality.
- 69.9% of pedestrian collisions occured at intersections, and among those, 59.2% occur at signalized intersections.
- 68.4% of cyclist collisions occured at intersections among those, 46.8% occur at signalized intersections.

Driver Behaviour

The following road user collision trends were noted:

- Distracted driving was a contributing factor to 25.1% of fatal and injury collisions.

- Drug and alcohol were a contributing factor in 4.5% of fatal and injury collisions.
- Aggressive driving contributed to 32% of all fatal and injury collisions (1165 injury collisions in 2015-2019).

Social Costs of Collisions

- Social cost figures were calculated, representing costs incurred by individuals directly involved in a collision and society at large in Niagara Region.
- The average societal cost of collisions in Niagara Region over 2015-2019 was more than $350 million.

Introduction

Niagara Region is committed to providing a safe transportation system for all road users including pedestrians and cyclists of all ages. This report provides an overview of collisions occurred in Niagara Region from 2015 to 2019. The data used in the preparation of this report are collisions that have occurred reported by Niagara Police Services and Accident Support Services.

Niagara Region road network consists of roads under the jurisdiction of Regional Municipality of Niagara and 12 local municipalities [1, 2, 3].

This report provides insight into trends, patterns, and characteristics of collisions occurred in the entire Niagara Region road network. Appendix A provides the same information for collisions which took place on the regional roads only. The main reason for this distinction is that the regional roads often have different traits compared to the municipal roads (e.g. higher volume of traffic, higher speed, different operational classification, and different geometric design). This report can assist in identifying potential safety issues and initiating the conversation to identify mitigative actions to improve safety for all road users of all ages.

Road safety is a complex and multidisciplinary subject. In Niagara Region, many professionals work together to provide a safe transportation system to our residents. These professionals include law enforcement, engineers, consultants, planners, public health staff, student transportation services, and educators.

1 Municipalities of Fort Erie, Grimsby, Lincoln, Niagara Falls, Niagara-on-the-Lake, Pelham, Port Colborne, St. Catharines, Thorold, Wainfleet, Welland, and West Lincoln

2 All provincial roads (QEW, Hwy 406...) serve the Niagara Region but collisions occurred on the provincial roads are not included in this document.

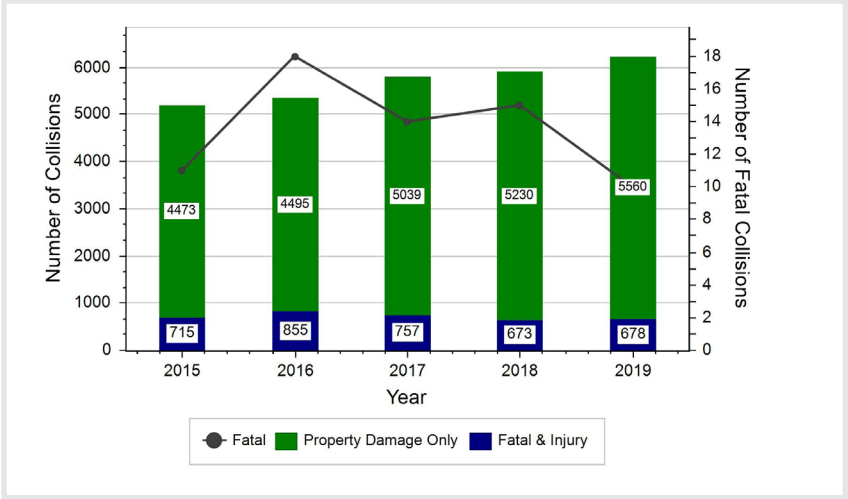
3 Collisions that occured on Niagara Parks Commision are not included.

- Niagara Region experiences around 5,695 collisions per year.
- Average number of fatal and injury collisions is 678 collisions per year over the last 5 years.
- Number of fatal and injury collisions have been consistent over the past 5 years; but 2019 had the lowest number of fatal collisions of the past 5 years (10 fatal collisions).
- Drivers in the age group of 20-29 have the highest frequency of drivers involved in collisions.

Frequency and Severity of Collisions

A review of the Region's collision data shows that the total number of collisions are continuously increasing. The number of fatal and injury collisions are almost the same over the past 5 years with an average of 722 injury and 13 fatal collisions per year. Although, 2019 experienced the highest total number of collisions (6,238), the number of fatal collisions was the lowest (10) in the past 5 years. Fatal and injury pedestrian and cyclist collisions constitute 13% and 9% of fatal and injury collisions.

The Region's plan is to continuously reduce the number of fatal and injury collisions as well as property damage only collisions through a coordinated and cohesive plan among all stakeholders.



Collision Frequency (2015-2019)

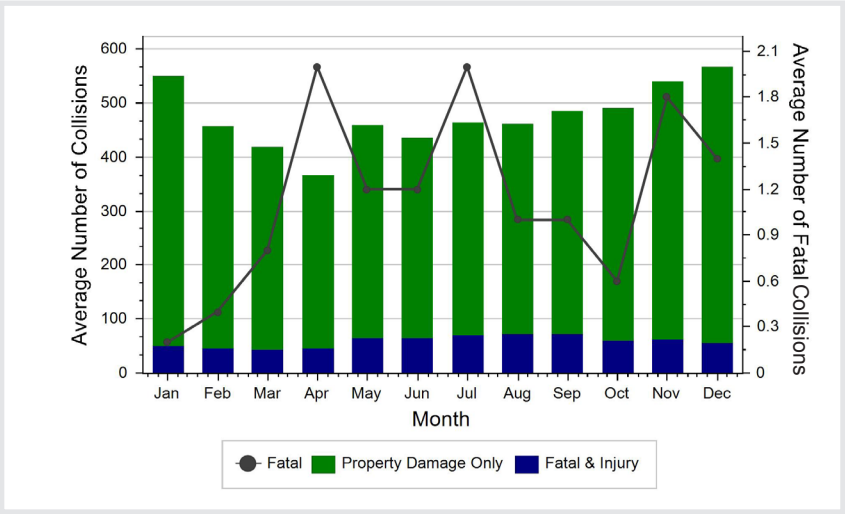
A review of available age of drivers involved in collisions in the past 5 years (2015-2019) shows that the age groups between 20-24 and 25-29 have the highest frequency of drivers involved in collisions.

Collisions by Driver Age, 5 Years (2015-2019)

Month, Day, and Time of Collisions

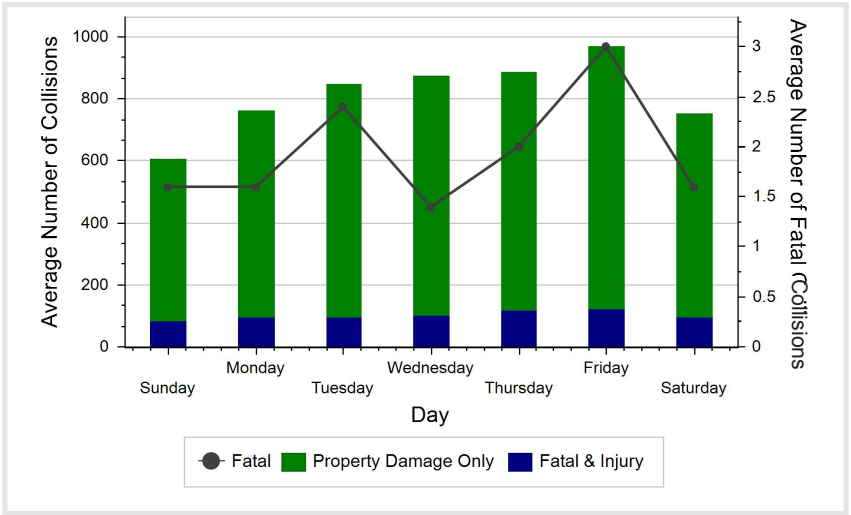
The highest frequency of collisions occurred during the months of November, December, and January. In fact, 29% of total collisions (2015-2019) took place during these three months which is consistent with provincial averages.

The months of April, July, November experienced the highest frequency of fatalities based on 2015-2019 collision data. These observations are consistent with similar provincial statistics.



Collisions by Month, Five Year Average (2015-2019)

Fridays saw more collisions occur compared to other days of the week. This observation holds true in the Province of Ontario. Additional resources in the form of enforcement and educational campaigns can be devised fro Fridays to improve safety.

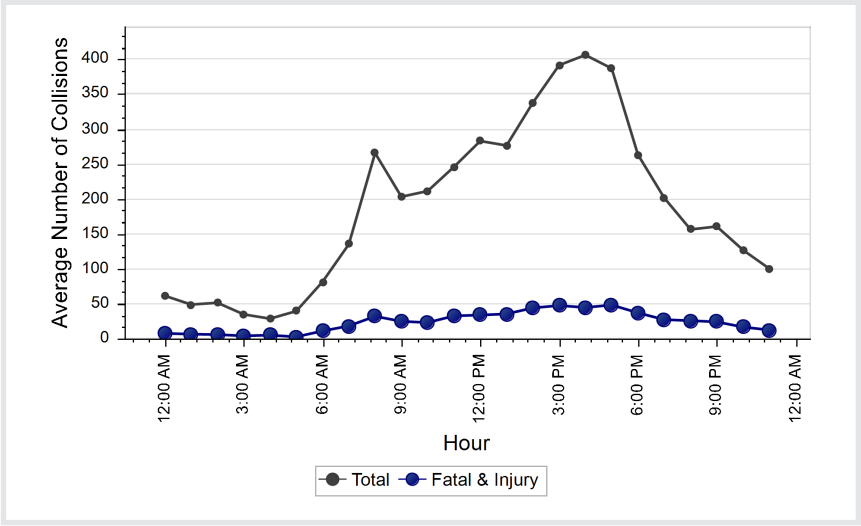


Collisions by Day-of-Week, Five Year Average (2015-2019)

- 29% of all collisions occured during the months of November, December, and January.

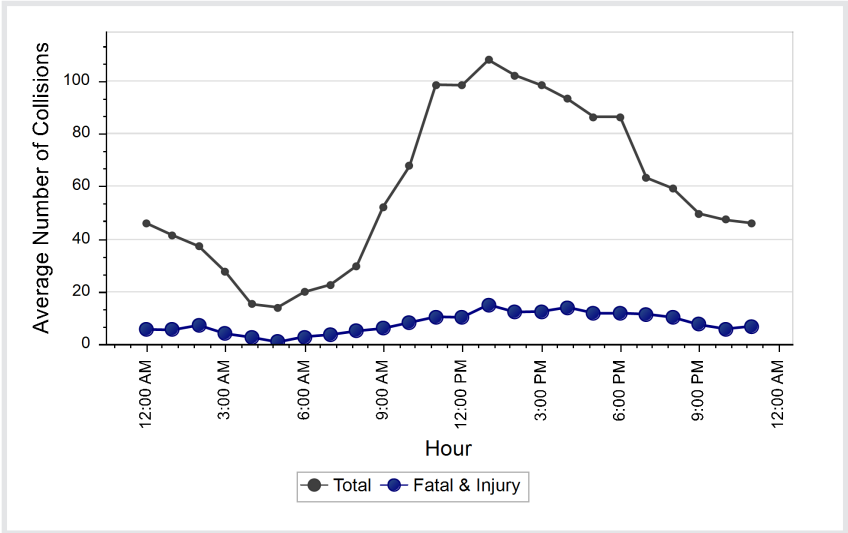
- More collisions and most fatal and injury collisions occur during Fridays compared to any other day of week.
- The highest frequency of collisions is between 2:30 PM and 6:00 PM consistent with PM peak of traffic.

During weekdays, there is a strong correlation between the peak period of traffic and the number of collisions. In Niagara Region, most collisions, regardless of their severity, occurred in the PM peak of traffic (2:30 PM – 6:00 PM), mid-day peak of traffic (around noon), and AM peak of traffic (8:00 AM – 9:00 AM).



Weekday Collisions by Time-of-Day, Five Years Average (2015-2019)

The pattern of collisions during weekends is different from the weekdays. The number of collisions during weekends was less frequent than weekdays and the hours with the highest frequency of collisions spread from 9:00 AM to 8:00 PM.

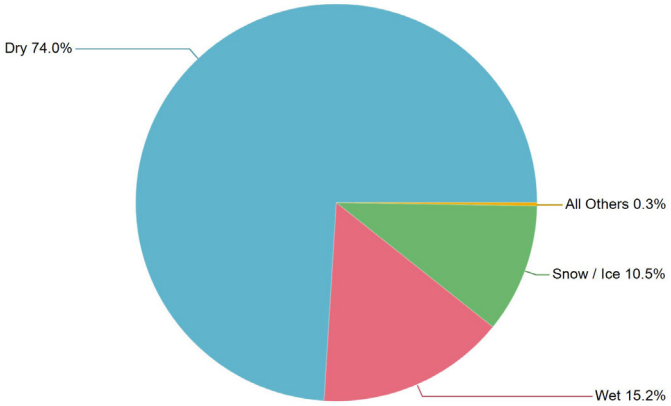


Weekend Collisions by Time-of-Day, Five Years Average (2015-2019)

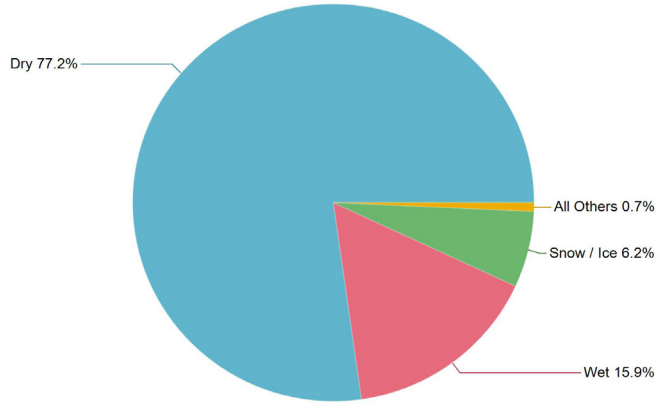
Collisions by Road Surface Condition

Water, ice, or snow reduce the friction between tires and the road surface. The reduced friction can contribute to collisions. A road and drainage designed according to standards in conjunction with proper road maintenance ensures that the rain runoff is quickly drained off the road surface. Niagara Region spends significant resources to ensure that their roads are properly maintained during Ontario's harsh winters and that road surfaces are cleared of snow and ice according to provincial standards and best practices.

The majority of collisions (74%) occurred on dry surface conditions. Collisions that occurred on wet and snow/ice covered road surfaces were 15.2% and 10.5% respectively. The percentages of fatal and injury collisions by road surface condition is approximately similar to the percentages of total collisions.



Collisions by Road Surface Condition, Five Years (2015-2019)



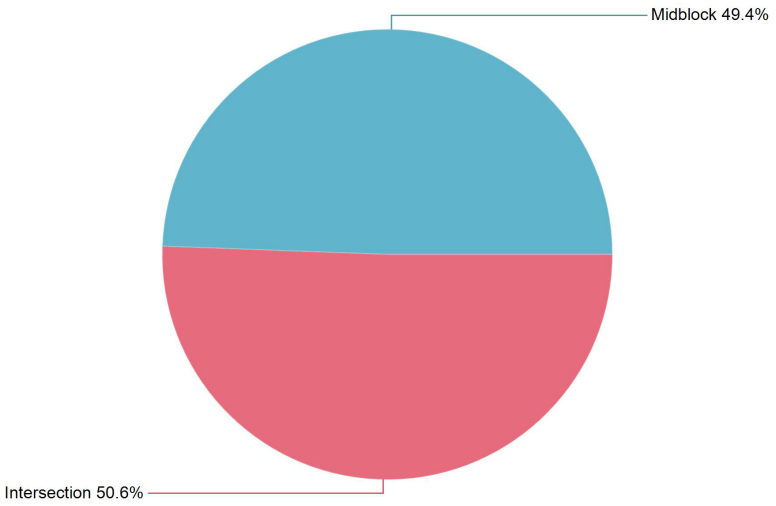
Fatal and Injury Collisions by Road Surface Condition, Five Years (2015-2019)

- The majority of collisions (74%) occurred on dry surface conditions.
- Collisions occurred on wet and snow/ice covered road surfaces were 15.2% and 10.5% respectively.
- There is no evidence to suggest that more fatal collisions occurred during non-dry surface conditions.

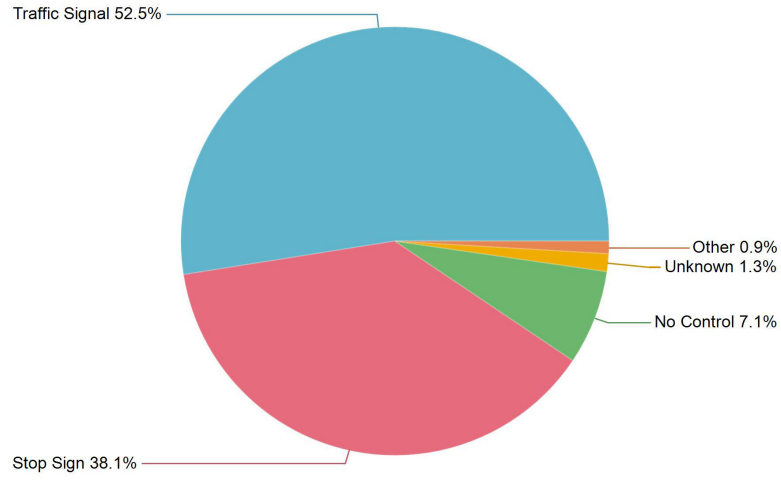
- 50.6% of all collisions occurred at intersections. Among those, 52.5% occurred at signalized intersections and 38.1% occurred at stop controlled intersections.
- It appears that red light cameras can potentially be an effective tool to improve safety at signalized intersections in Niagara Region.

Collision Impact Type

Collisions that occurred at intersections or were intersection-related constituted more than half of total collisions. This observation is consistent with other municipalities as intersections are major conflict points in a transportation network. Among those intersection collisions, more than half took place at signalized intersections. This observation shows that signalized intersections should be one of the priority areas in Niagara Region and that road safety programs such as Red Light Cameras can potentially be effective in improving safety in Niagara Region.



Collisions by Location, Five Years (2015-2019)



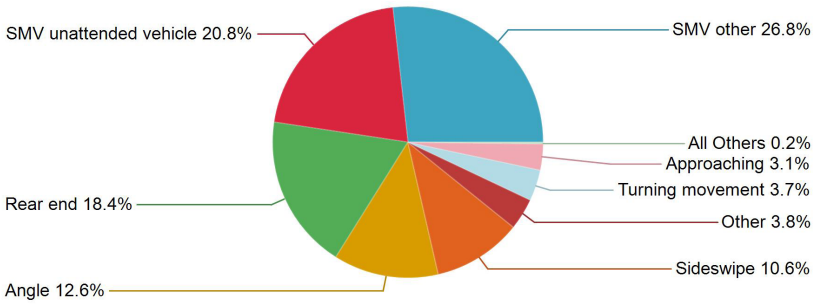
Intersections Collisions by Traffic Control Type, Five Years (2015-2019)

More fatal collisions occurred on road sections but more injury collisions happened at intersections.

Distribution of Collisions by Location (2015-2019)

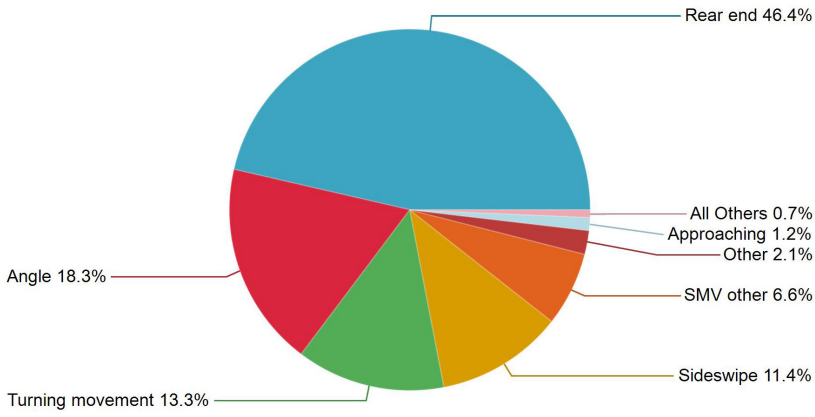
Location	Fatal	Injury
Intersections	42.6%	61.9%
Road Sections	57.4%	31.8%

Single Motor Vehicle (SMV) collisions constituted 47.6% of total collisions on midblocks followed by rear-end collisions (18.4%) This is an indication that several engineering countermeasures (e.g. review of curves and left turn lanes) and increased speed enforcement can improve road safety across the Region.



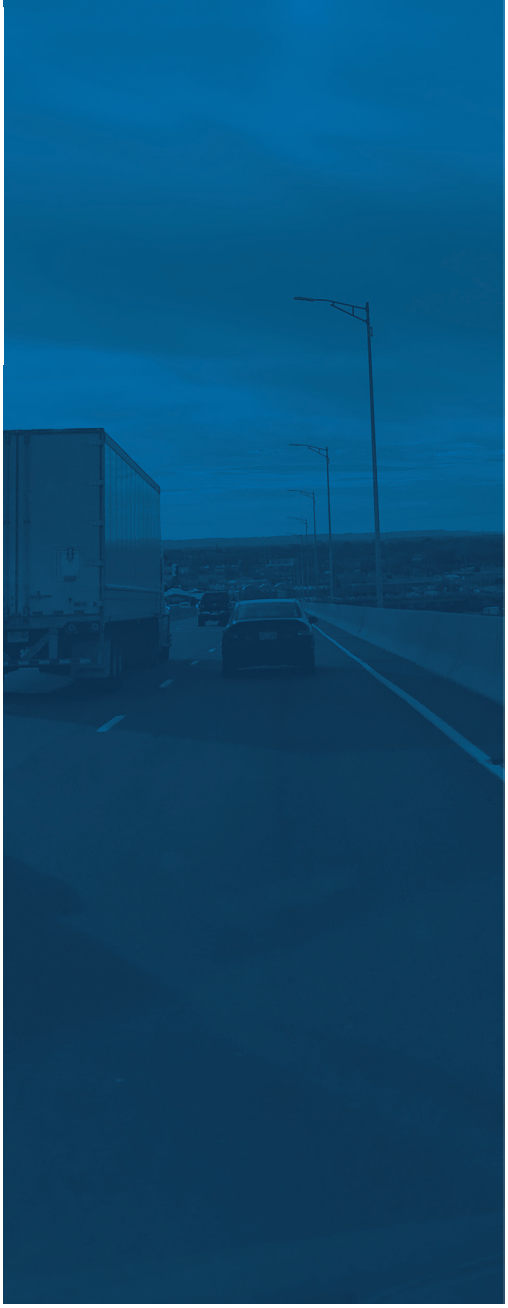
Midblock Collisions by Initial Impact Type, Five Years (2015-2019)

Rear-end collisions were the largest type of collisions (46.4%) at signalized intersections. This is consistent with other jurisdictions and the Province of Ontario. The second largest type of collision is angle collisions (18.3%). The percentage of angle collisions is higher than other municipalities.

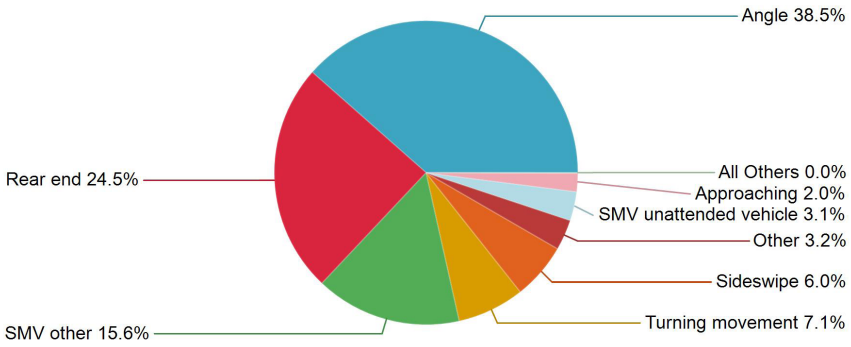


Signalized Intersection Collisions by Initial Impact Type, Five Years (2015-2019)

- 47.6% of total collisions on midblocks were single motor vehicle (SMV) collisions followed by rear-end collisions (18.4%).
- Rear-end collisions were the largest type of collisions (46.4%) at intersections followed by angle collisions (18.3%).
- More fatalities occurred on midblocks but more injuries occurred at intersections.



- Angle collisions were 35.8% of collisions at stop controlled intersections.



Stop Controlled Intersection Collisions by Initial Impact Type, Five Years (2015-2019)

Angle collisions were the largest type of collisions (35.8% at stop controlled intersections. This is consistent with other jurisdictions and the Province of Ontario. The second largest type of collision is rear-end (24.5%).

Intersections with the Highest Frequency of Fatal and Injury Collisions, 5 Years (2015-2019)

Description	Municipality	Jurisdiction	Collision Frequency
Dorchester Road at Lundy's Lane	Niagara Falls	Regional	15
Niagara Street at Vine Street / Facer Street	St. Catharines	Regional	14
Lundy's Lane at Montrose Road	Niagara Falls	Regional	14
Drummond Road at Lundy's Lane	Niagara Falls	Regional	13
Dorchester Road at Thorold Stone Road	Niagara Falls	Regional	12
Dorchester Road at McLeod Road	Niagara Falls	Regional	12
Kalar Road at Lundy's Lane	Niagara Falls	Regional	11
Drummond Road at McLeod Road	Niagara Falls	Regional	11
Carlton Street & North Service Road at Geneva Street	St. Catharines	Regional	10
Prince Charles Drive North at Thorold Road	Welland	Regional	10
Niagara Street at Woodlawn Road	Welland	Regional	10
East Main St/Schisler Road at Moyer Road/Doans Ridge Road	Niagara Falls	Regional	10
McLeod Road at Oakwood Drive/Ramp	Niagara Falls	Regional	10
Neilson Avenue at Welland Avenue	St. Catharines	Municipal	10

Road Sections with the Highest Frequency of Fatal and Injury Collisions, 5 Years (2015-2019)

Description	Municipality	Jurisdiction	Collision Frequency
Welland Avenue between Grantham Avenue & Export Avenue	St. Catharines	Municipal	13
Ontario Street between Byron Avenue & Scott Street West	St. Catharines	Regional	9
Lundy's Lane between Allanport Road & Highway 58 & Centre Street	Thorold	Regional	9
Stevensville Road between Bertie Street & Gorham Road & Bowen Road	Fort Erie	Regional	7
Oakwood Drive between McLeod Road & Ramp & Montrose Road	Niagara Falls	Municipal	5
Main Street between Barker Street & Peer Street & Ferry Street & Lundy's Lane	Niagara Falls	Municipal	5
Lundy's Lane between Drummond Road & Leonard Ave	Niagara Falls	Regional	5
South Pelham Road between Balsam Street & Sumbler Road	Welland	Regional	5
King Street between Eleventh Street & Thirteenth Street	Lincoln	Regional	5

Speeding and aggressive driving contribute to severity and frequency of collisions. In Ontario, speeding related collisions constituted 14.7% of total fatalities in 2019[1]. Police collision reports identify the at-fault driver action which potentially contributed to the collision.

The following actions are categorized as aggressive driving:

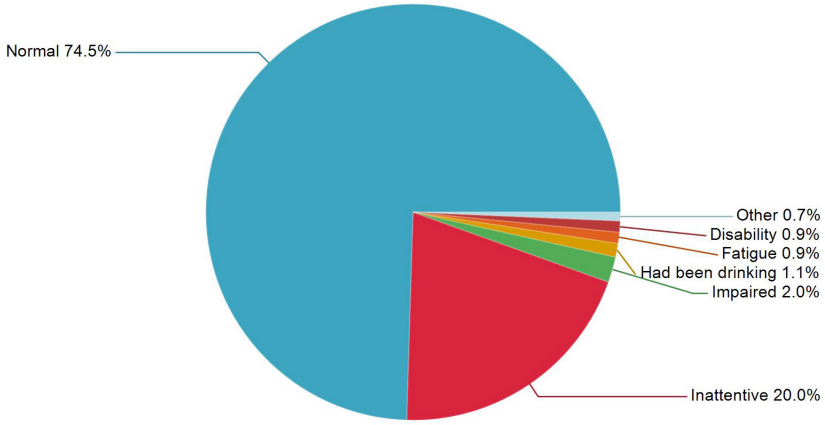
- Following too close
- Speed too fast
- Exceeding speed limit
- Lost control

Based on 2015-2019 collision data, aggressive driving contributed to 31.6% of all collisions.

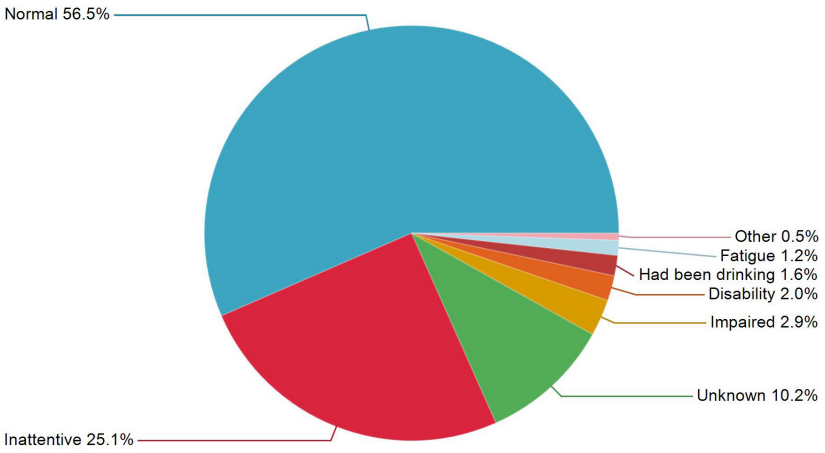
1 Ontario Road Safety Annual Report, 2019, Page 1

- Aggressive driving contributed to 31.6% of all collisions.
- Distracted driving contributed to 25.1% of fatal and injury collisions.
- Drug and alcohol contributed to 3.1% and 4.5% of total collisions and fatal and injury collisions in 2015-2019 respectively.

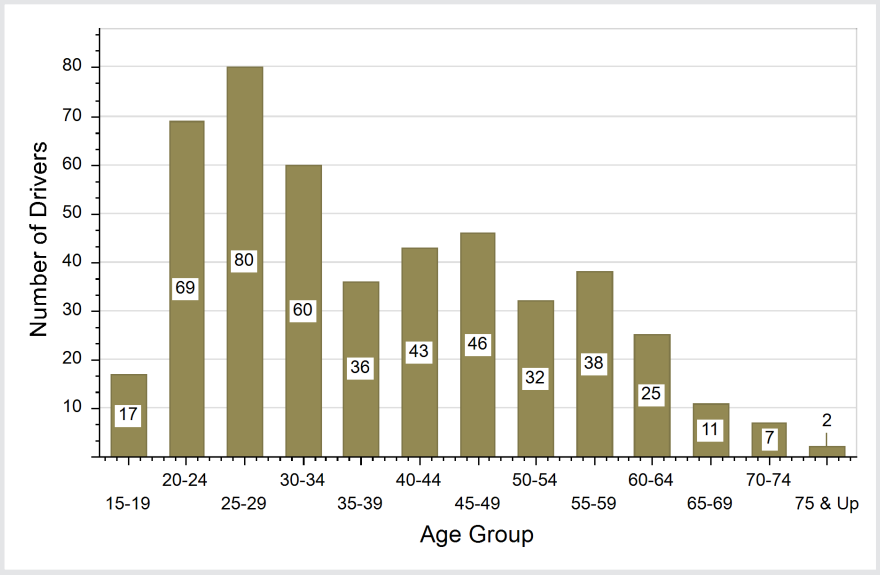
Distracted driving is one of the leading contributing factors to collisions in many jurisdictions including the Province of Ontario. It is difficult to identify whether a driver, cyclist, or pedestrian was distracted at the time of a collision. Based on the observations made by the police officers, in 25.1% of fatal and injury collisions, drivers were inattentive (distracted) in 2015-2019 collisions. It is quite conceivable that the actual percentage of distracted driving collisions is likely higher.



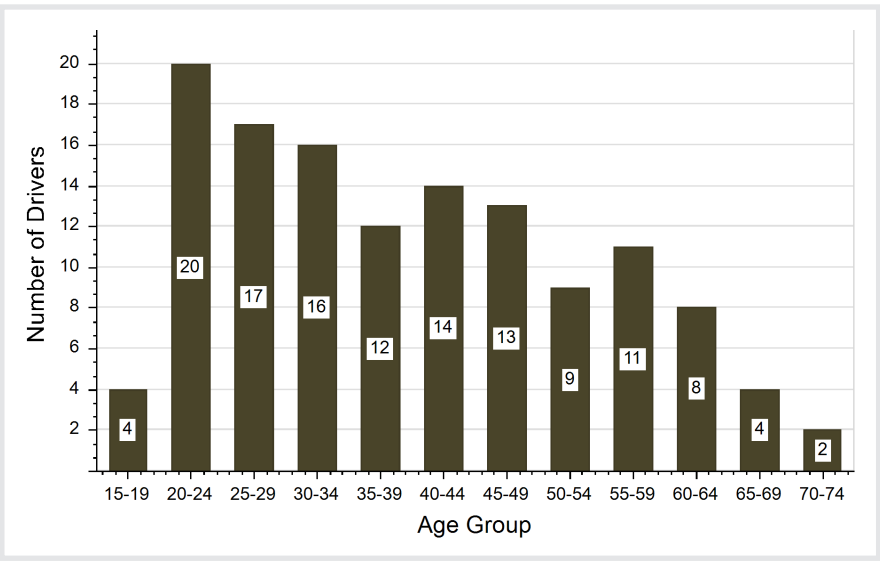
Collisions by At-Fault Driver Condition, 5 Years (2015-2019)



Fatal and Injury Collisions by At-Fault Driver Condition, 5 Years (2015-2019)



Impaired Drivers by Age, 5 Years (2015-2019)



Impaired Drivers in Fatal and Injury Collisions by Age, 5 Years (2015-2019)

It appears that the age groups of 20-24 and 25-29 contributed to more collisions involving an impaired driver compared to any other age group in Niagara Region.

The City of St. Catharines experienced the highest frequency of collisions in Niagara Region, and the City of Niagara Falls experienced the highest frequency of fatal collisions in 2015-2019.

The Town of Niagara-on-the-Lake experienced the largest number of collisions per capita. West Lincoln expereinced the largest fatal collisions per capita.

- Age groups 20-24 and 25-29 contribute to more impaired driving collisions.

Frequency of Collisions in Niagara Region by the municipality (2015-2019 collisions)

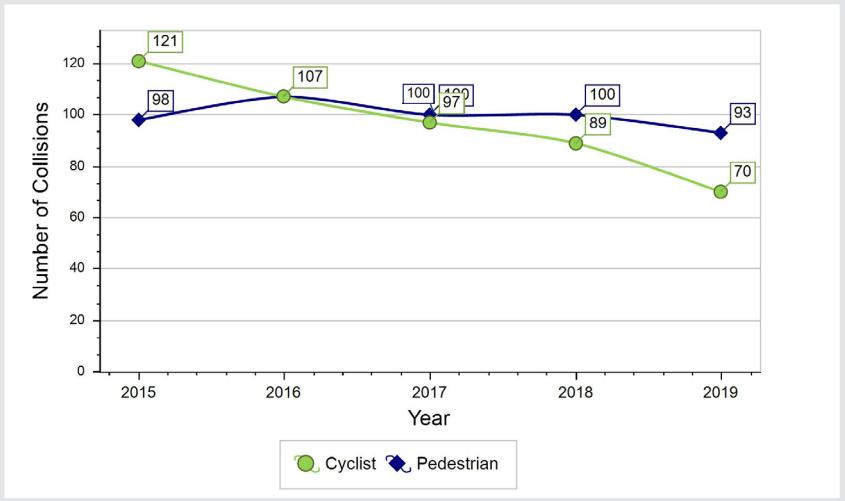
Municipality	Population	Number of Collisions				Number of Collisions per 1000 Population			
		Fatal	Injury	PDO	Total	Fatal	Injury	PDO	Total
St. Catharines	133,113	12	1,007	8,333	9,352	0.09	7.57	62.60	70.26
Niagara Falls	8,8071	13	859	6,047	6,919	0.15	9.75	68.66	78.56
Welland	52,293	7	405	2,754	3,166	0.13	7.74	52.66	60.54
Fort Erie	30,710	7	207	1,168	1,382	0.23	6.74	38.03	45.00
Niagara on the Lake	17,511	1	207	1,169	1,377	0.06	11.82	66.76	78.64
Thorold	18,801	3	126	1,031	1,160	0.16	6.70	54.84	61.70
Lincoln	23,787	5	173	972	1,150	0.21	7.27	40.86	48.35
Grimsby	27,314	3	155	932	1,090	0.11	5.67	34.12	39.91
Pelham	17,110	2	124	817	943	0.12	7.25	47.75	55.11
Port Colborne	18,306	3	126	666	795	0.16	6.88	36.38	43.43
West Lincoln	14,500	8	157	628	793	0.55	10.83	43.31	54.69
Wainfleet	6,372	4	64	274	342	0.63	10.04	43.00	53.67
Haldimand	45,608	0	0	4	4	0.00	0.00	0.09	0.09

Pedestrian and Cyclist Collisions

Pedestrians and cyclist collisions often result in injury or fatality. Niagara Region in partnership with local municipalities strives to create a safe road network for pedestrians and cyclists. It appears that the number of pedestrian collisions has fluctuated between 105 and 93 in the past 5 years. In 2019, Niagara Region experienced 93 pedestrian collisions which were the lowest in the past 5 years. The number of cyclist collisions decreased from 2015 to 2019 with 2019 experiencing the lowest number of cyclist collisions (70).

It appears that the frequency of pedestrian and cyclist collisions are fortunately less compared to similar jurisdictions in Ontario.

It is notable that the walking and cycling mode shares are small in Niagara Region.



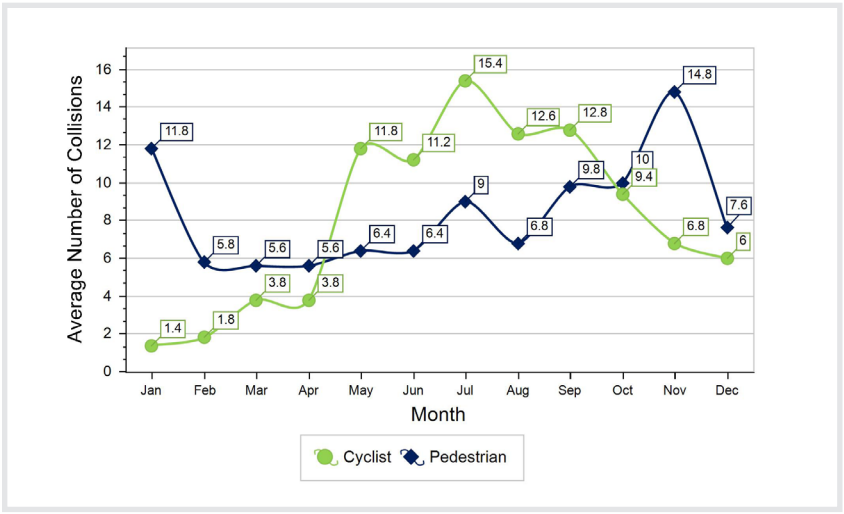
Collisions Involving Pedestrians and Cyclists (2015-2019)

The highest frequency of pedestrian collisions occurred in the month of November. One of the reasons is the short duration of day light during this month. Educational campaigns can assist in reducing the frequency of pedestrian collisions during this month.

The highest frequency of cyclist collisions occurred during the summer months when the highest frequency of cyclists ride on the Region's transportation system.

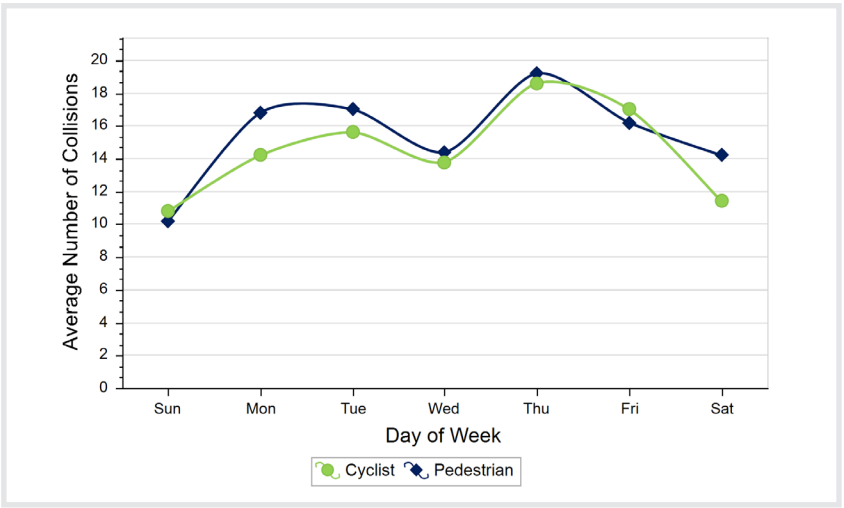
- 93 Pedestrian Collisions occurred in 2019, the lowest in the past 5 years.
- 70 cyclist collisions occurred in 2019 the lowest in the past 5 years.

- The highest frequency of pedestrian collisions occurred in November.
- The highest frequency of cyclist collisions occured in July.
- Thursdays experienced the highest frequency of pedestrian and cyclist collisions.

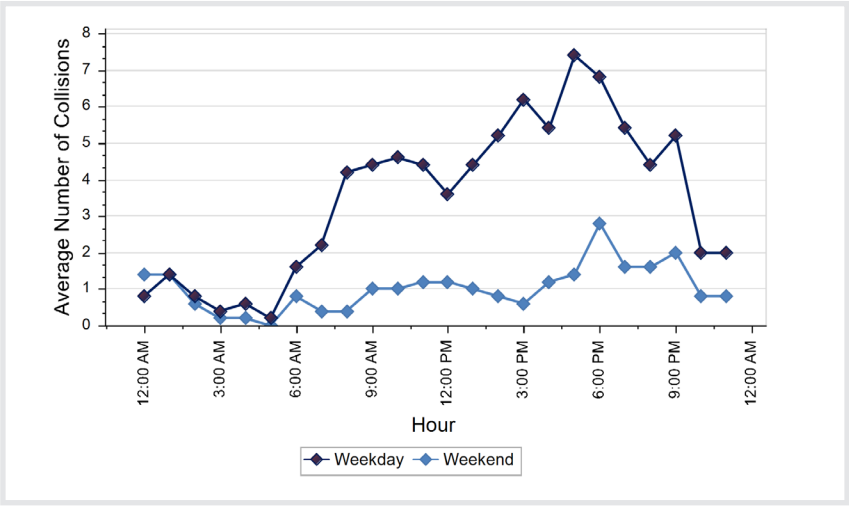


Collisions Involving a Pedestrian or Cyclist by Month, Five Year Average (2015-2019)

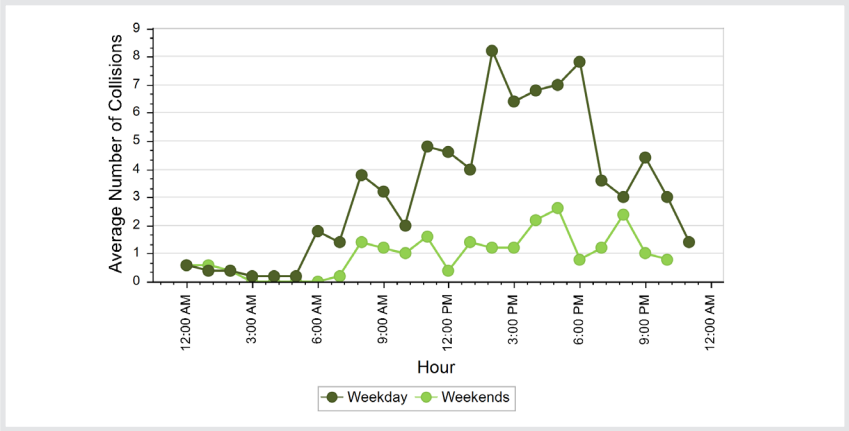
The highest frequency of pedestrian and cyclist collisions occurred on Thursdays unlike total number of collisions (Fridays experienced the highest frequency of collisions).



Collisions Involving a Pedestrian or Cyclist by Day of Week, Five Year Average (2015-2019)



Collisions Involving Pedestrians or by Time of Day, Five Year Average (2015-2019)



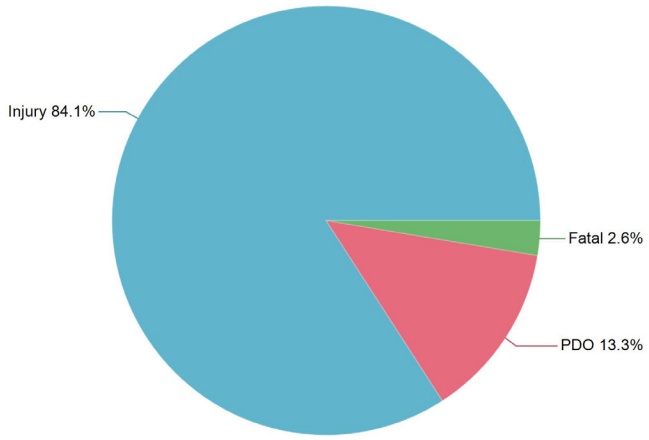
Collisions Involving Cyclist by Time of Day, Five Year Average (2015-2019)

Locations with the Highest Frequency of Pedestrian Fatal and Injury Collisions (2015-2019)

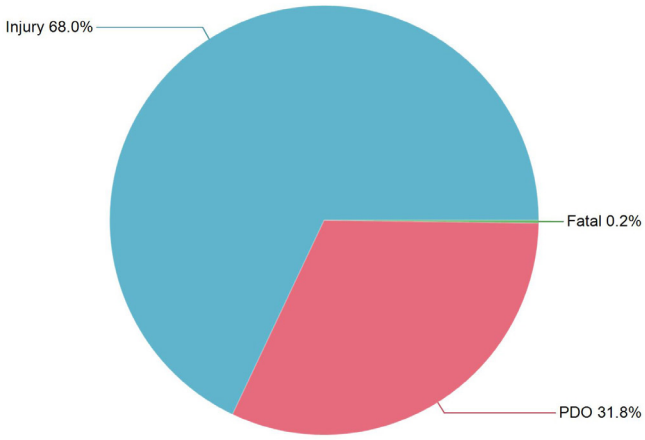
Description	Municipality	Jurisdiction	Collision Frequency
Church Street at Geneva Street	St. Catharines	Regional	5
Ontario Road at Wright Street	Welland	Municipal	4
King Street at Lincoln Street	Welland	Municipal	4
Hellems Avenue/Plymouth Road at Lincoln Street	Welland	Municipal	4
Lundy's Lane between Beaverdams Road & Kalar Road	Niagara Falls	Regional	3
Lakeshore Road between Geneva Street & Shoreline Drive	St. Catharines	Regional	3
Lundy's Lane between Carlton Avenue & Prince Edward Avenue & Corwin Avenue	Niagara Falls	Regional	2
Main Street between Barker Street & Peer Street & Ferry Street & Lundy's Lane	Niagara Falls	Municipal	2
Ridge Road North between Cutler Street & Hershey Street & Dominion Road	Fort Erie	Municipal	2

- 81.4% of pedestrian collisions resulted in an injury and 2.6% of pedestrian collisions resulted in a fatality.
- 68% of cyclist collisions resulted in an injury and 0.2% of cyclist collisions resulted in a fatality.
- 69.9% of pedestrian collisions occurred at intersections.
- 59.2% of these collisions occured at signalized intersections.

Pedestrian collisions are more severe than other types of collisions. Based on 2015-2019 collision data, 81.4% of pedestrian collisions resulted in an injury and 2.6% of pedestrian collisions resulted in a fatality. More than 68% of cyclist collisions result in an injury and 0.2% of cyclist collisions result in a fatality.

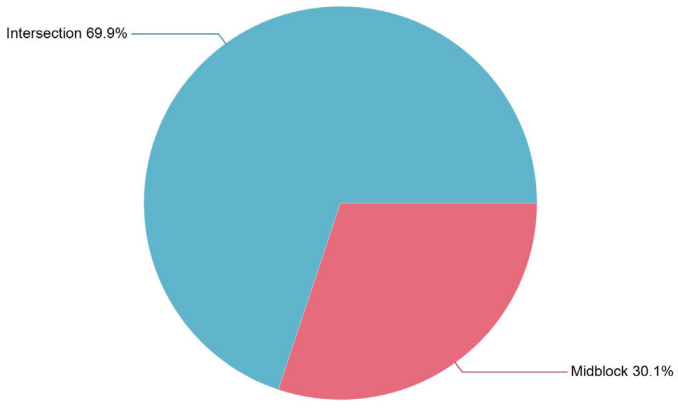


Collision Involving Pedestrian by Severity, Five Years (2015-2019)

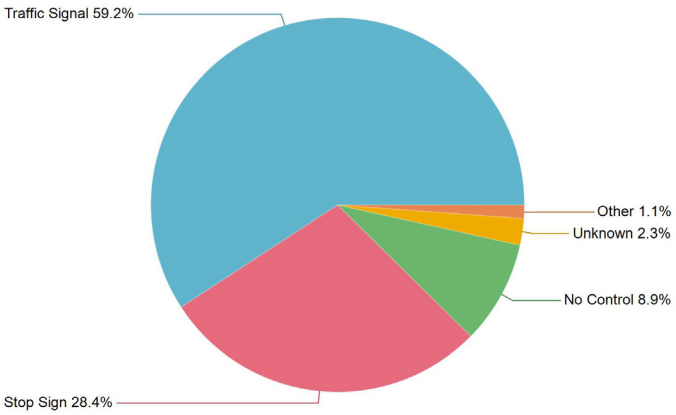


Collision Involving Cyclist by Severity, Five Years (2015-2019)

Most pedestrian collisions (69.9%) occurred at intersections and among those, 59.2% took place at signalized intersections. This is another indication that more focus on signalized intersections can result in improvement of safety in Niagara Region.

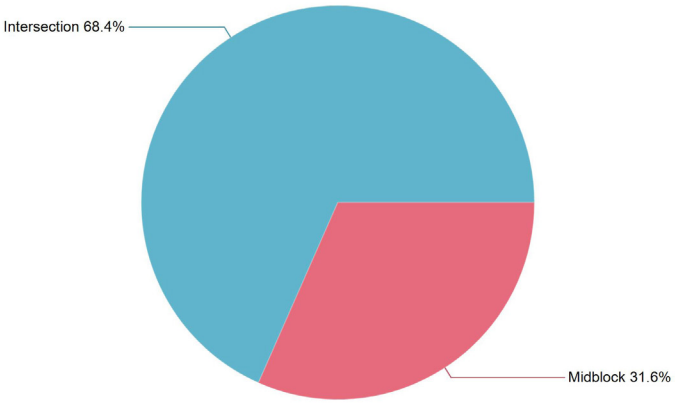


Collisions Involving Pedestrian by Location, Five Years (2015-2019)

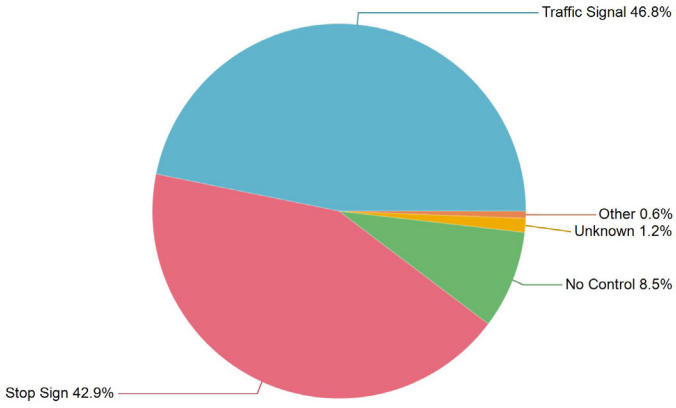


Collisions Involving Pedestrian by Intersection Control Type, Five Years (2015-2019)

Intersections and specifically signalized intersections took the largest share of cyclist collisions in Niagara Region where 68.4% of all cyclist collisions occurred at intersections. Among those, 46.8% were at signalized intersections.



Collisions Involving Cyclist by Location, Five Years (2015-2019)

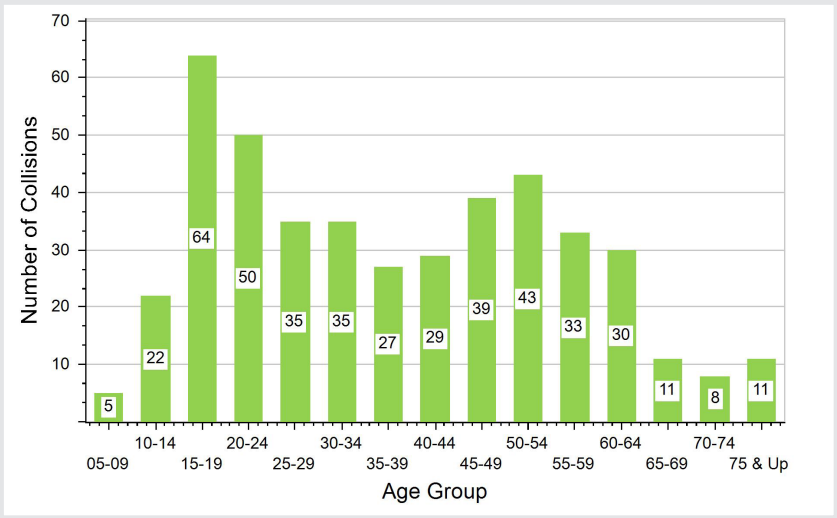


Collisions Involving Cyclist by Intersection Control Type, Five Years (2015-2019)

- 68.4% of all cyclist collisions occurred at intersections.

- Pedestrians older than 60 years old were the largest age group who were injured.
- The age groups of 15-19 and 20-24 involved in more cyclist collisions than any other age group.

The age distribution of pedestrians involved in collisions showed that pedestrians older than 60 years old were the largest age group injured (injury or fatality). The age groups of 15-19 and 20-24 contribute to more cyclist collisions than any other age groups in Niagara Region.



Cyclist Collisions by Cyclist Age, 2015-2019

Social Cost of Collisions

Traffic collisions impose direct and indirect costs on society. Direct costs include property damage, emergency response services, medical and insurance costs and traffic delays. Examples of indirect costs include disability and workdays lost by the victims, as well as pain and suffering.

On average, the societal cost of collisions in Niagara Region over 2015-2019 was more than $350 million per year.

Societal Cost of Collisions per Year in Niagara Region [1, 2]

Year	Fatal Collisions	Injury Collisions	PDO Collisions	Societal Cost of Fatal Collisions	Societal Cost of Injury Collisions	Societal Cost of PDO Collisions	Total Societal Cost of Collisions
2015	10	705	4473	$16,444,106	$99,148	$9,673	$277,607,938
2016	18	837	4495	$16,689,734	$100,629	$9,817	$428,771,534
2017	14	743	5039	$16,922,433	$102,032	$9,954	$362,884,153
2018	15	658	5230	$17,336,122	$104,527	$10,198	$382,154,403
2019	10	668	5560	$17,712,712	$106,797	$10,419	$306,398,647
Average Societal Cost of Collisions							**$351,563,335**

1 Vodden, K., Smith, D., Eaton, F., and D. Mayhew (2007) Analysis and Estimation of Societal Cost of Motor Vehicle Collisions in Ontario, Transport Canada, Report. Number TP 14800F.

2 The societal cost of collisions were adjusted for each year using Bank of Canada inflation rates (https://www.bankofcanada.ca/rates/related/inflation-calculator/)

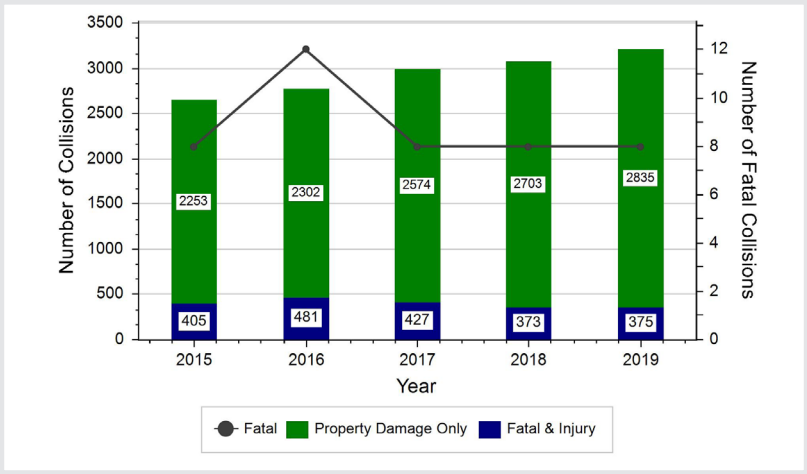
APPENDIX A

Collisions Occurred on Regional Roads

Appendix A provides collision statistics for collisions occurred in 2015-2019 on the road network under the jurisdiction of Regional Municipality of Niagara (Niagara Region) only. The collisions presented in Appendix A were part of the collisions reported in the main report. The main objective of the statistics presented herein is to provide more in-depth and exclusive insight in collision patterns on regional network.

Frequency and Severity of Collisions

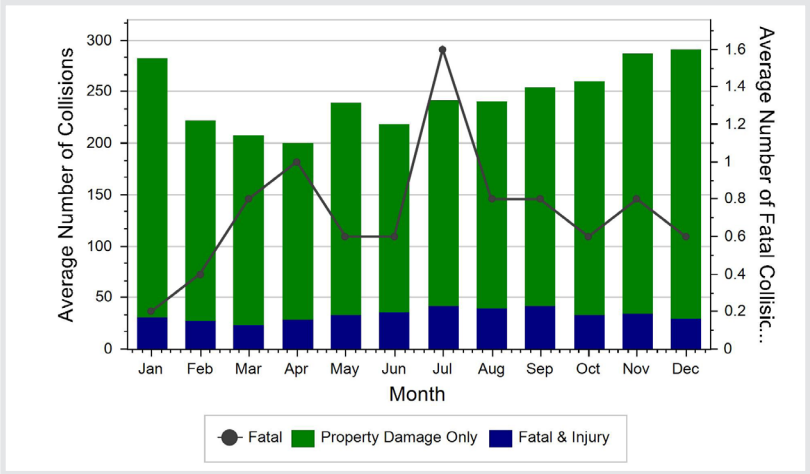
A review of collisions occurred on regional roads shows that the total number of collisions are continuously increasing. On average, 2946 collisions per year occurred on regional roads among those 412 collisions were fatal and injury. Although, 2019 experienced the highest total number of collisions, fatal collisions was the lowest percentage (8) in the past 5 years.



Collisions Frequency (2015-2019)

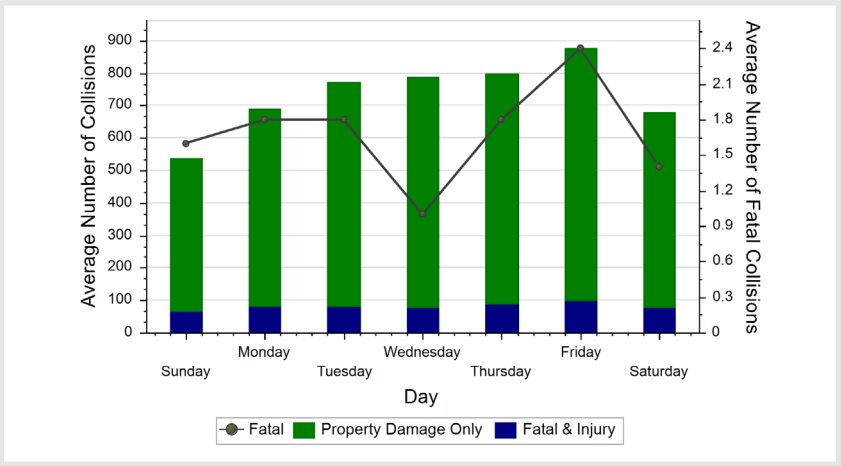
Month, Day, and Time of Collisions

Similar to the observations made for the collisions took place in the entire Region, the highest frequency of collisions occurred in the months of November, December, and January on regional roads. The month of July experienced the highest frequency of fatal collisions.



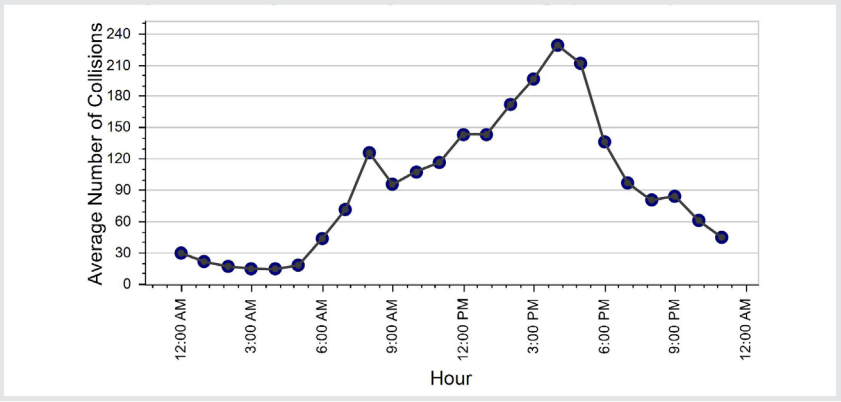
Collisions by Month, Five Year Average (2015-2019)

Among all days of week, Fridays had the highest frequency of collisions per day and the highest frequency of fatal collisions per day.

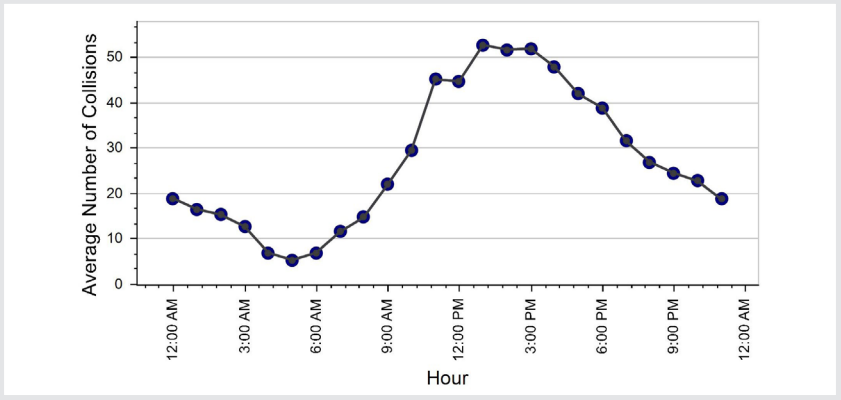


Collisions by Day-of-Week, Five Year Average (2015-2019)

The patterns of collisions during weekdays and weekends for collisions occurred on regional roads are consistent with those occurred in the entire Region. During weekdays, there is a strong correlation between the peak periods of traffic and the number of collisions. During weekends, the frequency of collisions were significantly less than during weekdays. Also, collisions are spread over time with the highest frequency of collisions per hour occurring from 10:00 AM to 6:00 PM.



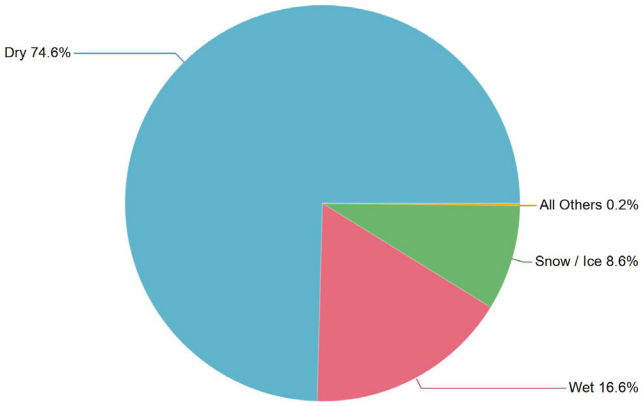
Weekday Collisions by Time-of-Day, Five Year Average (2015-2019)



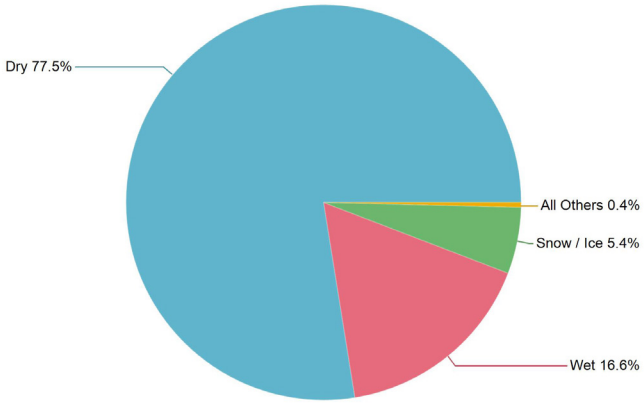
Weekend Collisions by Time-of-Day, Five Year Average (2015-2019)

Collisions by Road Surface Condition

The majority of collisions (74.5%) occurred on dry surface conditions. Collisions occurred on wet and snow/ice covered road surfaces were 16.6% and 8.6% respectively. The percentages of fatal collisions by road surface condition is approximately consistent with the percentages of total collisions. The same distributions were observed for collisions occurred in the entire region.



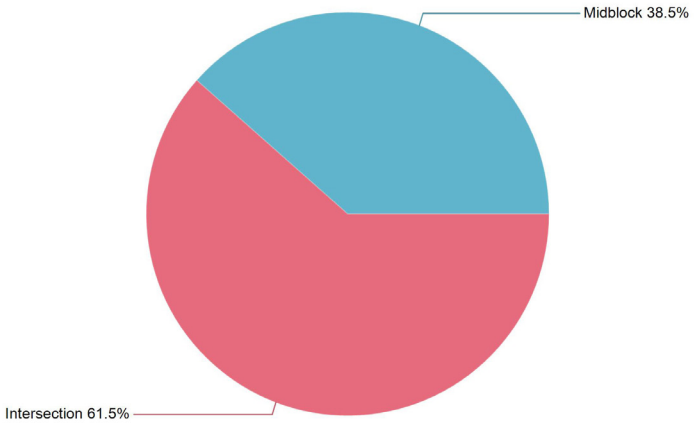
Collisions by Road Surface Condition
Five Years (2015-2019)



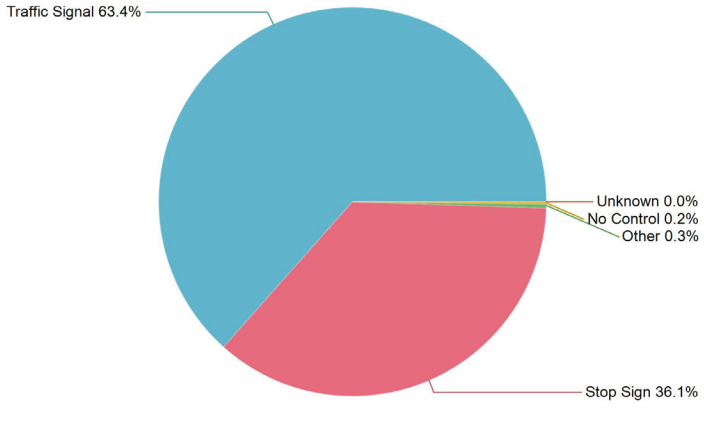
Fatal Collisions by Road Surface Condition,
Five Years (2015-2019)

Collision Impact Type

61.5% of all collisions on the regional network occurred at intersections. This percentage for Niagara Region was 50.6%. Additionally, 63.4% of all collisions occurred at signalized intersections. These observations suggest that the Region can keep improving safety on regional roads.



Collisions by Location, Five Years (2014-2018)



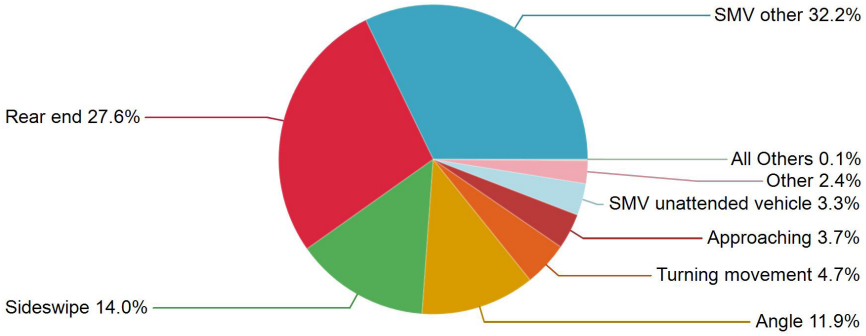
Intersections Collisions by Traffic Control Type, Five Years (2015-2019)

Similar to the observations made for Niagara Region, most fatal collisions occurred along mid blocks but most injury collisions at intersections.

Distribution of Collisions by Location (2015-2019)

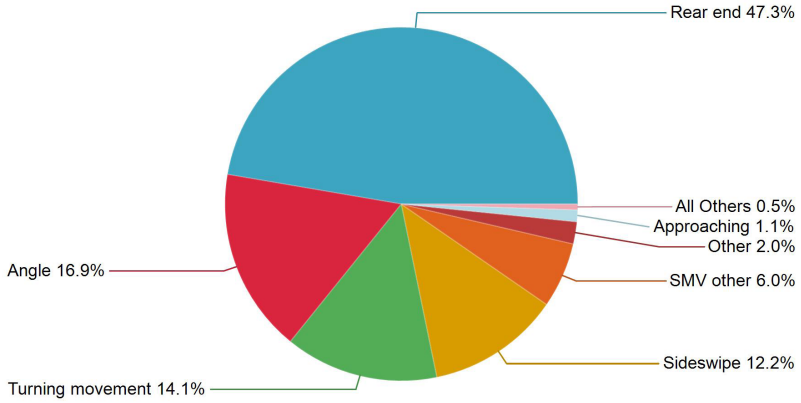
Location	Fatal	Injury
Intersections	47.7%	66.7%
Road Sections	52.3%	33.3%

Single Motor Vehicle Collisions (SMV) constituted 35.5% of total collisions followed by rear-end collisions (27.6%). These two percentages for collisions occurred in Niagara Region were 47.6% and 18.3% respectively.



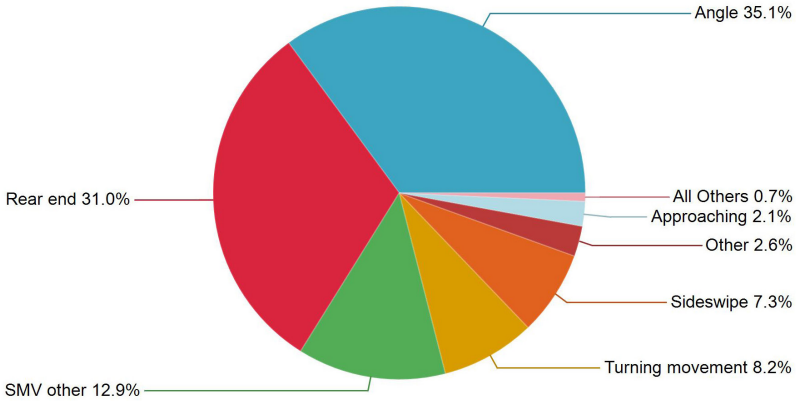
Mid block Collisions by Initial Impact Type, Five Years (2015-2019)

Rear-end collisions were the largest type of collisions (47.3%) at signalized intersections. This is consistent with other jurisdictions and the Province of Ontario. The second largest type of collision is angle collisions (16.9%). The percentage of angle collisions is higher than other municipalities.



Intersection Collisions by Initial Impact Type, Five Years (2015-2019)

Angle collisions were the largest type of collisions (35.1%) at intersections. This is consistent with other jurisdictions and the Province of Ontario. The second largest type of collision is Rear end collisions at intersections (31%).



Un-Signalized Intersection Collisions by Initial Impact Type, Five Years (2015-2019)

Intersections with the Highest Frequency of Fatal and Injury Collisions (2015-2019)

Intersection	Municipality	Jurisdiction	Collision Frequency
Dorchester Road at Lundy's Lane	Niagara Falls	Regional	15
Niagara Street at Vine Street / Facer Street	St. Catharines	Regional	14
Lundy's Lane at Montrose Road	Niagara Falls	Regional	14
Drummond Road at Lundy's Lane	Niagara Falls	Regional	13
Dorchester Road at Thorold Stone Road	Niagara Falls	Regional	12
Dorchester Road at McLeod Road	Niagara Falls	Regional	12
Kalar Road at Lundy's Lane	Niagara Falls	Regional	11
Drummond Road at McLeod Road	Niagara Falls	Regional	11
Carlton Street & North Service Road at Geneva Street	St. Catharines	Regional	10
Prince Charles Drive North at Thorold Road	Welland	Regional	10
Niagara Street at Woodlawn Road	Welland	Regional	10
East Main St/Schisler Rd at Moyer Road/Doans Ridge Road	Welland	Regional	10
McLeod Road at Oakwood Drive/Ramp	Niagara Falls	Regional	10

Mid blocks with the Highest Frequency of Fatal and Injury Collisions (2015-2019)

Road Section	Municipality	Jurisdiction	Collision Frequency
Ontario Street between Byron Avenue & Scott Street West	St. Catharines	Regional	9
Lundy's Lane between Allanport Road & Highway 58 & Centre Street	Thorold	Regional	9
Stevensville Road between Bertie Street & Gorham Road & Bowen Road	Fort Erie	Regional	7
Lundy's Lane between Drummond Road & Leonard Avenue	Niagara Falls	Regional	5
South Pelham Road between Balsam Street & Sumbler Road	Welland	Regional	5
King Street between Eleventh Street & Thirteenth Street	Lincoln	Regional	5
Niagara Stone Road between Airport Road & Niagara District Airport & Eastchester Avenue	Niagara on the Lake	Regional	4
Lundy's Lane between Ferry Street & Main Street & Hanan Avenue	Niagara Falls	Regional	4
Lundy's Lane between Carlton Avenue & Prince Edward Avenue & Corwin Avenue	Niagara Falls	Regional	4
Caistorville Road between Bismark Road & Concession 3 Road	West Lincoln	Regional	4
Ontario Street between Ramp & South Service Road & Union Road	Lincoln	Regional	4
Lundy's Lane between Beaverdams Road & Kalar Road	Niagara Falls	Regional	4
Niagara Street between Merritt Road & Merrittville Highway & Quaker Road	Welland	Regional	4
Glendale Avenue between Homer Road & Seaway Haulage Road	Niagara on the Lake	Regional	4
Lakeshore Road between Geneva Street & Shoreline Drive	St. Catharines	Regional	4
Highway 20 between Concession 4 Road & St Ann's Road	West Lincoln	Regional	4
Falls Avenue between Ramp & Ramp	Niagara Falls	Regional	4

Speeding and aggressive driving contribute to severity and frequency of collisions. In Ontario, speeding related collisions constituted 17% of total fatalities in 2016[1] . Police collision reports identify the at-fault driver action which potentially contributed to the collision.

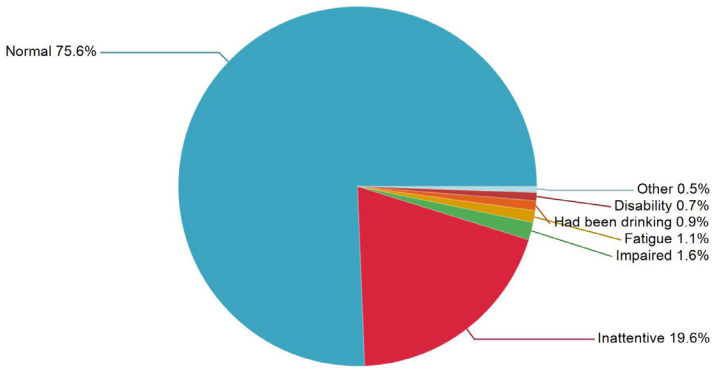
1 Ontario Road Safety Annual Report, 2016, Page 12.

The following actions are categorized as aggressive driving:

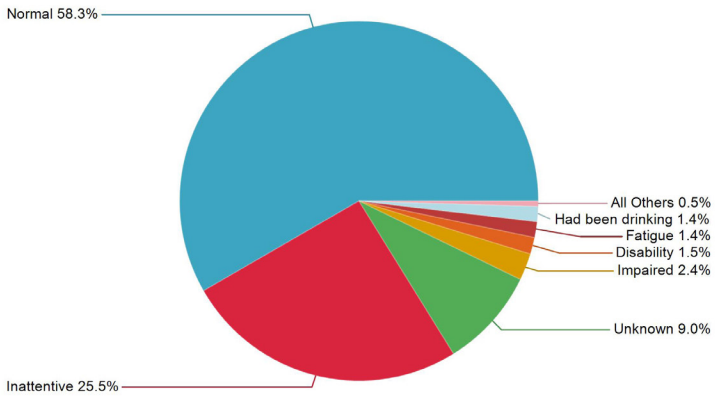
- Following too close
- Speed too fast
- Exceeding speed limit
- Lost control

Based on 2015-2019 collision data, aggressive driving contributed to 25.1% of all fatal and injury collisions on regional roads.

Distracted driving is one of the leading contributing factors to collisions in many jurisdictions including the Province of Ontario. It is difficult to identify whether a driver, cyclist, or pedestrian was distracted at the time of a collision. Based on the observations made by the police officers, in 25.5% of fatal and injury collisions, drivers were inattentive (distracted) in 2015-2019 collisions.



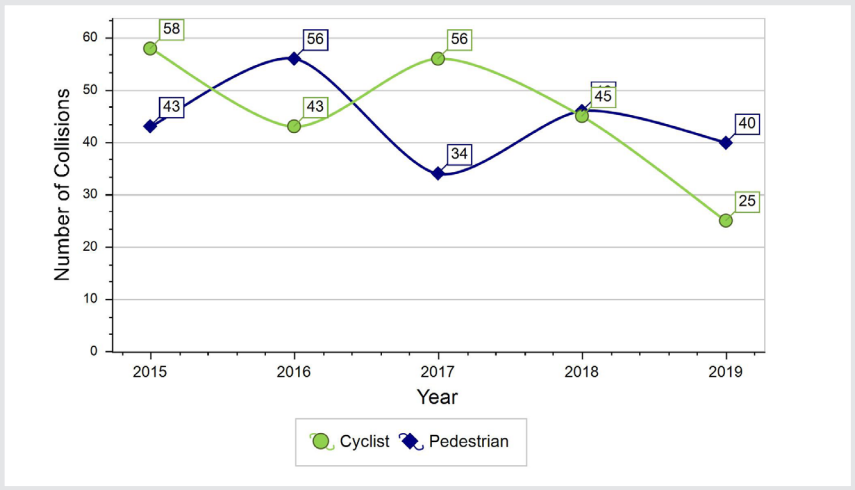
Collisions by At-Fault Driver Condition, 5 Years (2015-2019)



Fatal and Injury Collisions by At-Fault Driver Condition, 5 Years (2015-2019)

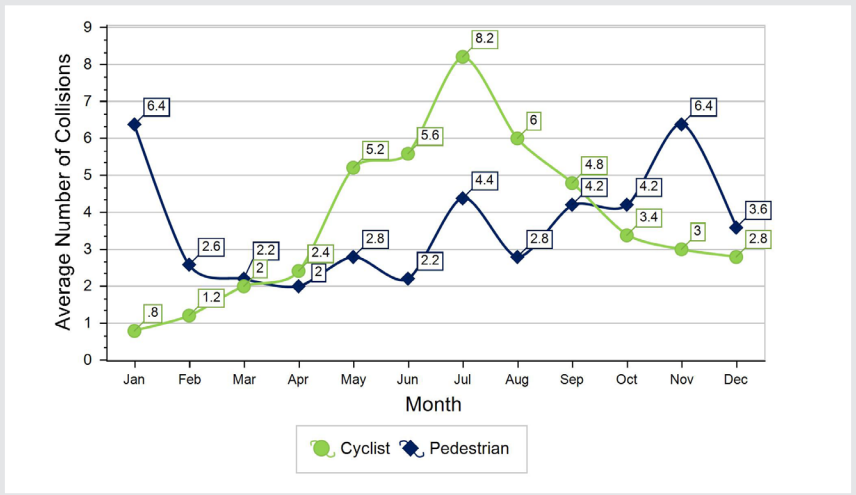
Pedestrian and Cycling Collisions

The number of pedestrian and cyclist collisions on regional roads are approximately 27% less than collisions occurred in Niagara Region. The number of pedestrian and cyclist collisions fluctuated from year to year. 2015 experienced the highest frequency of pedestrian and cyclist collisions within the study period (43 and 53 collision respectively) and 2019 experienced the lowest pedestrian and cyclist collisions (40 and 25 collisions respectively).

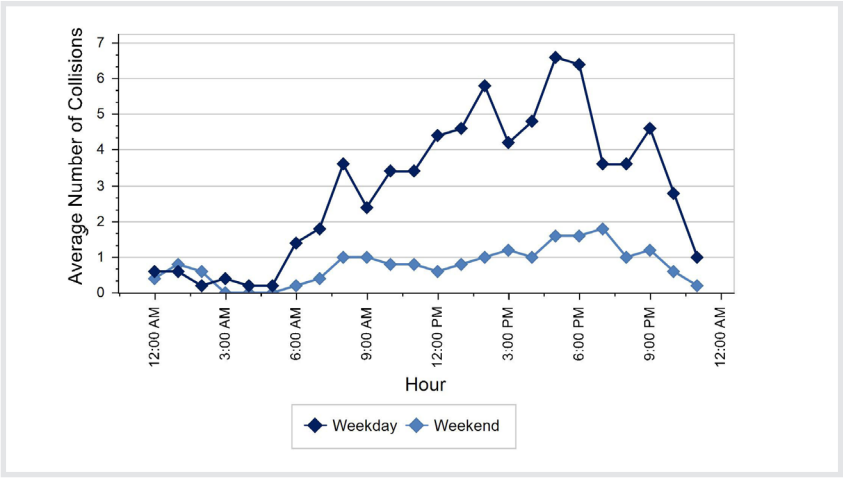


Collisions Involving Pedestrians and Cyclists (2015-2019)

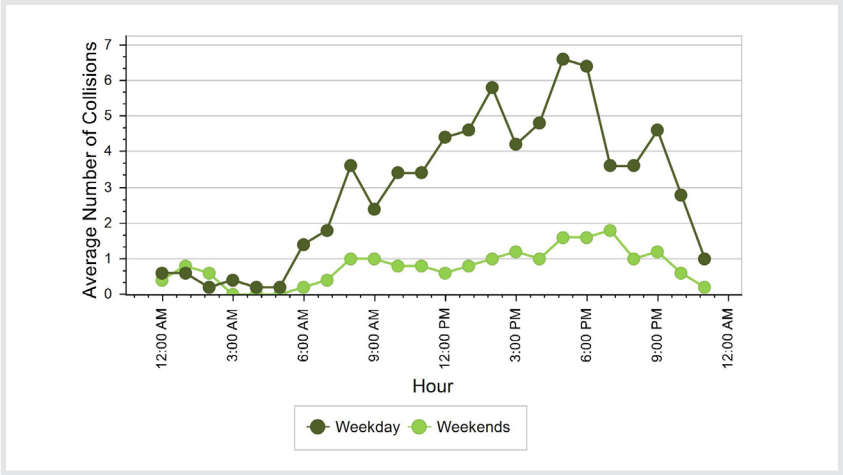
The highest frequency of pedestrian collisions occurred in the month of November which is consistent with most jurisdictions in Ontario. The highest frequency of cyclists collisions occurred during summer months of July, August and September.



Collisions Involving a Pedestrian or Cyclist by Month, Five Year Average (2015-2019)

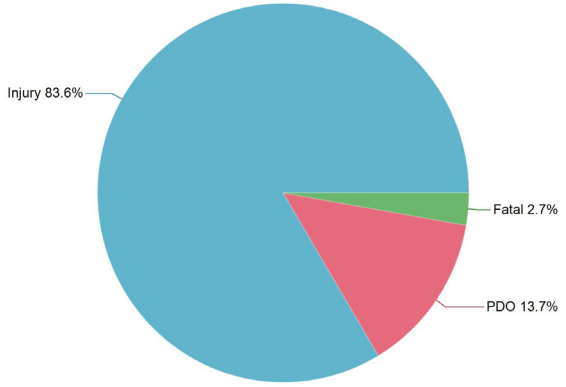


Collisions Involving Pedestrian or by Time of Day, Five Year Average (2015-2019)

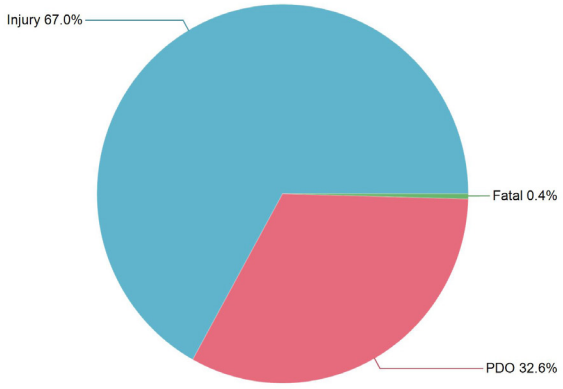


Collisions Involving Pedestrian or by Time of Day, Five Year Average (2015-2019)

Pedestrian collisions are more severe than other types of collisions. Based on 2015-2019 collision data, 83.6% of pedestrian collisions resulted in an injury and 2.7% of pedestrian collisions resulted in a fatality. More than sixty seven percent of cyclist collisions result in an injury and 0.4% of cyclist collisions result in a fatality.

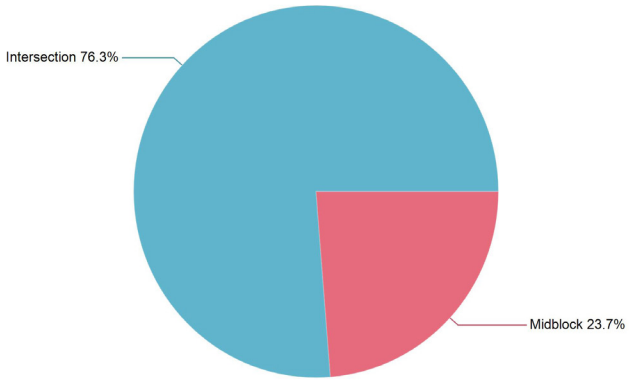


Collisions Involving Pedestrian by Severity Five Years (2015-2019)

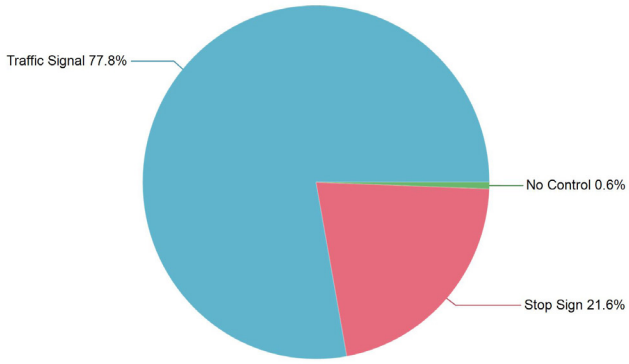


Collisions Involving Cyclist by Severity Five Years (2015-2019)

76.3% of pedestrian collisions occurred at intersections. Among those, approximately 77.8% occurred at signalized intersections.

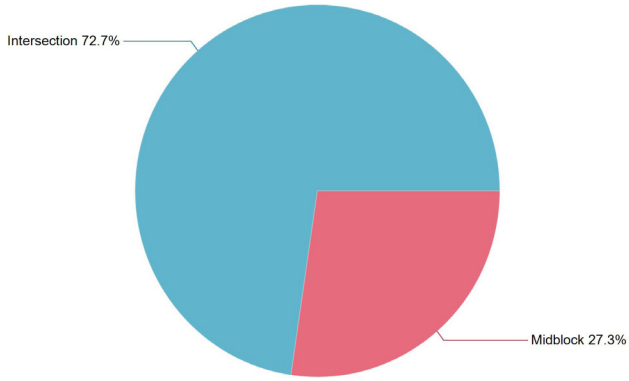


Collisions Involving Pedestrian by Location
Five Years (2015-2019)

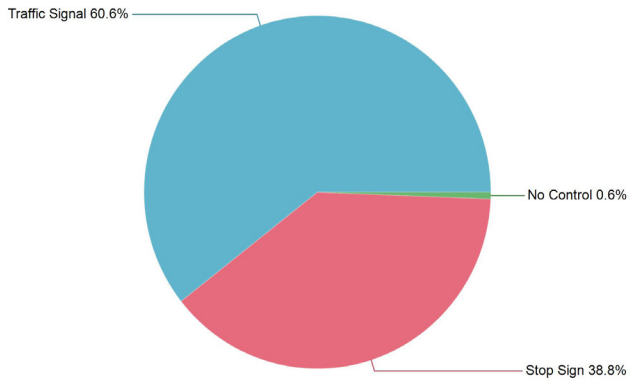


Collisions Involving Pedestrian by Intersection Control Type
Five Years (2015-2019)

72.7% of cyclist collisions occurred at intersections. Among those, approximately 60.6% occurred at signalized intersections.



Collisions Involving Cyclist by Location
Five Years (2015-2019)



Collisions Involving Cyclist by Intersection Control Type
Five Years (2015-2019)

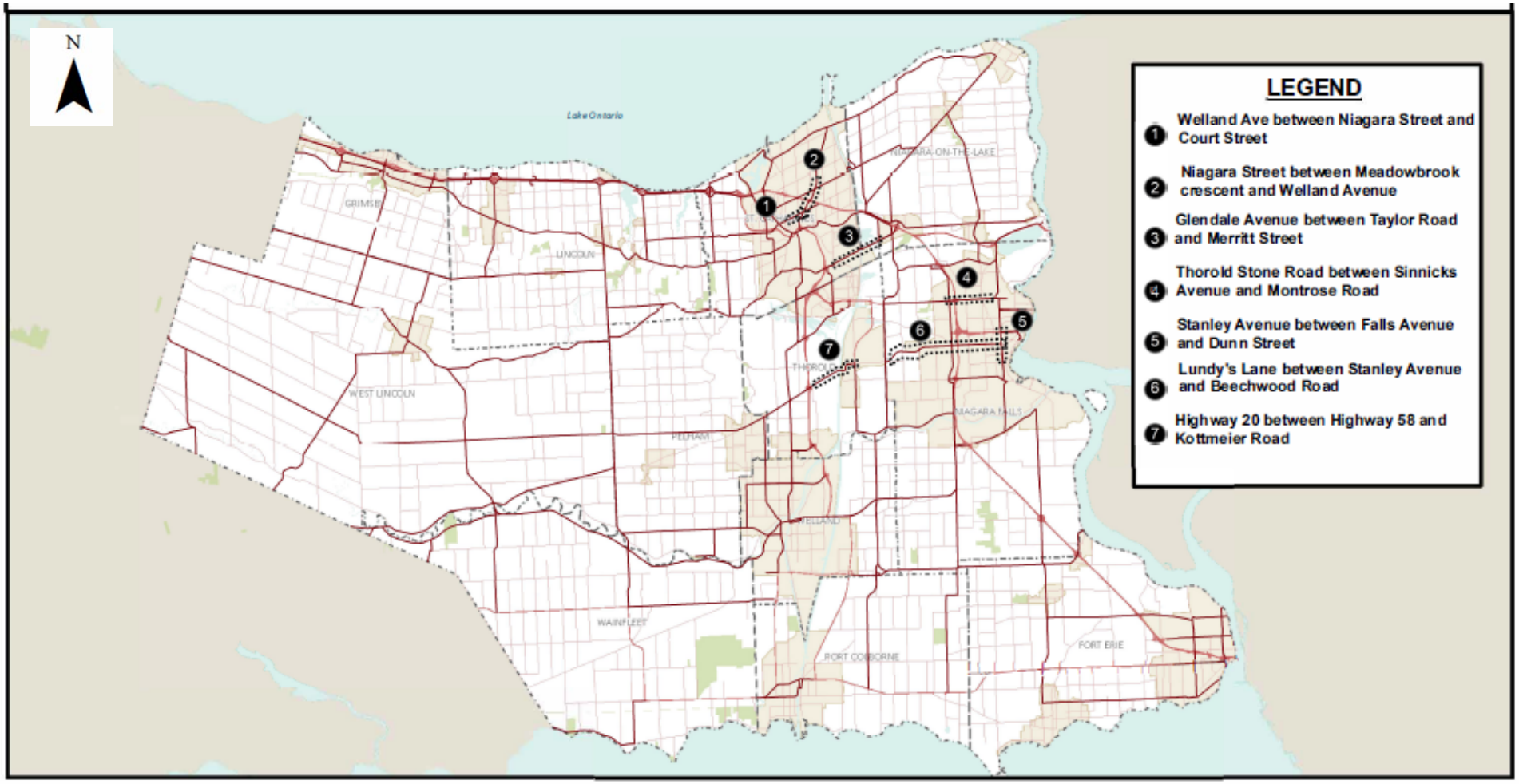
Intersections with the Highest Number of Pedestrian Collisions, 5 Years (2015-2019)

Intersection	Municipality	Jurisdiction	Collision Frequency
Church Street at Geneva Street	St. Catharines	Regional	5
Lake Street at Lakeshore Road	St. Catharines	Regional	3
Fitch Street at Prince Charles Drive North	Welland	Regional	3
Prince Charles Drive North at Thorold Road	Welland	Regional	3
Dieppe Road/North Service Road/Ramp at Niagara Street	St. Catharines	Regional	3
Drummond Road at Lundy's Lane	Niagara Falls	Regional	3
Ferry Street/Lundy's Lane at Main Street	Niagara Falls	Regional	3
Drummond Road at McLeod Road	Niagara Falls	Regional	3
Lundy's Lane between Beaverdams Road & Kalar Road	Niagara Falls	Regional	3
Lakeshore Road between Geneva Street & Shoreline Drive	St. Catharines	Regional	3
Lundy's Lane between Carlton Avenue & Prince Edward Avenue & Corwin Avenue	Niagara Falls	Regional	2

Locations with the Highest Number of Cyclist Collisions (2015-2019)

Intersection	Municipality	Jurisdiction	Collision Frequency
Niagara Street at Vine Street / Facer Street	St. Catharines	Regional	3
Rolling Acres Drive at Thorold Stone Road	Niagara Falls	Regional	3
Belmont Avenue at Lundy's Lane	Niagara Falls	Regional	3
Christie Street at Clarke Street/South Service Road	Grimsby	Regional	2
Carlton Street & North Service Road at Geneva Street	St. Catharines	Regional	2
Fourth Avenue at Seventh Street South	St. Catharines	Regional	2
Glenridge Avenue at Westchester Crescent	St. Catharines	Regional	2
Livingston Avenue at St Andrews Avenue	Grimsby	Regional	2
Ferry Street at Stanley Avenue	Niagara Falls	Regional	2
Bridge Street at Victoria Avenue	Niagara Falls	Regional	2
Disher Street at Gorham Road	Fort Erie	Regional	2
Lundy's Lane at Montrose Road	Niagara Falls	Regional	2
Dorchester Road at Lundy's Lane	Niagara Falls	Regional	2

Niagara Region Corridor Review



Niagara Region