

City of Ottawa

Road Safety Action Plan 2020 – 2024

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1. Introduction

In the last five years (2013-2017), there were almost 73,500 reported motor vehicle collisions in the City of Ottawa, averaging approximately 14,700 collisions per year (this includes collisions involving cyclists and pedestrians). At a minimum, motor vehicle collisions result in significant economic impacts resulting from property damage and lost time to road users. Unfortunately, the impacts are often much more significant, resulting in life altering injuries and death. In Ottawa, an average of 24 fatal and 124 major injury collisions have occurred annually, over the past 5 years. The pain and suffering resulting from motor vehicle collisions reach far into communities, and touch almost everyone.

Recognizing the tremendous impact of motor vehicle collisions, the City, along with its partner agencies (also known as stakeholders), has updated their Road Safety Action Plan (RSAP) to address collisions in the City and their subsequent effect on Ottawa road users.

The City was one of the early adopters of the RSAP approach to improving safety. This current plan is the third iteration of the RSAP; the first was initiated in 2002, and the second in 2012. Each plan has built on the previous. The first plan integrated efforts from Ottawa Police Services, Ottawa Public Health and Transportation Services and the second built on the integrated approach and adopted the Swedish Vision Zero model, which was branded as Towards Zero 2012-2016. The Towards Zero model holds the understanding that no loss of life is acceptable from motor vehicle collisions. The City has had a full 5-year cycle through its second plan implementation and this report outlines the process of developing the next phase of the RSAP.

In keeping with Canada's Road Safety Strategy 2025, developed by The Canadian Council of Motor Transport Administrators (CCMTA), this iteration of Ottawa's RSAP adopts the Safe System Approach to road safety.

“The Safety System Approach (SSA) is how many countries leading in road safety are achieving their vision of eliminating deaths and serious injuries. SSA contains the following principles:

- **Ethics:** human life and health are paramount and take priority over mobility and other objectives of the road traffic system (i.e., life and health can never be exchanged for other benefits within the society)
- **Responsibility:** providers and regulators of the road traffic system share responsibility with users
- **Safety:** road traffic systems should take account of human fallibility and minimize both the opportunities for errors and the harm done when they occur
- **Mechanisms for change:** providers and regulators must do their utmost to guarantee the safety of all citizens; they must cooperate with road users; and all three must be ready to change to achieve safety. It is recognized

that Canadian jurisdictions will implement the SSA in a manner that is Appropriate to their environment.”¹

It is important to recognize that regardless of how a Road Safety Strategy is branded (Vision Zero, Towards Zero, etc.), the objective is the same. To work in a focused, collaborative and responsible way to continuously reduce death, and life altering injuries as a result of motor vehicle collisions. The vision statement is based upon an ethical principle that cannot be disputed, and guides decision making on all levels. As with any other Vision Zero or Towards Zero plan, the goal recognizes the practical and logistical challenges associated with the vision, and maps out achievable and reasonable objectives for the plan.

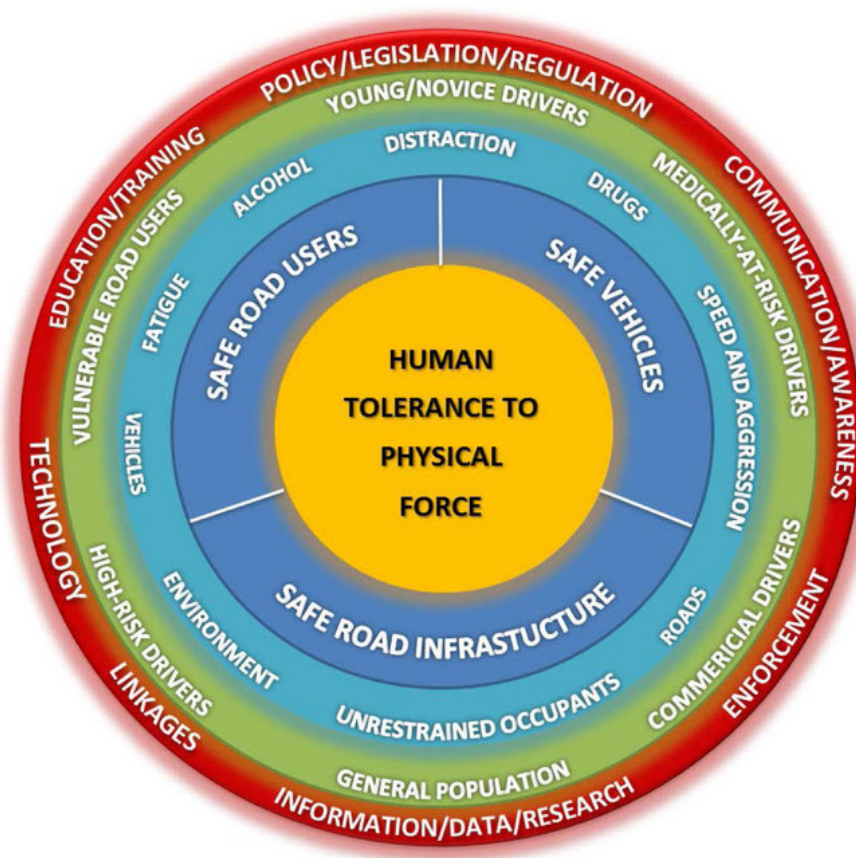


Figure 1: Canadian Road Safety Strategy 2025²

Figure 1 illustrates the many aspects of our world that have a role in road safety, from simple physics to the complexity of human factors, infrastructure design and policy making. As with any

¹ <https://roadsafetystrategy.ca/en/strategy>

² <https://roadsafetystrategy.ca/en/strategy>

strategic planning exercise, identifying emphasis areas allows the plan to have a focussed approach to targeting reductions in a select subset of the possible. Focussing resources on specific emphasis areas allows teams to create a work plan with achievable goals, while collaborating with other teams to target the same goals. With road safety, there are endless avenues that can be explored. Following a strategic plan allows practitioners to focus on those with the most evidence to support their effectiveness and ensure that resources are not dispersed to the point of being ineffective.

It should be noted that there are several aspects of a safe system approach that are not practical to be addressed on a municipal level and require action and stewardship on a provincial and federal level. For example, vehicle regulations are a federal mandate, and driver licensing and hospital care are managed provincially. Integrating the collaboration between the different levels of government has supported the success of the safe system approach in Europe and Australia. On the other end of the spectrum is the responsibility of each individual road user to be accountable for their alert and compliant road use. While the safe system approach recognizes that people make mistakes that can lead to collisions, it clearly identifies that there is a shared responsibility between the user, provider and regulator. Just like any other system, safe road systems will not and cannot reach their mandate without actively engaged users.

The new plan is structured in a way that best coordinates a diverse set of stakeholders in education, enforcement, and engineering allowing the sharing of resources and providing the necessary oversight to ensure the integrated RSAP is embedded within the City's corporate culture. The RSAP sets out the vision, goals, objectives, and action plans to create safer roads, with the intent to actively reduce motor vehicle collisions causing death or injury.

The RSAP builds on the City's existing road safety programs by determining key areas (known as emphasis areas) for which safety can be enhanced and by developing a set of individual safety initiatives (known as countermeasures) that would be most effective in reducing fatal and major injury (FMI) collisions for each emphasis area. This document explains the process of the development of the newest phase of the City's RSAP and provides detail on the elements of the action plan that will lead towards achieving the Plan's vision and goal. The City's Gender and Inclusion Strategy will be considered on an ongoing basis, to help inform aspects of the RSAP, including data analysis, policy development and targeted education and awareness campaigns.

2. Process and Methodology

Implementing and contributing to road safety within the City is a shared responsibility. A wide range of organizations can impact road safety in the City, including those in the fields of engineering, law enforcement, planning and policy development, public health, education, and advocacy. The development of this phase of the RSAP was a collaborative process where feedback and input from partners, as well as the public, was critical to the success of the project. Figure 2 shows the key steps in the development of the RSAP.

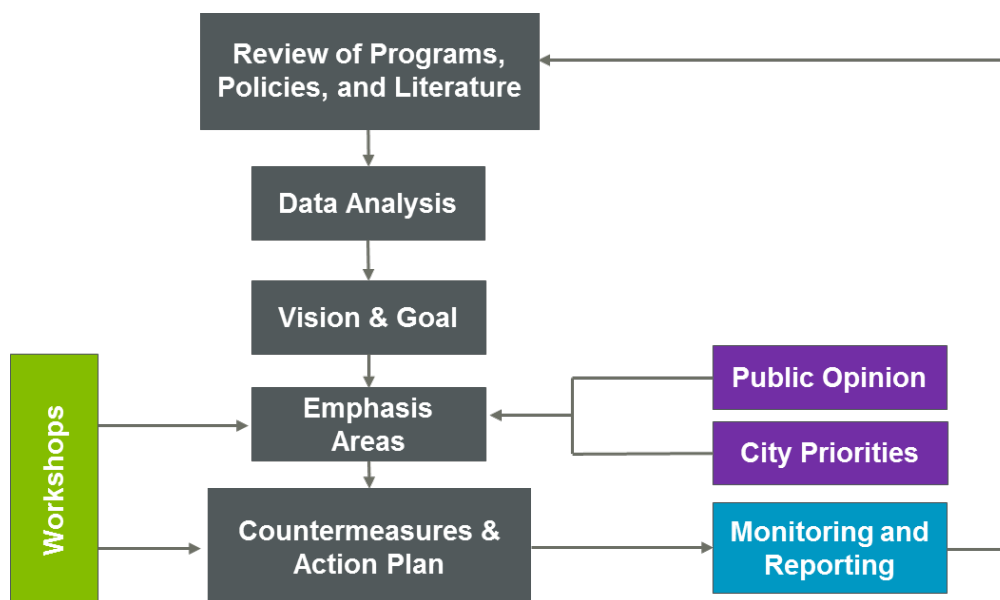


Figure 2: RSAP Process Flow Chart

Review of Programs, Policies and Literature

Prior to the development of the RSAP, CIMA completed a review of other jurisdictions that have an existing road safety strategic plan, titled Strategic Road Safety Action Plan: Review of Vision Zero Best Practices (2018). A literature review was conducted, including 22 North American jurisdictions that have adopted Vision Zero, or Safe Systems approaches in their Road Safety Action Plans. Sweden and the Netherlands were also studied as part of this exercise. Four jurisdictions were selected for a detailed review:

- City of Edmonton
- City of Calgary
- City of Toronto
- City of San Jose

The noted jurisdictions were interviewed on their existing plan and their Vision Zero actions. The information that was gathered from these jurisdictions was used to compare the City's previous Towards Zero 2012-2016 plan, to benchmark it against other cities. In addition to this review, many documents were reviewed to provide an understanding of policies and programs that can and do support road safety within the city; and RSAPs from other jurisdictions were reviewed to provide guidance and examples to build upon.

Project Stakeholders

The project team identified the partner agencies that would be able to contribute to road safety within the City. The agencies were informed about the project objectives, process, and their roles and responsibilities. They also participated in the three workshops that took place during the development of the RSAP where they were able to provide their feedback and input. These

workshops were held at City Hall, on Saturday, April 6, 2019 June 22, 2019 and October 19, 2019. The workshops were facilitated by CIMA+, and included senior staff representation from:

- Transportation Services
- Ottawa Police Services
- Ottawa Public Health

Community stakeholders from the following individuals, agencies, and organizations included:

- Bike Ottawa;
- Causeway;
- Centre de Ressources Communautaires de Vanier;
- Consortium de Transport d'Ottawa;
- Council on Aging of Ottawa;
- CSC Vanier;
- Ecology Ottawa;
- EnviroCentre;
- Federations of Citizens Associations;
- Green Communities Canada;
- Hans on the Bike;
- Healthy Transportation Coalition;
- IPromise;
- MADD Canada – Ottawa Chapter;
- National Capital Commission;
- Ottawa Disability Coalition;
- Ottawa Hospital;
- Ottawa Safety Council;
- Ottawa Student Transportation Association;
- RightBike/ Causeway;
- Society of Ottawa Area Riders (SOAR);
- Walk Ottawa/ Healthy Transportation Coalition; and,
- WISE.

Opening statements were delivered by Mayor Jim Watson, Councillor Blais, Chair of Transportation Committee, John Manconi, General Manager of Transportation Services and Philippe Landry, Director of Traffic Services.

Vision and Goal

The City engaged a public relations firm to develop the theme, vision and goal for the RSAP. Many options were developed, and focus tested.

Collision Data Analysis

The RSAP is primarily a data driven study, so collision analysis using 2013 – 2017 (5 years) data was undertaken (see Appendix A). Combined fatal and major injury (FMI) collisions were

the focus of the analysis as it ties into Vision Zero and a commitment to working towards eliminating deaths and serious injuries on the roads in the City. The analysis of collisions provided a better understanding of how collisions are happening within the City and who is involved (e.g. age groups, types of collisions, cause of collisions, etc.). Once the project team completed the collision analysis, they identified target areas with the largest group of collisions, referred to as emphasis areas (discussed in section 5). As part of this study, 743 FMI collisions were examined. This included collisions on Federal and Provincial jurisdiction roadways that fall within the city limits. Of the 743 FMI collisions that occurred during the 5-year period, 75 occurred on Provincial highways, 15 on Federal roadways, and the rest on City of Ottawa roadways.

Public Opinion

In addition to the collision analysis, the project team sought input to understand the public's perception on road safety within the City. People who live or work in the City provided feedback through a market research company. Additional input was provided by people who chose to go online and complete the survey provided on the City's website.

Feedback from the survey was organized into the different area types found in the City of Ottawa:

- Central Business District (CBD)
- Core Residential
- Suburban Inside the Greenbelt
- Suburban Outside the Greenbelt
- Rural

The number of responses from the survey was approximately proportionate to the population in each of the area types provided by the City. The overall priorities identified by those who completed the survey were similar to the top priorities determined by the data analysis. Each of the main priorities was also ranked by the public, so although the order of the priorities differed, the top concerns determined by the public and data analysis were similar. A summary of the public opinion survey analysis can be found in Appendix A.

The partner agencies (including the City) who were a part of the development of the RSAP were also a crucial part in the development of emphasis areas. In addition to the public surveys, there were three stakeholder workshops which included members of organizations who implement road safety programs in the City. Together, with the public input and the data analysis, the project team and the partner agencies determined the emphasis areas of the plan.

Emphasis Areas

The collision data, public input, and discussions with the partners resulted in the identification of emphasis areas. Emphasis areas chosen were based on the groupings of collisions with the biggest potential for safety improvement adjusted by public input and the priorities of the City. To have the best opportunity to reduce collision frequency and improve safety within the City, the City should allocate resources to the identified emphasis areas.

Countermeasures

After identifying the emphasis areas, the project team and partners developed a series of individual actions, called countermeasures. A countermeasure is an action taken to counteract a danger or threat; in this case, to reduce the frequency or severity of motor vehicle collisions. The complete set of countermeasures is intended to provide a balanced and effective approach to improving road safety in the City. Stakeholder workshop #2 focussed on a review and discussion of the existing and proposed countermeasures.

Action Plan

The action plan is developed using input from all the previous sections. The new RSAP builds upon the strong components of the last plan and makes suggestions for enhancements and potential new actions that may be taken, if resources are available. The action plan discusses over-arching components of a plan as well as actions based upon the emphasis areas.

3. Review of Ottawa's Previous Program

As noted, this is the third iteration of a strategic road safety plan for the City of Ottawa. CIMA reviewed the performance of the previous plan to highlight areas of success and also to identify areas that offered potential for improvement. Figure 3 provides context to the City of Ottawa's road safety performance, compared to other jurisdictions internationally and locally.

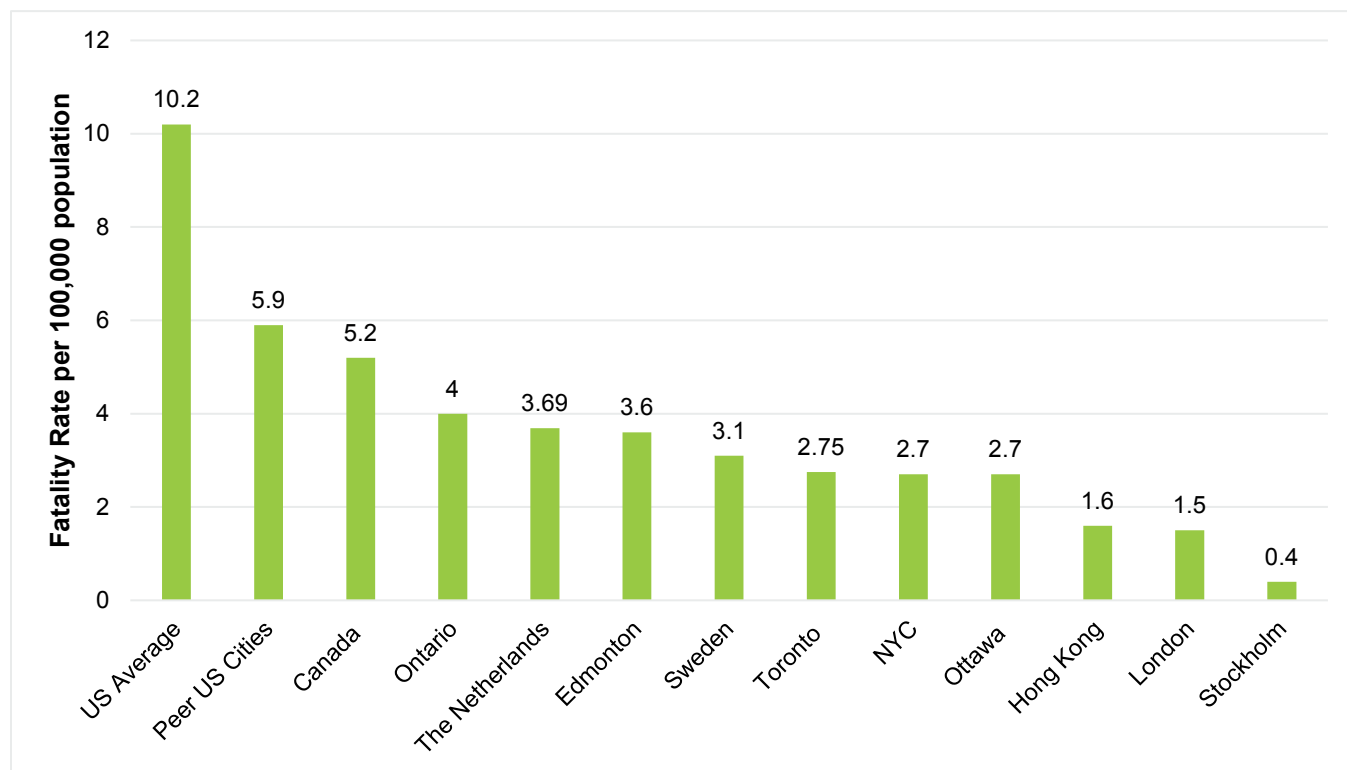


Figure 3: Fatality Rates for Various Jurisdictions

Figure 4 summarizes the changes in fatal and major injury (FMI) collisions using 5 years before the implementation of the 2012-2016 plan and 5 years after implementation for each emphasis area that was chosen for the plan. As shown in the figure, motorcyclists, distracted driving, and older adult drivers showed an increase in collisions since the implementation of the previous plan.

With the increase of smart phone use, distracted driving as a contributing factor to FMI collisions has been increasing across Canada³. The Ottawa FMI data reflects this increase. Further, it is generally noted by police as being under-reported, given that many people will not admit to using cell phones while driving. Significant research is being done to help develop strategies to change the trend and reduce the road toll associated with distracted driving. This knowledge and experience is something that Ottawa can draw upon, for future distracted driving initiatives.

FMI collisions involving motorcyclists also showed a large increase between the before and after review periods. Motorcycling collisions have not been well studied, and there is little research with regards to countermeasures that can effectively reduce motorcycle collisions. Ottawa's increase does not reflect an increase in motorcycle registrations, or other population data.

The other large increase in collisions involved Older Adults. Older adults are often considered a vulnerable road user, due to physical and medical limitations associated with aging. The higher number of collisions is likely a reflection of the increase in the number of older adults in Ottawa. "Seniors (aged 65 and over) represented approximately 7% of Ottawa's population in the 1960s. Their share has steadily risen to reach 13.2% as of the 2011 Census, and is projected to represent just over 20% of Ottawa's population in 2031."⁴

Aggressive driving, young drivers and children involved in FMI collisions all showed a decrease in FMI collisions between the before and after review period. Aggressive driving showed to be the most reduction during the duration of the monitoring period as many of the collision types related to aggressive driving decreased during the study time frame. The exception being speed related FMI collisions which did decrease, but not enough to meet the target reduction of 10%.

Young drivers and children also saw a reduction in collisions. The reduction in young driver FMIs is reflective of downward trends in nation wide trends in serious collisions⁵ Regardless of the downward trend, this age cohort still has a higher FMI collision involvement than other age categories. There is significant research into this topic, and many jurisdictions, including Ottawa have been actively engaging young drivers to try to reduce this trend.

³ <https://www.tc.gc.ca/en/services/road/stay-safe-when-driving/distracted-driving.html>

⁴ <https://ottawa.ca/en/city-hall/get-know-your-city/statistics-and-economic-profile/statistics/ottawas-population>

⁵ Transport Canada: <https://www.tc.gc.ca/eng/motorvehiclesafety/resources-researchstats-menu-847.htm>

The results for children involved in FMI collisions in Ottawa are very positive from a road safety perspective. There was a reduction by more than 50%. Although the numbers are very low to begin with, it is a noteworthy positive change.

Pedestrian and cycling collisions showed little to no change. This reflects the nationwide collision data for both those modes. Hans on the Bike⁶, summarized census data on walking and cycling in Ottawa, between 2006 and 2016. The number of people walking to work increased 5%, and cycling to work increased 28.5%. This coupled with the data that shows significant increases in cycling volumes at bike counter locations, show a large increase in cycling numbers. Although the number of collisions has not changed significantly, it is possible to surmise that the rate of walking and cycling collisions, per person using that mode, has decreased.

The review of Ottawa's previous plan demonstrated that the plan was developed based on the best practices at the time. The previous plan adopted a progressive vision; this vision included a reasonable goal in the reduction of fatal and major injury collisions. The emphasis areas were consistent with those adopted within other jurisdictions. The countermeasures included in the previous plan were comprehensive and consider the multidisciplinary nature of road safety. The Road Safety Unit and Safer Roads Ottawa was successful in forging partnerships with other departments in the City to ensure the capital project development considers road safety. It isn't possible to evaluate whether or not the collision reductions can be attributed to the specific countermeasures in the previous iteration of the RSAP, rather than other influencing factors. However, as will be explained in section 6 of this report, significant research has been done to evaluate the effectiveness of individual engineering countermeasures. Further research into the effectiveness of education and awareness campaigns also indicates a positive impact⁷.

There are several opportunities for building on the success of the previous plan, that include strengthening the collaborations between departments and partner agencies, and improving monitoring and evaluation activities, including a more comprehensive and accessible annual report.

Note that the collision data represented in Figure 4 is based upon the data analysis that was undertaken for the 2012 RSAP. The before data was collected and reported upon for the creation of the 2012 RSAP, and includes the collision data available, at that time. Collision data typically has a 6 month to 1-year delay in processing and validating, therefore, studies involving collision data are based upon data that is 1 to 2 years old.

⁶ <https://hansonthebike.com/2017/12/12/ottawa-commute-census-data/>

⁷ https://tirf.ca/wp-content/uploads/2017/01/2015_RoadSafetyCampaigns_Report_2.pdf

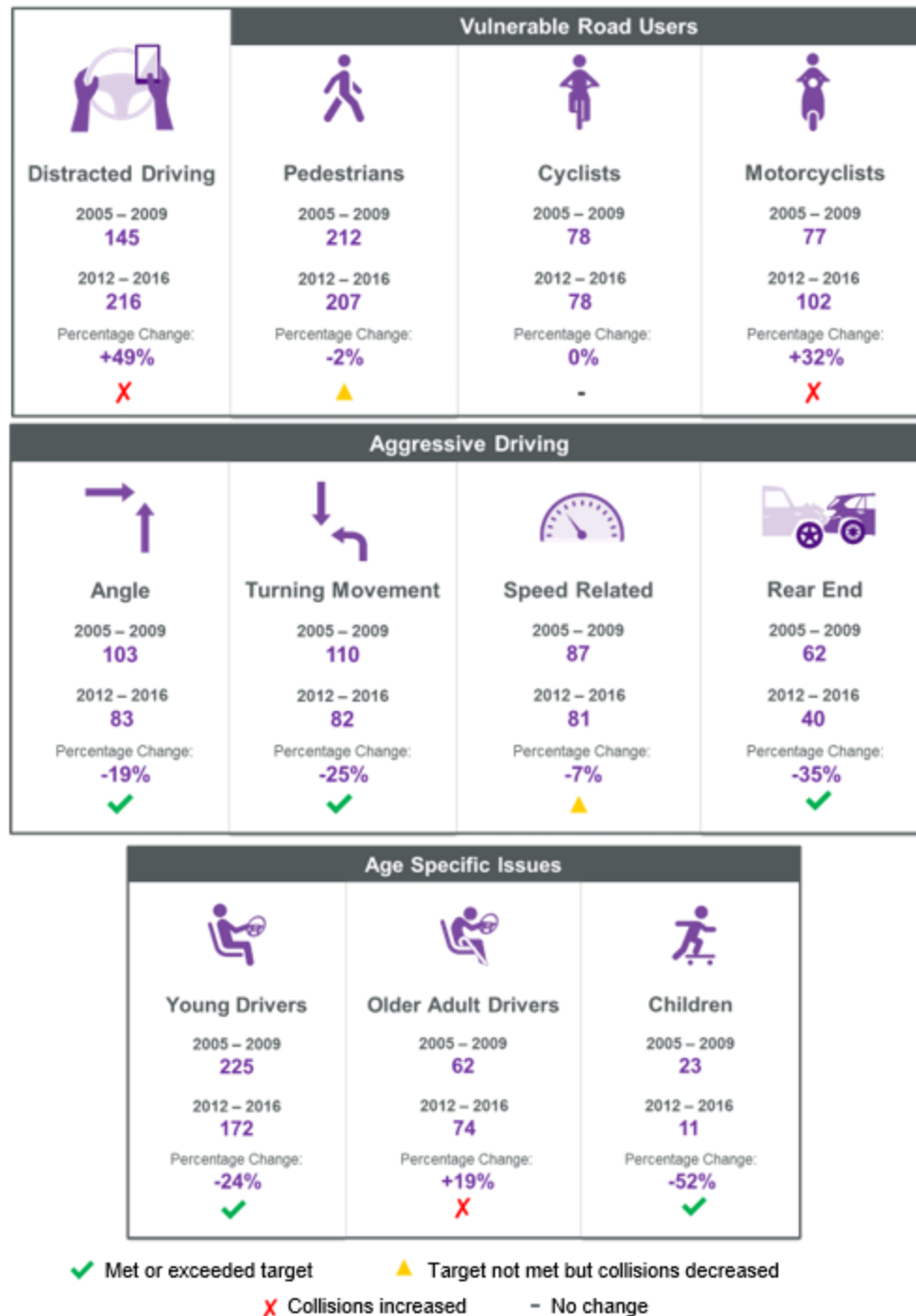


Figure 4: Previous Road Safety Action Plan Performance

4. Towards Zero - Vision and Goal

The City's third generation RSAP builds on the City's existing road safety programs and is guided by the theme of *Think Safety Act Safely* in recognition of the shared responsibility and

the change in culture required to continue the progress towards zero fatalities and major injuries.

5. Emphasis Areas

An emphasis area is a type or group of collisions, that are a priority safety concern. Resources will be allocated to actions to reduce these collisions. The selection of emphasis areas is the foundation of achieving the RSAP goal because they indicate the highest priority collisions and therefore where to most effectively apply resources. Typically, four to eight emphasis areas are selected in strategic road safety plans. The number of emphasis areas needs to be limited to ensure that enough resources are allocated to the most critical emphasis areas.

The development of emphasis areas for the RSAP was based on results from the collision data analysis, public input, and feedback from stakeholders.

5.1. Collision Analysis

The collision analysis is documented in detail in Appendix A. In total 743 FMI collisions that occurred in the City of Ottawa, were analysed to help develop potential emphasis areas for the RSAP. The collision analysis is the foundation of the data driven approach to identifying emphasis areas.

The collision data that was used to develop the emphasis areas was derived from motor vehicle collision reports completed by the Police Services in the Ottawa area and retained by the City Transportation Services department database. The collision reports contain many fields/categories of data which are validated, and are useful for determining general trends in collisions.

Collision data for a longer period of time (typically 5 years) are usually analyzed to identify emphasis areas and provide a better understanding about the nature of collisions in a jurisdiction. This study analyzed FMI⁸ collisions from 2013 to 2017. FMI collisions are used as the reference point for the RSAP for several reasons. First, these directly relate to the Vision Zero/Safe Systems approach which recognizes that property damage only, minor and minimal injury collisions will still occur. Second, the quality and reliability of collision data for this subset of collisions is superior to property damage only collisions. Third, the RSAP has limited resources and they should be focused where they can achieve the greatest effect.

A summary of collision analysis (FMI collisions only) for the largest groups of collisions (also referred to as “emphasis areas”), such as where the collision took place, the contributing behaviour or who was involved, is shown in Figure 5. City of Ottawa data is for all roads within

⁸ FMI (Fatal and Major injury) = A fatal injury is defined as an injury that results in death within 30 days of a motor vehicle collision. A major injury is defined as an injury that results in an involved person being admitted to the hospital and staying overnight.

the City. A single collision might involve multiple emphasis areas, so there are overlaps among the group totals. Further, a single collision may involve multiple road users – the statistics in this report reflect the number of collisions and not the number of road users in the collision, unless otherwise specified.

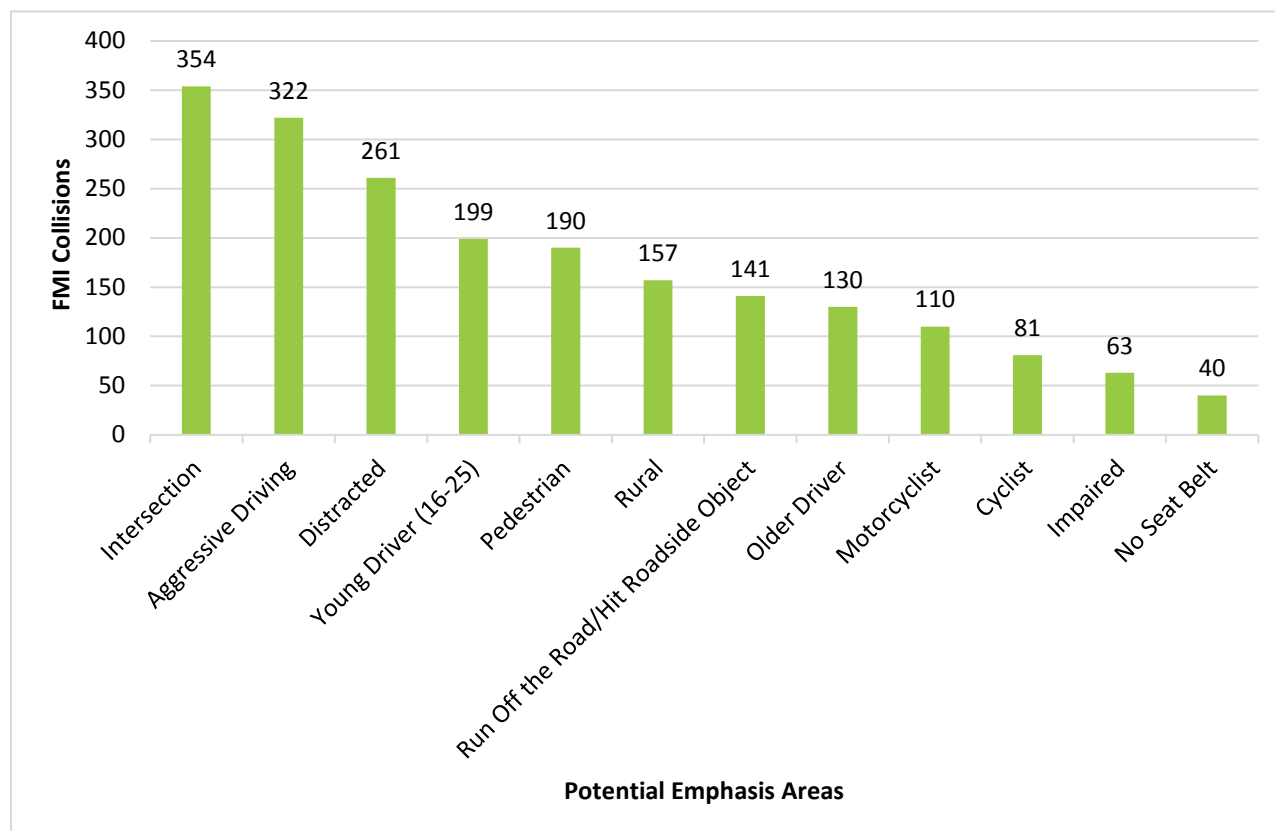


Figure 5: Highest Categories FMI Collisions (2013 – 2017)

5.2. Public Survey

Data analysis is typically the main influencer in the selection of emphasis areas in a road safety action plan, but often it is not the only factor, as consideration must also be given to the evidence of what is an effective intervention, along with social and economic inputs. To consider the community perspective, input was sought from Ottawa residents. CIMA, with the assistance of Dynata (a market research firm formally known as Research Now), surveyed people who live or work in the City of Ottawa regarding traffic safety and road safety improvement priorities.

Dynata participants are paid for their time to complete surveys. For the purpose of the assignment, Dynata was instructed to exclude respondents with a place of residence outside of the City of Ottawa and engaged a sample of 1000 residents. Dynata was also instructed to reach out to specific postal codes that were chosen based on area types to ensure that input was received from each area within the City.

In addition to the Dynata surveys, an online survey was made available to the general public from February to March 2019 on the City's website through the following approaches:

- Survey link emailed through partner agencies, stakeholder groups and community associations,
- Public notices, and
- Social media.

The survey asked residents to rank a set of road safety areas (listed in Figure 6) based on what they felt should be the priority for the City to address.

In total, approximately 3000 City of Ottawa residents aged 16 years and older responded to either the Dynata online survey or the City of Ottawa online engagement survey. Additional analysis on the survey can be found in the technical memorandum in Appendix A.

Although the public's highest priority rankings were slightly different than the results of the collision analysis, the public indicated a high priority for concerns in line with the collision data analysis. The public ranked priority to address most road safety issues with high priority. In general, it appears that the public has a good understanding of the road safety concerns within the City. The combined results of public support for priority road safety areas from both Dynata and the City's website is shown in Figure 6.

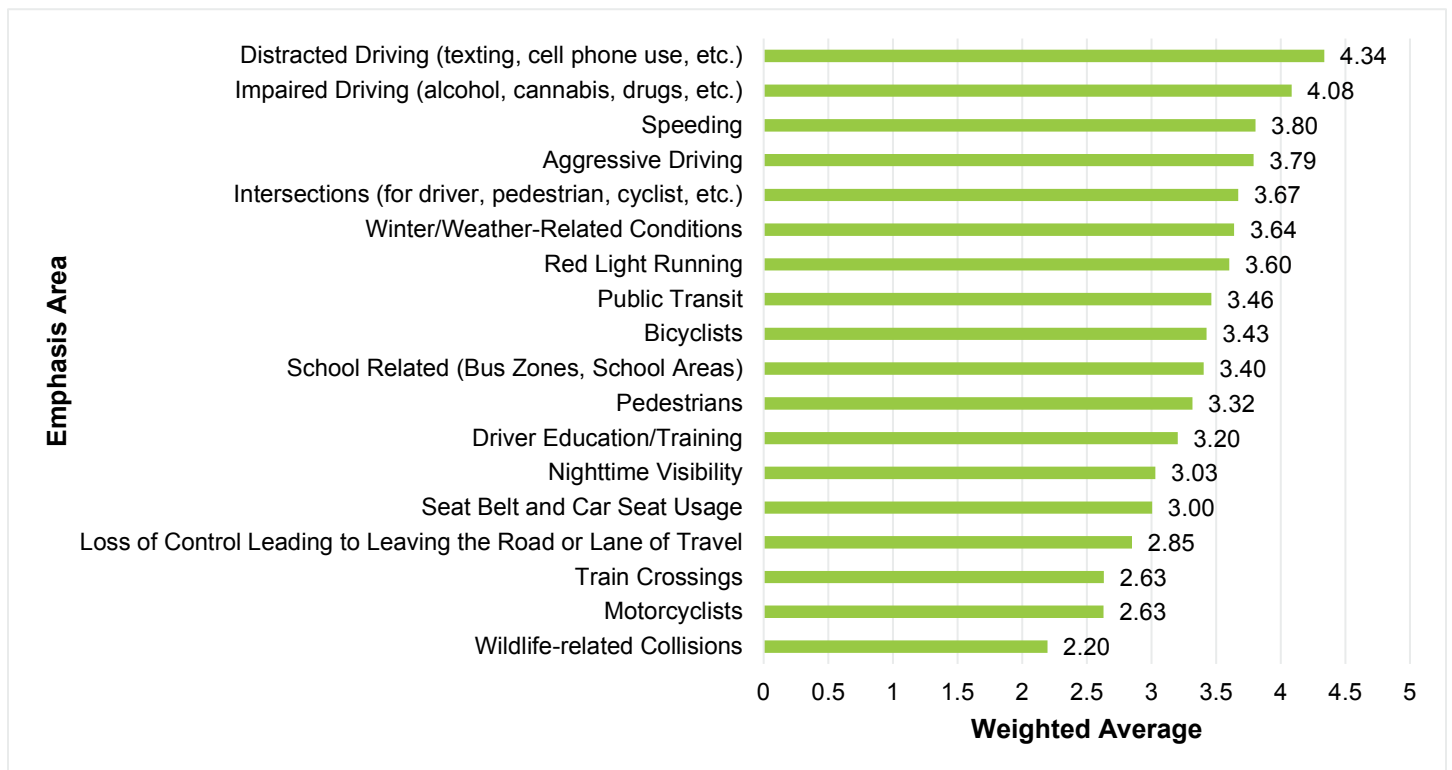


Figure 6: Combined Average Emphasis Area Priority Ratings by All Survey Participants
*Ranking based on 5 = Highest Priority and 1 = Lowest Priority

5.3. City of Ottawa Priorities

As noted, the selection of emphasis areas is predominantly a data-driven process. However, along with the input from the public, City priorities also played an integral part in the final

selection of emphasis areas. Recognizing these priorities is in keeping with the Safe Systems approach to Road Safety. Emphasis areas that were not at the top of the data-driven list were included in the final emphasis areas list, based on City priorities. Also, some reorganization and combination of emphasis areas better reflected the City's priorities.

Rural collisions, motorcyclists, and impaired driving were included in the final list. Rural collisions, although fewer in number, resulted in a higher proportion of FMI collisions than the other area types within the City. Rural roads tend to have higher speeds, so collisions tend to be more severe. Ottawa's road network is unique in a way that the City has a large portion of rural roadways compared to other Canadian cities. Combining pedestrians, cyclists, and motorcyclists together into one category was a priority of the City to ensure that all vulnerable road users were included in the plan. Also, aggressive, distracted, and impaired driving are combined into one category of high-risk drivers in recognition that many of these behaviours overlap, and are better served by addressing the behaviour, with enforcement and education programs.

5.4. Emphasis Area Summary

The four emphasis areas chosen for the RSAP are described below.

- **Intersections:** All FMI injury collisions occurring within (or related to) an intersection.
- **High-Risk Driver Behaviours:** All FMI collisions that are caused by any of the following driver actions/conditions:
 - Apparent Driver Action (Aggressive):
 - Following too close
 - Exceeding the speed limit
 - Speed too fast for conditions
 - Disobeying traffic control
 - Failing to yield right of way
 - Driver Condition:
 - Inattentive
 - Impaired
- **Vulnerable Road Users:** All FMI collisions that involve a motor vehicle and a pedestrian, cyclist, or a motorcyclist.
- **Rural Areas:** All FMI collisions that occur within the transportation area classified by the City as rural.

When analyzing the data, there are two important things to consider:

- There is overlap between the emphasis areas.
- High risk drivers and vulnerable road users are the result of combining several inputs from the police data.

The overlap between emphasis areas is easiest to explain with an example. For example, if a pedestrian were involved in a collision at an intersection and the driver was distracted, this collision is represented in 3 emphasis areas: vulnerable road users, intersections, and high-risk

drivers. Therefore, you cannot add the emphasis area totals to get the total number of FMI collisions that occurred over that time period.

The efforts of the RSAP are focused on reducing the number of FMI collisions in the defined emphasis areas. As the RSAP continues to grow and countermeasures are implemented, priorities will change in the City which may result in changes to the emphasis areas (as seen from the previous road safety plan). The emphasis areas should be revisited with each update to the RSAP, as collision trends change and new road safety concerns arise.

For a detailed description of the process to determine the emphasis areas, please refer to Appendix A.

6. Countermeasures

The plan to deliver improved road safety in the City through the RSAP will consist of a number of individual initiatives called countermeasures. A countermeasure is an action taken to reduce the frequency or severity of motor vehicle collisions. The countermeasures chosen for the RSAP require two characteristics:

- They have a likelihood (evidence-based or emerging and show promise of effectiveness) of contributing to the reduction of collision frequency or severity of an emphasis area; and
- There must be an internal department, or partner agencies that are prepared to support and deliver the countermeasure.

The partner agencies of the RSAP identified and selected the countermeasures based on their evidence of impact in the emphasis area and their ability to continue or undertake new or enhanced safety initiatives. The partner agencies who participated in the development of the RSAP are listed in Appendix A.

6.1. Types of Countermeasures

6.1.1. E's of Road Safety

Road safety is a diverse and complex field that requires involvement of partners from various disciplines with various types of expertise. The three E's of road safety provide a broad range of different approaches which may be taken to address road safety issues. Diverse approaches can provide short-term and long-term actions and can help to mitigate many of the major roadway safety issues, road user perceptions, and user behaviours. Some jurisdictions have added additional E's such as Empathy, Engagement, and Evaluation. All approaches are reflective of the diversity of components required to work together to reduce serious collisions, using the Safe Systems perspective. For simplicity of organizing the countermeasures, this RSAP uses the following 3 E's.

The definition of the three major E's of road safety are listed below in alphabetical order.

Education countermeasures aim to change road user behaviour so that road users are more aware of safe road use. Currently, the options for disseminating information are many, and the

type of communications medium chosen depends largely on the target audience. Education campaigns can be very targeted or more broad-based and reach a larger population of road users compared to engineering or enforcement measures that tend to be location specific.

Enforcement countermeasures include both police manned and automated enforcement. They emphasize attempting to gain better compliance with existing rules of the road, with the secondary aim of educating drivers about the consequences of their actions. Enforcement can be continuous or limited to specific campaigns and locations.

Engineering countermeasures are changes to the physical format of the roadway, including traffic calming measures, changes to traffic control devices such as traffic signal timing, warning devices, or pavement markings policy and practice changes, or changes to regulations, such as traffic flow or parking rules. Most engineering actions are site specific or limited to a group of similar sites.

The countermeasures outlined in the RSAP focus on policies and programs that can be delivered by the City of Ottawa and partner agencies. It is important to note that the Safe Systems approach also highlights the responsibilities of the road users to behave in a safe and conscientious manner.

6.1.2. Countermeasure Categories

Countermeasures are presented in the following sections. Not all countermeasures can be immediately implemented, as some require funding or formal approvals, while others are tied to the time frames of other larger projects, such as road construction or provincial outreach campaigns. The action plan below is intended for the five-year time frame (2020 to 2024), but also shows long-term measures that are likely implemented outside of this phase of the RSAP.

The proposed countermeasure program is comprised of three types of countermeasures:

- Existing actions to be retained at the current level of effort,
- Existing programs to be enhanced or expanded, and
- New initiatives that need to be created or developed.

Most countermeasures target specific emphasis areas, while some are general countermeasures that are specific to more than one emphasis areas.

In addition to the countermeasures being classified as engineering, enforcement, or education, the countermeasures are also categorized into four types:

- Policy,
- Systemic,
- Location specific, and
- Demographic specific.

Policy countermeasures indicate new standards or policies customized for the City. They may be a set of guidelines or procedures that are applied to the City as a whole. Examples of this are the Official Plan and Transportation Master Plan that set a policy framework for issues related to land use and transportation, with road safety being an element it seeks to achieve. Policy countermeasures also consist of studies to provide further understanding of the

behaviour of a group of users or even contributing factors to collisions. An example of a policy countermeasure is the Complete Street Guidelines, Multi Modal Level of Service and Building Better and Smarter Suburbs.

Systemic countermeasures are countermeasures that have proven to be effective (usually engineering countermeasures) and will be implemented widely and pro-actively across the City, as opportunities arise. An example of a systemic countermeasure is safety edge, which could be applied to all rural City roads during resurfacing projects or implementation of cycling facilities as re-construction projects are undertaken.

Location-specific countermeasures improve safety at individual sites. Detailed collision analysis is required to identify locations and to determine the type of countermeasure(s) required. An example of a location-specific countermeasure is adding a protected left-turn phase at an intersection.

Demographic-specific countermeasures target a particular group of road users, such as drivers or pedestrians or a particular age range within the City. Detailed collision analysis is required. An example of a demographic-specific countermeasure is an educational campaign for impaired driving.

6.1.3. Ottawa Public Health (OPH)

OPH contributes as a Support Role to the Road Safety Action Plan countermeasures. OPH seeks to inform, where possible, discussions through participating on Technical Advisory Committees and currently, as members of the CORE team. This includes in areas such as urban design, land use, mobility, environment, etc.

The work of teams such as Healthy Eating Active Living, Injury Prevention, and School Health carry out many initiatives to promote uptake of active transportation, road safety, and school active transportation through comprehensive health promotion approaches, ranging from policy, to education as well as awareness raising and creating supportive environments. All of which can help advance road safety as part of OPH's mandate as per the Ontario Public Health Standards to reduce the frequency, severity and impact of preventable injuries. OPH Epidemiology team provides quantitative support to helping understand road safety issues and identify areas for moving forward.

This work is all underpinned through OPH's mission to work together with our community to improve, promote and protect the health and well-being of the people of Ottawa. The Road Safety Action plan aligns with the new OPH strategic plan which includes a strategic direction to "Influence the Social and Physical Environments that Support Health and Well-Being", with an annual measure to promote "Healthy Communities by Design."

6.2. Existing, Enhanced, and New Countermeasures

If the current safety efforts by the City and its partner agencies are maintained but not altered the likelihood is low that a significant reduction in either the number or severity of FMI collisions

will be achieved, especially in the context of increasing traffic volumes. To succeed in effectively reducing collisions within the City, by enhancing existing programs or developing new ones significant additional resources are required.

The value of the RSAP will be in focusing the City and the partner agencies on emphasis areas, and in ensuring coordination and collaboration between partners and instilling the safety culture throughout the partner organizations. The coordination of the team members should result in less duplication of effort and instead working together to deliver countermeasures in the most efficient way – this will free up some resources. In the end, the value gained through the reallocation of resources is important but the RSAP will require significant additional resources in terms of new, carefully targeted programs to succeed.

6.3. Existing Policies, Guidelines and Programs

A number of policies, guidelines and programs at the city contribute to achieving the City's road safety goals. These include, but are not limited to the following:

- Complete Streets Implementation Framework - a process to ensure roadways are planned, designed, constructed, operated and maintained for everyone's safety and comfort regardless of people's age, ability, or mode of transportation. The approach aims to ensure that basic needs of all users are provided as a minimum, and then further improvements are considered within the scope of transportation projects.
- Multi-Modal Level of Service guidelines - include levels of service targets for all modes of travel given the location context (i.e. road classification, proximity to schools, parks, transit, adjacent land uses, etc.).
- Arterial Road Corridor Design Guidelines - includes cycle tracks as standard features for all arterial roads when they are constructed or renewed.
- Neighbourhood Collector Streets Design Guidelines - includes various road safety design features, including cycle tracks and traffic speed management guidance for all Collector roads.
- Transportation Impact Assessment Guidelines - provides guidance for road modifications required to support private development applications, further establishes the Complete Streets concept with new requirement to assess Level of Service for all users rather than reviewing only vehicle Level of Service.
- Building Better and Smarter Suburbs – provides guidance on speed management requirements for local roadways being constructed as part of new subdivisions.

Some of the existing programs in the 2019 Budget, that support the Road Safety Action Plan are included in Table 1.

Table 1: Road Safety Existing Countermeasures Budget (2019)

Project Description	Total in Thousands (\$000)	Emphasis Area
909388 2019 Sidewalks & Pathways - CW	2,675	Vulnerable Road Users
909464 2019 Active Transportation Missing Links	193	Vulnerable Road Users
909465 2019 Pedestrian Access-Intersect & Ramp	200	Vulnerable Road Users
909470 2019 Area Traffic Management	745	High Risk Drivers (Speed)
909484 2019 Sidewalks & Pathways - Other	200	Vulnerable Road Users
909316 2019 New Traffic Control Devices	2,430	All
909317 2019 Safety Improvement Program	1,031	All
909466 2019 Pedestrian Facilities Program	2,239	Vulnerable Road Users
909467 2019 Cycling Facilities Program	4,377	Vulnerable Road Users
909058 2019 Post LRT Improvements Scott Street (Holland to Bayview)	2,500	Vulnerable Road Users
909468 2019 Development Sidewalks	153	Vulnerable Road Users
909395 2019 Acces. Ped Signal/Ped Countdown Sig.	600	Vulnerable Road Users
909322 2019 Advance Traffic Management Systems	405	All
909320 2019 Life Cycle Renewal TCS	1,665	Vulnerable Road Users
909396 2019 Safer Roads Ottawa	420	All
909397 2019 Pedestrian Safety Evaluation Prog.	380	Vulnerable Road Users
909398 2019 Cycling Safety Program	105	Vulnerable Road Users
909547 2019 Traffic & Pedestrian Safety Enhance	1,630	High Risk Drivers (Speed)
909548 2019 Pedestrian Crossover Program	500	Vulnerable Road Users
2019 Adult School Crossing Guard Program	2,707	Vulnerable Road Users
Road Safety Related Total	25,155	

6.4. Collision Modification Factors (CMF)

The CMF Clearinghouse is a database developed and maintained by the U.S. Federal Highways Administration⁹, recognized as the most comprehensive source of countermeasure information for engineering countermeasures in North America. It uses scholarly research from across the world to determine the effectiveness of countermeasures using their CMF value. A CMF is an estimate of the potential changes in collision frequency which might be expected as a result of implementing a specific countermeasure. Each source of research in the Clearinghouse is rated according to the quality of the research methodology, and each is categorized as to the specific effect expected. For this project, Clearinghouse data was consulted. Only research having 3 stars out of 5, and usually 4 out of 5 (signifying high quality) was considered. Where available, CMFs have been supplied for the countermeasures to better inform the partner agencies of the possible degree of success of the countermeasures. Generally, the CMFs are available only for engineering countermeasures, typically those applied at a specific site. For education and enforcement programs, there is much fewer specific data

⁹ www.CMFClearinghouse.org

on effectiveness, because the impacts of these programs, by their very nature, are much more difficult to measure and to attribute to a reduction in collisions.

It is important to note that CMFs have their limitations and should only be considered under a professional assessment. CMFs are extracted from studies that may have unique locations, traffic conditions, and even roadway environments. Since these unique characteristics are rare to duplicate exactly, collision reduction expected as a result of a new countermeasure is variable. A study may evaluate total collision reduction, or it could evaluate a specific type of collision, such as rear-end or angle collisions or severity of a collision. Also, implementing countermeasures requires engineering judgement to ensure that the countermeasure is effective at the implemented location. For example, protected left-turn phasing at a location with no left-turn collisions will show no reduction in collisions, but if it is implemented at a location with high left-turning collisions, the collision reduction is high.

6.5. Emphasis Area Specific Countermeasures

Countermeasures have been selected with an initial emphasis area in mind but may impact multiple emphasis areas. For example, a countermeasure designed to prevent vehicle-to-vehicle collisions at an intersection may also prevent collisions involving pedestrians or cyclists at the intersection. Countermeasures are listed only once and they are connected to the emphasis area for which the countermeasure is expected to have the most impact.

In many cases, the required magnitude of the countermeasure will only be determined through detailed investigation. For engineering measures, the data will indicate the number of potential sites which may be candidates. For enforcement, the duration and number of officers required will be subject to an in-depth review. Similarly, the size and cost of educational programs will depend on the approach to reaching the target audience in terms of the medium and the duration of the messaging. Ultimately, the degree of success of the RSAP at reducing collisions will be one of the most important factors in determining cost and effort. If the numbers are not dropping as fast as the City wants, more resources will have to be applied.

A survey was sent to the stakeholders for their input on countermeasure priorities with a list of pre-determined proposed countermeasures by the City. The purpose of the survey was to receive input from the stakeholders and ask about their contributions to existing programs. Overall, there were 11 responses to the survey and the agencies who participated had positive responses towards contributing to educational campaigns, supporting existing programs, and providing educational support on a community level.

The following sections describe the countermeasures for the RSAP. Delivery is listed by department as well as external partner.

6.5.1. Intersections

Intersection collisions resulted in 354 of the 743 FMI collisions from 2013 to 2017, representing an annual average of 70 FMI collisions. Figure 7 shows the nature of the intersection collisions. Intersection collisions are coded as “at intersection” or “intersection related” on the police reports. The most common impact type within the intersection was single motor vehicle (SMV),

which include vehicles (and bicycle) collisions with pedestrians or with infrastructure. Angle collisions, defined as two vehicles hitting each other at right angles, also contribute a high number of FMI collisions at intersections. This impact type requires that one of the vehicles has violated the traffic control (stop sign or traffic signal), and often involves a vehicle travelling at high speed. When vehicles are involved in angle collisions, there is a high probability that it will be a severe collision, due to the vehicle speed, and the fact that, often, the occupant portion of the vehicle is impacted first.

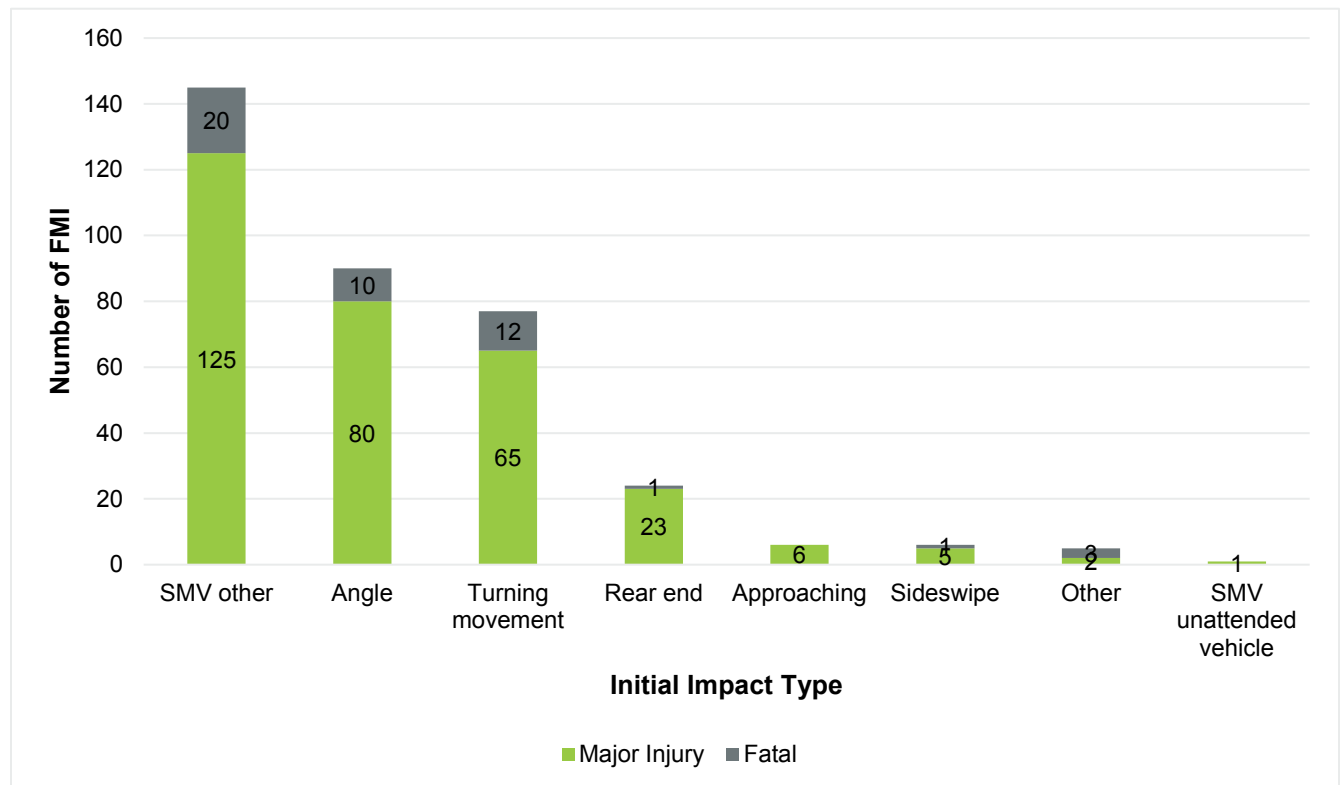


Figure 7: Intersection FMI Collisions 2013 – 2017 by Initial Impact Type

Intersection countermeasures tend to be more location specific, as each intersection can be unique in design and may vary in geometry, orientation to the landscape, volumes, and capacity. Larger scale re-constructions of the design of intersections can be expensive to implement, but smaller scale engineering measures, such as signage, signal timing, or pavement markings, can sometimes make an immediate impact on safety.

Table 2 lists the proposed countermeasures for intersection collisions.

Table 2: Intersection Countermeasures

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Engineering	Policy	Complete Streets Guidelines	Continue to apply the Council approved Complete Street Policy for new roadways and re-construction projects.	-	Existing	Transportation Planning, Infrastructure Services, Traffic Services
Engineering	Policy	Emerging Safety Devices	Pilot, test, and evaluate new emerging safety devices that have proven safety benefits.	-	Enhance	Traffic Services
Engineering	Policy	Road Safety Audit	Develop a Policy Document with internal City groups detailing new requirements for Road Safety Audits. Develop a process to identify which roadway modifications or new construction projects require pre- and post-construction detailed safety reviews.	10-60% (total collisions)	Develop	Infrastructure Services, Transportation Planning, Traffic Services
Engineering	Systemic	Network Screening	Update the existing approach to network screening to identify locations with high collisions in order to determine where best to implement countermeasures. Develop SPF (safety performance functions) for specific collision categories as per industry best practices.	-	Enhance	Traffic Services
Engineering	Systemic	Rail Safety - Grade Crossing Review	Ensure City is compliant with Federal Grade Crossing Regulations by required date in 2021. Monitor and ensure ongoing compliance with regulations by completing Detailed Safety Assessments (DSA) for all at-grade crossings every 5 years, as	25%	Existing	Traffic Services, Rail Authorities

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
			recommended by Transport Canada, jointly with the Rail Authority.			
Engineering	Location Specific	Left Turn Turning Movement Collision Reduction	Develop a systematic approach to review and prioritize locations for fully protected left turn installation to mitigate left-turn collisions. May require addition or extension of left turn lane.	99% left-turning collisions	Develop	Traffic Services
Engineering	Location Specific	Traffic Control Signal, Intersection Pedestrian Signals (IPS) and PXO Installation Process	Continue to prioritize pedestrian signal implementation, PXO installations and new traffic control signals based on safety.	44-77%	Existing	Traffic Services,
Engineering	Location Specific	Roundabouts	Continue to implement roundabouts as a means to reduce collisions. Roundabouts should be considered for new roadway intersections and as part of reconstruction or roadway modifications.	82% (Two-way Stop to Roundabout) 78% (Signalized to roundabout)	Enhance	Infrastructure Services, Transportation Planning, Traffic Services
Engineering	Policy	Improve Signal Conspicuity	Develop safety related policies to address minimum spacing for signalized intersections.	3-12%	Develop	Traffic Services
Engineering	Location Specific	Conduct Regular Signal Timing Updates	Review signal operations and update signal timings at 200-250 signalized intersections per year to reflect changing travel patterns and volumes for all road users.	-	Enhance	Traffic Services

6.5.2. High-Risk Drivers

The high-risk driver emphasis area includes a combination of aggressive driving, distracted driving, and impaired driving FMI collisions. On average, high risk driving results in approximately 90 FMI collisions annually, and 451 FMI collisions from 2013 to 2017. Table 3 shows a breakdown of individual collisions which show the high-risk driver's action and condition. Overall, high risk driver behavior was cited in 451 of the 743 FMI collisions. However, because data from two different field categories in the police report are used to assemble this information, there is some overlap. Therefore, adding the three categories together, results in a higher number. This means that in 451 of the FMI collisions, at least one high risk driver behavior was cited. In 195 of those, there was more than one. For example, a driver could have been reported as disobeying traffic control and being distracted.

Table 3: High Risk Driver FMI Collisions by Year

Year	Aggressive	Distracted	Impaired	Total
2013	66	40	14	120
2014	59	41	12	112
2015	54	41	9	104
2016	69	62	16	147
2017	74	77	12	163
Total	322	261	63	646

The categories in the figure show the action and/or condition of the high-risk driver. In some cases, it was a combination of a high-risk driving action and high-risk driving condition. For example, as mentioned previously, distracted driving (cited as inattentive) can often lead to aggressive driving behaviour (failing to yield right of way, disobeying traffic control, following too close, speeding, etc.) Further distracted driving is generally noted by police as being under-reported, given that many people will not admit to using cell phones while driving.

A 2017 study of Ottawa youth found that 16% of students in Grades 7 to 12 reported being a passenger in a car in the past year driven by someone who had been drinking and 11% reporting being passengers in a car driven by someone who had been using drugs other than alcohol. Additionally, 15% of Ottawa high school student drivers reported driving within an hour of using cannabis. Related to distracted driving, 29% of Ottawa high school student drivers reported sending or reading a text or email while driving in the past year¹⁰.

¹⁰ Ottawa Public Health – Ontario Student Drug Use and Health Survey, 2017

Countermeasures that are applied to high-risk drivers are mainly educational and enforcement measures aimed at altering driver behaviour.

Speeding and speed reduction is one of the core considerations within a safe systems approach to reducing FMI collisions, which recognises the human tolerance to physical force. Many studies have been done to quantify this, and the generally accepted research indicates that pedestrians struck at 30 km/h have a 10% chance of suffering from a fatal collision, while those struck at 50 km/h have an 85% chance of being killed¹¹.

Further research indicates that fatal and serious injury collision numbers are significantly influenced by changes to vehicle operating speeds, which is illustrated in Table 4.

Table 4: Vehicle Speed vs. Fatal and Injury Collisions¹²

	Relative Change in the Number of Accidents/Victims					
Change in Speed	-15%	-10%	-5%	+5%	+10%	+15%
Fatal Collisions	-44%	-32%	-17%	+19%	+41%	+65%
Serious Injury Collisions	-32%	-22%	-12%	+12%	+25%	+40%

In the safe systems model, influencing speed is something that can be addressed by road users themselves, as well as vehicle and infrastructure design. Although the infrastructure portion of this may be the easiest to control, from a public service perspective, it is also the most expensive. Drivers will typically drive at a speed that they are comfortable. This is not easily influenced with low cost engineering countermeasures such as signs and pavement markings.

Table 5 lists the countermeasures for high risk drivers.

¹¹ Interdisciplinary Working Group for Accident Mechanics (1986); Walz et al. (1983) and Swedish Ministry of Transport (2002)

¹² <https://roadsafety.piarc.org/en/road-safety-management-safe-system-approach/safe-system-principles>

Table 5: High Risk Drivers Countermeasures

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Engineering	Policy	Longitudinal Rumble Strips and Stripes	Develop a guideline for implementation of rumble strips in rural areas as part of resurfacing or re-construction projects.	Center Line Rumble Strips 44-64% Shoulder Rumble Strips 13-51%	Develop	Traffic Services, Infrastructure Services
Engineering	Policy	30 km/h Target Speed Limits – Local Roadways	When reconstructing a local roadway or building new local roads, design should reflect a 30 km/h target operating speed based on the Safe Systems approach.	-	Develop	Traffic Services, Transportation Planning, Infrastructure Services
Engineering	Systemic	Install Gateway Speed Limits	Implement gateway speed limit signage to establish 40 km/h or 30 km/h speed limits within neighbourhoods as per existing policies.	-	Enhance	Traffic Services, Transportation Planning
Enforcement	Location Specific	Red Light Cameras	Expansion of program to reduce intentional red-light running behaviors and to reduce right angle collisions at signalized intersections.	26% (reduction in angle collisions) +18% (potential increase in rear end collisions)	Enhance	Traffic Services
Enforcement	Location Specific	Automated Speed Enforcement	Undertake a pilot of automated speed enforcement when	14-53%	Develop	Traffic Services,

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
			Regulations are enacted to allow municipalities to use this form of enforcement.			
Engineering	Location Specific	Traffic Calming	Following new traffic calming guidelines, implement vertical/horizontal physical features and designs to reduce travel speeds, primarily on residential and local collector streets. Continue to install Speed Display Radar and other temporary traffic calming measures to help reduce speeds within neighbourhoods.	3-18%	Existing	Traffic Services, Transportation Planning
Engineering	Location Specific	High Friction Pavement	Use high-friction pavement materials at locations with rear-end high collisions.	24-86%	Existing	Traffic Services
Engineering	Location Specific	Roadside Design Improvements at Curves	Select and prioritize new sites, enhanced delineation and friction on horizontal curves in urban and rural locations.	6-33%	Enhance	Traffic Services
Enforcement	Systemic	Innovative Enforcement Technology	Seek additional technologies that can increase enforcement.	-	Develop	Ottawa Police Services and Traffic Services
Enforcement	Systemic	ALPR Project	Additional purchase of automated license plate recognition systems.	-	Enhance	Ottawa Police Services
Enforcement	Systemic	School Bus Camera Project	Following the evaluation of the first 12 months of the	-	Enhance	Ottawa Police Services

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
			program, increase the fleet of camera enabled buses.			
Enforcement	Location Specific	Operation SPRINGBOARD	Intelligence-led frontline deployment (FLD) neighborhood “enforcement corridor” enforcement project.	-	Existing	Ottawa Police Services
Enforcement	Location Specific	Summer Market Enforcement Blitz	Targeted enforcement initiative in the Byward Market (April – August 2019).	-	Existing	Ottawa Police Services
Enforcement	Location Specific	Monthly RIDE Program(s)	Intelligence-led RIDE program deployed across the City.	-	Existing	Ottawa Police Services
Enforcement	Location Specific	Speed Enforcement Assignment	Intelligence-led speed enforcement. Traffic Services provides all speed data to OPS to help in selection of enforcement locations.	-	Existing	Ottawa Police Services and Transportation Services
Enforcement	Demographic Specific	STEP (Selective Traffic Enforcement Program) Themes	Follow too close, stop sign violations, unsafe lane changes, red-light running, school bus/school safety zone, impaired driving, unsafe vehicles and heavy trucks, cycling safety, motorcycle safety, pedestrian safety, speeding, construction zones, distracted driving, roundabouts, vehicle occupant restraints.	-	Existing	Ottawa Police Services
Education	Policy	Policies on Cannabis/Drugs	Develop policies on cannabis and drugs for	-	Develop	Ottawa Student Transportation

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
			school bus operators to reduce collisions associated with impairment.			Authority (OSTA), OPH support
Education	Location Specific	Safety Blitz Team	Work with schools and City partners, including Police, By-law and Traffic Services to address safety issues around schools.	-	Develop	OSTA
Education	Location Specific	CAA Bus Monitors	Work with CAA to provide monitors on school buses to address behavior issues, allowing the drivers to focus on the driving task	-	Develop	OSTA, CAA
Education	Demographic Specific	Anti-Aggressive Driving Messaging	Development and delivery of a targeted messaging program through social media.	-	Existing	Ottawa Safety Council
Education	Demographic Specific	Distracted Driving Messaging	Development and delivery of targeted social media programming	-	Existing	Traffic Services, OPH support
Education	Demographic Specific	Impaired Driving Awareness Program	Social media education campaign focused on impaired driving by alcohol or drugs in secondary schools and effects on driving.	-	Existing	Traffic Services, OPH support
Education	Demographic Specific	Canada Road Safety Week / Police Week	Combined enforcement and public education initiatives.	-	Existing	Ottawa Police Services and Traffic Services, OPH support
Education	Demographic Specific	Leave the Phone Alone Campaign	Continued funding for awareness campaign.	-	Existing	Traffic Services

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Education	Demographic Specific	Drop It and Drive Presentations	Continued funding for education initiative.	-	Existing	Traffic Services
Education	Demographic Specific	Cannabis and Driving Campaign	Targeted campaign focused on drug impaired driving.	-	Develop	Traffic Services
Education	Demographic Specific	Toe Tag Events	Annual initiatives involving a mock collision scenario for graduating students.	-	Existing	Ottawa Fire, Paramedic and Police Services

6.5.3. Vulnerable Road Users

The vulnerable road user emphasis area includes pedestrian, cyclist, and motorcyclist FMI collisions. Between 2013 and 2017, there were 190 FMI collisions involving pedestrians, 110 motorcyclist FMI collisions, and 81 cyclist FMI collisions. In total this equates to approximately half of all FMI collisions within the City. Since this emphasis area includes a large road user group, many measures from each road safety E can be applied to reduce these collisions. Figure 8, Figure 9, and Figure 10 illustrate the annual trends of FMI collisions for pedestrian, cyclists, and motorcyclists, respectively.

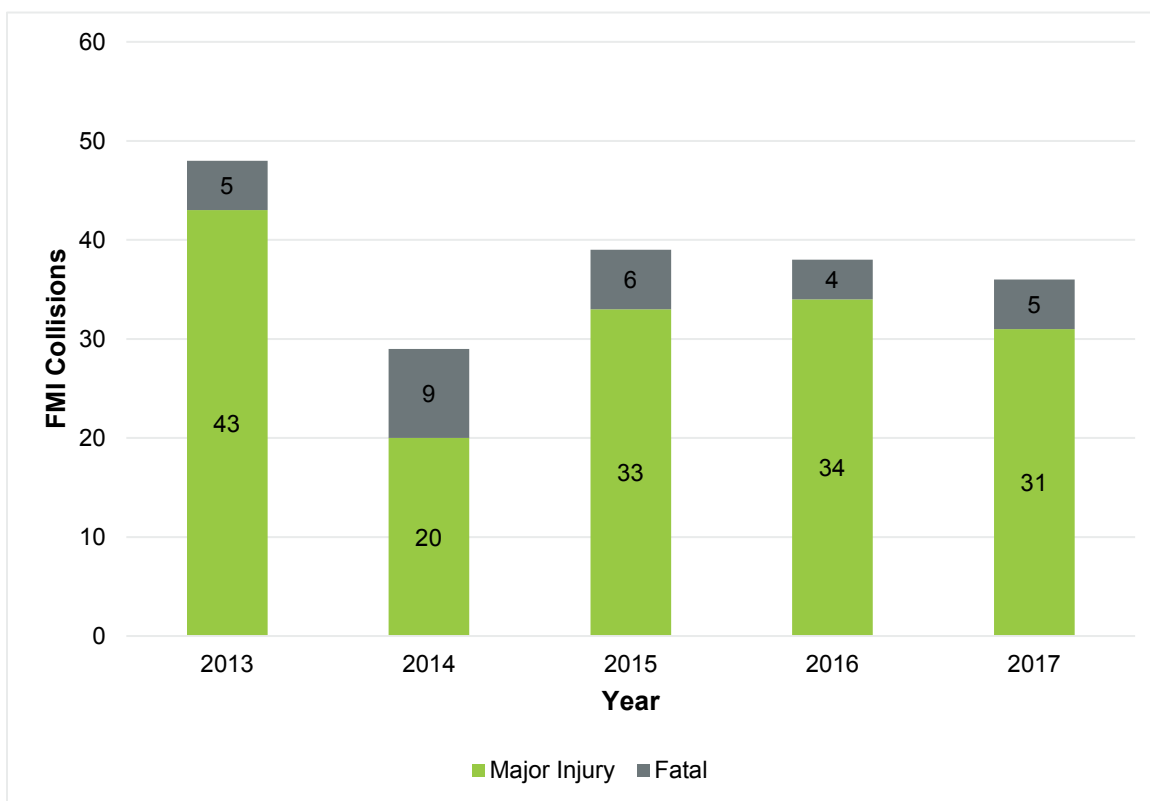


Figure 8: Pedestrians Involved in FMI Collisions Per Year

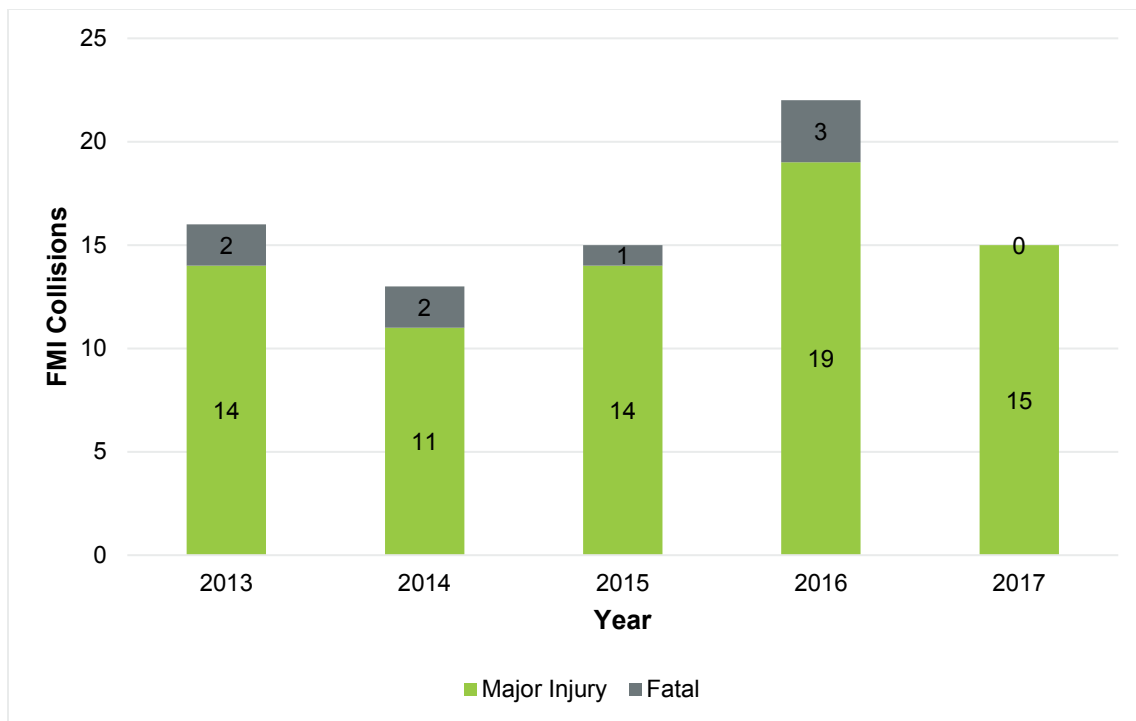


Figure 9: Cyclist FMI Collisions Per Year

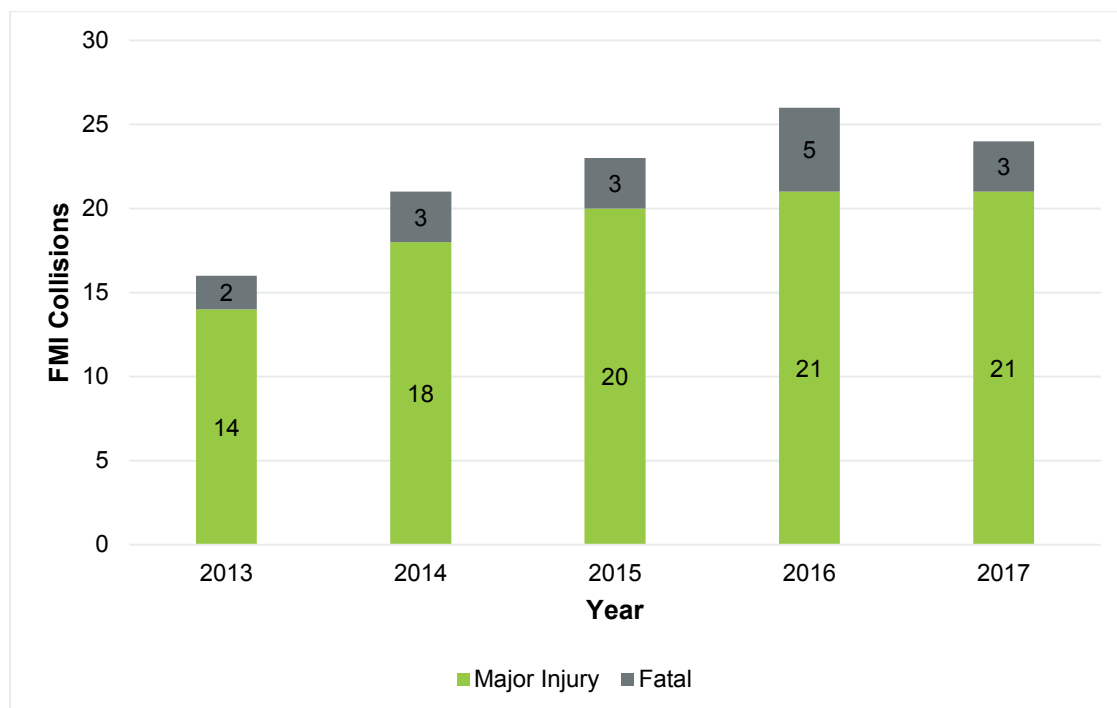


Figure 10: Motorcyclist FMI Collisions Per Year

Table 6 lists the countermeasures for vulnerable road users.

Table 6: Vulnerable Road Users Countermeasures

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Engineering	Policy	Leading pedestrian intervals (LPI)	Develop a leading pedestrian interval (LPI) assessment and implementation guideline prioritizing locations in the central business district and near schools. Implement LPI where criteria are met. LPI's provide an advanced pedestrian WALK display prior to vehicle GREEN display.	13-14%	Develop	Traffic Services
Engineering	Policy	No Right Turn on Red Restrictions	Implement no-right turn on red restrictions, as required, to address various safety concerns including to reduce or address right turning collisions with pedestrians, cyclists or vehicles, inadequate sightlines, high speed traffic on intersecting roadway or where heavy pedestrian volumes cross perpendicular to the right turn movement	-	Enhance	Traffic Services
Engineering	Policy	Crosswalk Marking Enhancements	Review existing ladder marking criteria and develop a systematic approach to prioritize locations for high visibility ladder markings in crosswalks	19-40%	Enhance	Traffic Services

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Engineering	Location Specific	Pedestrian Safety Evaluation Program (PSEP)	Conduct annual detailed safety reviews and prioritize locations for geometric improvements.	-	Enhance	Traffic Services, Infrastructure Services
Engineering	Systemic	Countdown Pedestrian Signals	Install at all new intersections and upgrade existing locations. Countdown timers provide a visual readout describing amount of time left to finish crossing at signalized intersections.	7-70%	Existing	Traffic Services
Engineering	Systemic	Accessible Pedestrian Signals	Install AODA compliant pedestrian push buttons at all new intersections and upgrade existing locations.	-	Existing	Traffic Services
Engineering	Location Specific	Install New Mid Block Pedestrian Signals or PXO's	Develop action plan for high collision/conflict locations. Consider rates/frequencies, available alternate crossings and consistency of collision patterns for prioritizing locations. Provide midblock crossing opportunities.	7-36% (flashing beacon)	Enhance	Traffic Services
Engineering	Location Specific	Adult Crossing Guard Program	Crossing guards provide crossing assistance to children on their way to and from school.	-	Enhance	Traffic Services
Engineering	Location Specific	School Zone Safety Reviews	Collaboration with schools to review and mitigate safety concerns.	-	Existing	Traffic Services,

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Engineering	Location Specific	Cycling Safety Improvement Program (CSIP)	Implement enhancements annually for 10 locations per year. Potential engineering countermeasures include signs, signals, pavement markings, bike lanes, bike boxes, cross rides.	-	Enhance	Traffic Services
Engineering	Location Specific	Expand Cycling Network	Create greater separation from vehicles as appropriate for the context and continue to expand the cycling network. Upgrade existing conditions and expand the network by implementing separated cycling facilities and dedicated bike lanes as per the Ottawa Cycling Plan and Complete Streets Policy. Continue to reallocate road space where applicable, evaluating overall operational and safety impacts for all users. Evaluate and mitigate locations (intersections and corridors) with the highest risk for conflicts.	59-74%	Enhance	Transportation Planning
Engineering	Location Specific	Red Revert Parameter at Signalized Intersections	Red reverts cannot be eliminated at intersections. Assess site specific operations to determine if there are special cases where an actuation can be held if vehicle/bike were to move off the sensor after other measures to improve signal	-	Develop	Traffic Services

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
			adherence have been explored.			
Engineering	Systemic	Motorcycle Safety	Conduct a comprehensive study of fatal and a major injury collision trends to identify cost effective countermeasures and network review of high motorcycle collision locations (Intersection, Midblock)		Develop	Traffic Services
Education	Demographic Specific	Walking School Bus	A Walking School Bus in the mornings on 13 routes. The current Walking School Bus paid leader model is funded by OSTA. Ottawa Safety Council is starting a hybrid paid/volunteer model that will be partially funded by Transportation Planning TDM program.	-	Enhance	Transportation Planning, OSTA and Ottawa Safety Council
Education	Demographic Specific	Pedestrian Safety Training for Elementary School Children in Grades JK – Grade 6	Curriculum-based pedestrian safety program that is a hands-on, interactive learning with a focus on speeding, distracted drivers. Program teaches children to be aware of their surroundings as pedestrians in our community.	-	Existing	Traffic Services, OSTA, Ottawa Safety Council, OPH support
Enforcement	Demographic Specific	Project ERASE	Sport motorcycle & modified car enforcement.	-	Existing	OPS

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Education	Demographic Specific	BestFit	Provides education, awareness, and proper installation of car seats to ensure children are properly secured when travelling passenger vehicle. Provide funding for XX clinics per year.	-	Existing	Traffic Services, Ottawa Safety Council
Education	Demographic Specific	Bike Rodeos	Bike Rodeos provide young bicyclists, JK through grade 4, the chance to learn safe riding skills and rules of the road, through fun stations and demonstrations.	-	Existing	Parks and Recreation and Ottawa Safety Council
Education	Demographic Specific	Share the Road Campaigns	Social Media messaging providing safety tips, information for motorists and motorcycle drivers alike - education and safety awareness.	-	Existing	Traffic Services, OPH support
Education	Demographic Specific	M1X (Gearing Up) Training and Licensing	Canada Council Gearing Up is Canada's only national motorcycle rider training program. Many insurance plans recognize the value of Gearing Up by offering insurance discounts to riders who successfully complete the rider training program.	-	Existing	Ottawa Safety Council
Education	Demographic Specific	Get There with Care Campaign	Targeted campaign promoting responsible mobility.	-	Develop	Traffic Services,

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Education	Demographic Specific	Take it to the Track Initiative	An initiative looking at working with high risk motorcyclists.	-	Develop	Ottawa Police Services
Education	Demographic Specific	Be Safe, Be Seen	Expand the initiative to 24 events in the late summer/early fall. Work with OSC on area specific presentations.	-	Enhance	Traffic Services, Ottawa Fire Services
Education	Demographic Specific	Cycling Safety Awareness Program - Campaigns Focused on New Cycling Infrastructure	Ensure that education efforts are made when new infrastructure is introduced.	-	Existing	Transportation Planning
Education	Demographic Specific	Campaigns Focused on Pedestrian Safety Infrastructure	Ensure that education efforts are made when new infrastructure is introduced.	-	Develop	Traffic Services
Education	Demographic Specific	Enhance Motorcycle Safety Courses	Expand the offering of these courses to the members of the community.	-	Enhance	Traffic Services
Education	Demographic Specific	Cycling Safety Courses	Expand the number of cycling courses offered to the community focused on teens, adults and older adults	-	Enhance	Traffic Services

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Education	Demographic Specific	Engagement Initiatives at Sites	SRO undertakes 30+ initiatives per year to for all vulnerable road users.	-	Existing	Traffic Services

6.5.4. Rural Areas

Rural area collisions account for 157 FMI collisions, which is shown in Figure 11. Although rural roads are not the road type with the highest number of FMI collisions, the rural area is the area type with the highest number of fatal collisions. This is due to higher speeds on rural roads, which result in more severe collisions. Countermeasures for rural areas are typically systemic since it is hard to address concerns that are location specific. Engineering countermeasures play a larger role for rural areas compared to education and enforcement. It is also important to note that 19 percent of FMI collisions in rural areas occur on provincial roads. As in the past, the City will continue to coordinate with our provincial partners to mitigate these collisions.

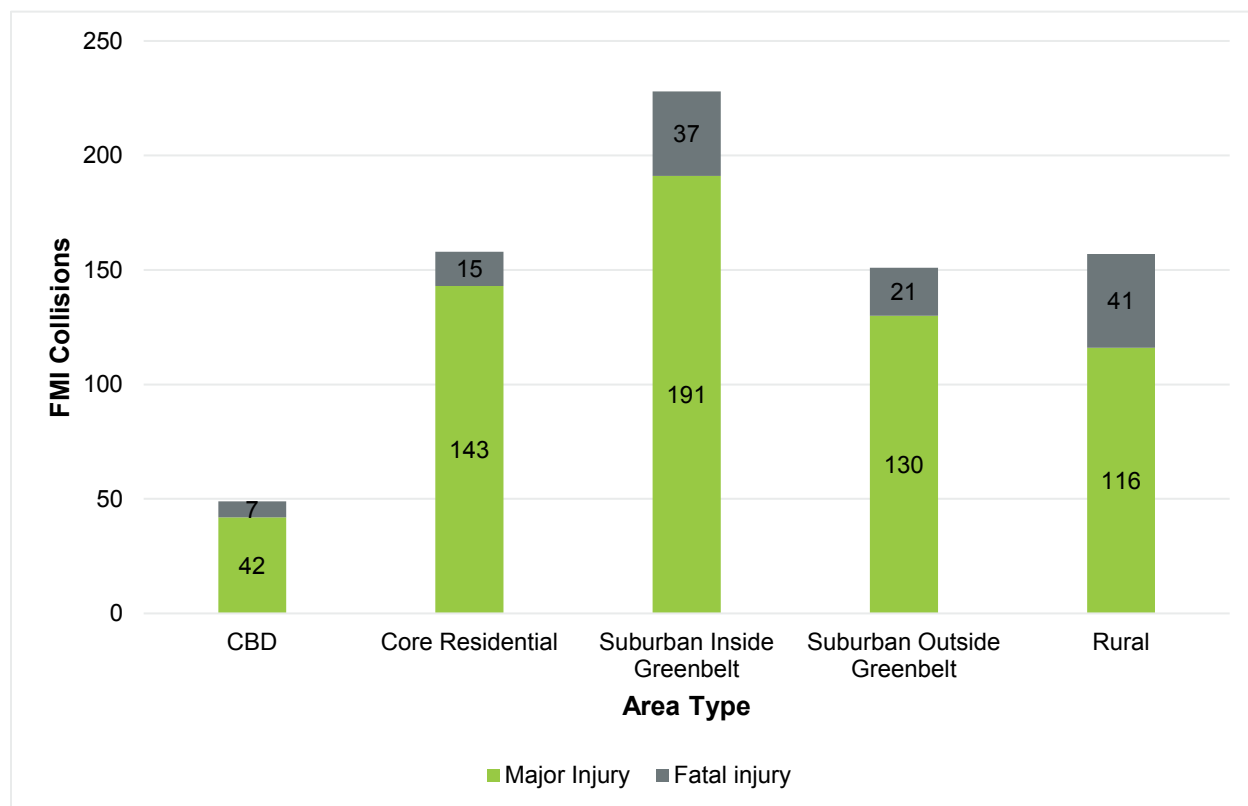


Figure 11: Area Type FMI Collisions (2013 – 2017)

*CBD = Commercial Business District

Table 7 lists the countermeasures for rural areas.

Table 7: Rural Area Countermeasures

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
Engineering	Systemic	Review and Prioritize Rural Corridors for Safety Improvements.	Prioritize rural corridors for review and enhanced signage. Develop SPF (safety performance functions) for specific rural related collision categories as per industry best practices. This would include proactively identify rural stop locations for upgrading ex. oversized stop sign, stop ahead sign, flashing LED beacon	10% reduction in injury and fatal collisions 15% Reduction in nighttime crashes	Develop	Traffic Services
Engineering	Systemic	Intersection Lighting	Develop a program to identify and prioritize locations where no lighting existed before or upgrade existing lighting to meet standards.	46-56%	Develop	Traffic Services
Engineering	Systemic	Maintenance on Rural Roads	Review and update process to include a data driven approach to identifying shoulder maintenance priorities on rural roads to help reduce the incidence of edge drop-off issues.	-	Existing	Road Services, Traffic Services
Engineering	Systemic	Safety Edge	Develop specifications and incorporate safety edge as part of resurfacing and roadway modification projects on roadways within rural area were possible. Safety edge refers to the technique of beveling the edge of the asphalt on roads without curbs. This allows motorists who partially leave the road to recover without over-correcting, or catching a wheel edge.	11%	Develop	Infrastructure Services, Traffic Services
Engineering	Location Specific	Upgrade Rural "Skewed" Intersections	Review and prioritize locations for upgrade from rural "skewed" intersection to standard intersection (ex. Dalmeny at Gordon Murdock). Close channel and	-	Develop	Traffic Services

Type	Category	Title	Description	Potential Collision Reduction	2019 Status	Delivery
			modify intersection to accommodate turning movements.			
Engineering	Location Specific	Improve Visibility of Signal Displays	Identify rural locations requiring signal backplates with retroreflective borders added to traffic signal indication (can help improve visibility during power outages). Develop a program to retrofit backplates.	15% in total collisions	Develop	Traffic Services
Enforcement	Demographic Specific	Rural Speed Enforcement Blitz	Intelligence-led focus on rural road speed.	-	Develop	Ottawa Police Services

7. Action Plan

This section brings together the input from the previous sections to outline the key components of a deliberate and measured RSAP. There are several overarching actions that are critical to the success of a RSAP:

- Institutionalizing a safety culture
- Organizational Structure
- Data Management
- Communications Plan
- Monitoring and Evaluation Plan
- Annual Reporting
- Training

There are also actions that are specific to the selected emphasis areas. This section will provide an overview of these actions.

7.1. Institutionalizing a Safety Culture

Most jurisdictions across North America that have instituted a Vision Zero or Safe Systems Approach (SSA) to road safety have obtained endorsement of the plan from both the top elected official, such as the mayor and a top public servant in charge of transportation. As leaders, their acceptance of the plan and the fundamentals of Vision Zero and SSA help to inspire culture change with both the public and with internal staff.

While road safety is recognized as a top priority for the City and the involved RSAP partner agencies, this is often not enough. Road safety must be integrated into the decision-making process throughout the City and agencies that are involved with the road system. Developing a traffic safety culture means creating a climate where traffic safety is highly valued and rigorously pursued, and this often requires a top down strategy. If the endorsement is not validated at critical decision points, it is unlikely that the plan will be as impactful as it can be.

Regardless, the RSAP can help institutionalize changes in the transportation safety culture through the following actions:

- Interaction, collaboration, and liaison between safety partners and other staff and agency members including invitation as non-participating members to certain RSAP activities,
- Encouraging the use of collision data and emphasis area objectives and strategies in all road network decision-making,
- Incorporating safety into existing plans and programs through formal and informal reviews, and
- Directing funding from RSAP to specific programs run by internal and external partners responsible for implementing those programs that contribute to road safety.

The goal of implementing a traffic safety culture is to start changing people's values and attitudes towards traffic safety, so that it is a part of every decision made regarding transportation. Dr. Nicholas Ward, a senior research scientist at the Western Transportation Institute at Montana State University, says:

“The goal of the traffic safety culture paradigm is to develop a process for changing values and attitudes so that safety is part of every transportation decision, whether individual or organizational.”¹³

Part of this cultural shift will be to invite members of groups not directly involved in the RSAP, for example, road construction or planning, to participate and to apply the philosophies of Vision Zero and SSA and the RSAP in their agency or department.

The City is currently in the process of updating the Transportation Master Plan (TMP). Ensuring that Vision Zero and SSA principles are incorporated into the plan is a critical part of the TMP and will help with institutionalizing safety in Ottawa.

7.2. Organizational Structure

The City of Ottawa has a well-established organizational structure that outlines the responsibilities of all the partners involved in implementing safety programs within, and external to, the organization. This section describes the existing structure, which is illustrated in Figure 12, and potential enhancements that should be pursued.

¹³ A Primer for Traffic Safety Culture by Nicholas Ward, Ph.D., Jay Otto, and Jeff Linkenbach, Ph.D., May 2014

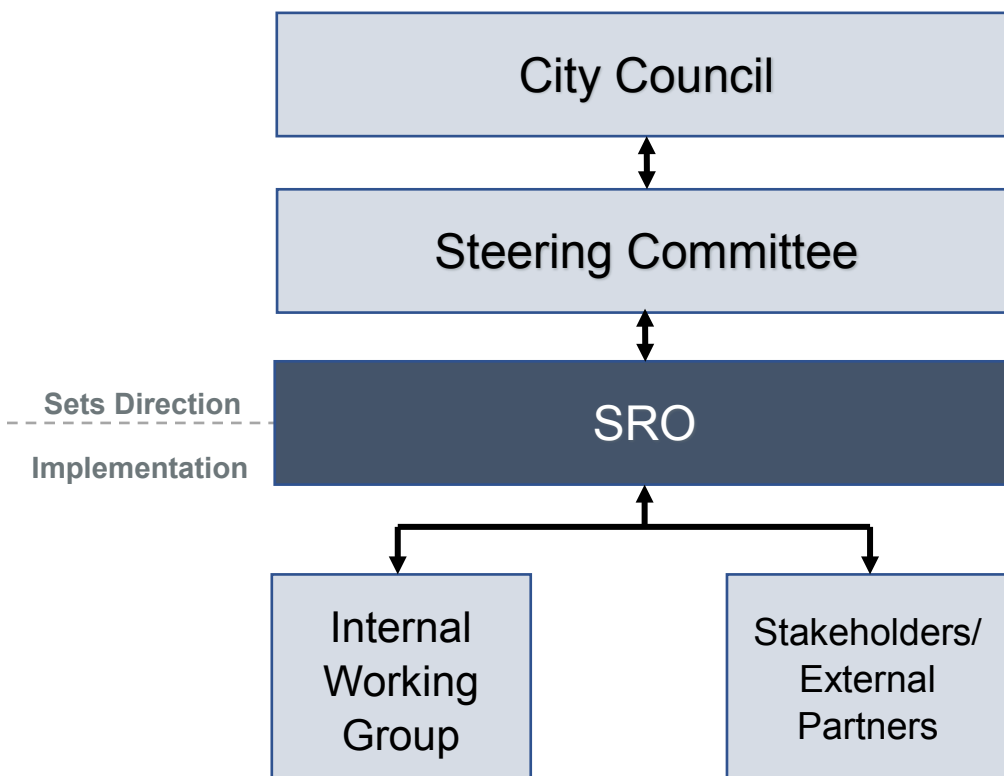


Figure 12: Organizational Structure of the RSAP

7.2.1. RSAP Team (Safer Roads Ottawa)

It will be necessary to coordinate the different participants in this structure. Currently, the Safer Roads Ottawa (SRO) team meets with the Steering Committee, the Internal Working Group and the Stakeholders, on an as needed basis. The SRO Coordinator reports to the Steering Committee annually, as well as coordinates meetings with the other groups, as necessary. For this iteration of the RSAP, SRO should continue with its role of coordinating and reporting back on the progress of the plan. One of the key responsibilities of the coordination role is to ensure that there is cross pollination between the different groups supporting the plan. A Safe Systems plan requires that Education, Enforcement and Engineering all work together, and are aware of the actions and progress of the other groups to provide support as needed for those initiatives. A formalized meeting schedule and mandate should be undertaken to ensure that continues, moving forward.

7.2.2. Steering Committee

The Steering Committee acts as the leader/champion of the RSAP and is responsible for guiding the program, delivering the countermeasures, and is directly responsible for the management and success of the RSAP. The Steering Committee tracks the progress and the

performance of the RSAP. The RSAP is a long-term project that requires significant commitment from each partner agency, so as much commitment, informal or formal as possible will be obtained from the leadership of each of the partner agencies. The Steering Committee includes senior management from Ottawa Fire Services, Ottawa Paramedic Services, Ottawa Police Services, Ottawa Public Health and Transportation Services. Since 2017, the Regional Supervising Coroner has joined the Steering Committee as well. This group should meet 2-4 times per year to evaluate the progress of the RSAP and discuss high priority issues within the City related to road safety. Senior Management who are currently on the Steering Committee are listed below:

- Chief, Ottawa Fire Services
- Chief, Ottawa Paramedic Service
- Chief, Ottawa Police Service
- Medical Officer of Health, Ottawa Public Health
- General Manager, Transportation Services Department
- Regional Supervising Coroner

7.2.3. Internal Working Group

The Internal Working Group consists of representatives who deliver safety programs. This group represents the management from each of the departments within the City who are involved in the RSAP. The Internal Working Group consists of senior staff from each service area that has taken on a responsibility in the RSAP. The Internal Working Group is accountable for the progress of the RSAP, and should be reporting back to their departmental Steering Committee representative directly as needed, as well as to the Steering Committee as a whole through, SRO. It is recommended that the Internal Working Group meets on a monthly or bi-monthly basis to discuss and coordinate safety programs and present their progress towards implementing countermeasures identified in the RSAP. As the program progresses, the Internal Working Group should consider meeting more frequently (for example, Edmonton's road safety office meets on a weekly basis).

During the development of the RSAP, a CORE team met regularly to direct the progress of the RSAP. This included regular attendance from the Ottawa Police Services, Ottawa Public Health, and Transportation Services, primarily, Traffic Services. It is recommended that the Internal Working Group consist of these participants as well as key communications or public engagement staff that can work closely with SRO on the development and roll out of strategy and materials for the educational components related to the culture change that is required for the RSAP.

This group should remain open to the potential for the addition of new internal participants, as the plan grows and expands its resource needs. The following is a list of other service areas that could play a large role in the RSAP, moving forward, and examples of their potential involvement.

- Transportation Planning: development of the Transportation Master Plan, Ottawa Cycling Plan, Ottawa Pedestrian Plan, Traffic Calming;

- Planning, Infrastructure and Economic Development: ensuring road safety principles are integrated into policies, road reconstruction projects, construction of new roads within subdivisions;
- New innovations in asphalt and guiderails to improve road safety
- Traffic Management and Innovation: connected and autonomous vehicles, and smart city features that can impact road safety

7.2.4. Stakeholder Committee

The Stakeholder Committee will consist mainly of representatives from local road safety partners. In Ottawa, this is a well-established group, that has provided support to the SRO program for many years. It consists of the organizations that participated in the development of this iteration of the RSAP, including Bike Ottawa, Ottawa Safety Council, MADD Canada, and many others. A list of participants is included in Appendix A. This group is meant to advocate for road safety within the City. The programs that are delivered by this group consist mainly of educational safety programs. It is recommended that this group meets on a quarterly basis with the SRO to discuss their efforts towards improving road safety.

7.3. Data Management

The City's transportation related data is primarily managed by the Transportation Data Collection & Analytics team in the Transportation Services Department. This team uses a data software known as TES (Transportation Engineering Software), to manage traffic volumes, operating speed data and police collision report data. This software program is utilized by many jurisdictions in Ontario and has the capacity to support the state of the practice safety analysis, including network screening (collision hot spot identification), and systemic approaches to countermeasure application.

Transportation data management is a critical and necessary element in a Vision Zero, SSA because the data is required to help establish locations for study, as well as monitoring the effectiveness of the program. Efforts should be taken to maintain this resource and enhance it as the technology evolves.

Some jurisdictions and organizations have explored the possibility of integrating health/hospital data or insurance industry data to help with monitoring and evaluation. The Transportation Services Department can collaborate with Ottawa Public Health to look at integrating health/hospital data related to collisions with monitoring and evaluation. Further, alternative sources of data are becoming available due to advancements in technology. It is worthwhile to monitor these advancements for opportunities to improve RSAP monitoring and evaluation methods.

7.4. Communication Plan

Engaging the public in road safety is fundamental to a RSAP. Reaching the road user to educate and promote safe choices, and compliance to the rules of the road are a necessary part

of a Vision Zero and SSA to road safety. Most Vision Zero RSAPs have taken the branding of their plan very seriously. Communication plans utilize interactive websites, educational videos, events, swag, etc., to actively engage the public.

A communication plan can also focus on key messaging and working with the media to get ahead of the dialogue on politically sensitive events. Serious injuries and deaths are an emotional subject, especially when they are preventable, and the RSAP communications team should be prepared to work with the media and elected officials to reassure and comfort the public when tragedies occur. This type of trust requires time and genuine effort to be established. Many Vision Zero cities face harsh criticism by the public and media for “not doing enough”, however this can also be interpreted as a sign of a well engaged public or advocacy community, which is a critical element to the culture change needed to move the Safe Systems Approach forward.

7.5. Monitoring and Evaluation Plan

The purpose of the Evaluation and Monitoring plan will be to analyze the successes to build upon the areas for improvement. The analysis should be completed annually, and results should be presented in an annual report. The analysis should include the following:

- Before and after collision analysis for engineering countermeasures, both systemic and location specific, where 3-5 years of data is available.
- Engineering countermeasures delivered and enhancements.
- Enforcement countermeasures delivered and enhancements.
- Educational countermeasures delivered and enhancements.

The monitoring and evaluation plan should outline Key Performance Indicators (KPIs) for the variety of different countermeasures, such that the necessary data is collected on an ongoing basis. KPIs is a performance metric that can be chosen by the leading organization that reflects a numerical statistic of the RSAP's performance relative to the goal (for example, collision reduction, number of enforcement campaigns, number of school programs, etc.).

While it is often possible to measure the actual effect of engineering changes to the road environment on road user safety, the same is not true for enforcement and education. It may be possible to measure and attribute outputs, that is, the extent of the actions taken, but it is more difficult to predict the expected degree of success of enforcement and education countermeasures in terms of actual safety reductions. The longer timeframes and many other factors influencing changes in road user behaviours make it difficult to separate out the effect of specific road safety programs. It is possible to measure whether the messages reached the intended recipients and it is possible to ask whether the road user intends to change their behaviour as a result. With engineering countermeasures, the prediction tools are more accurate, but still only provide an estimate of the expected outcome.

The longer timeframes on both implementation and program impacts mean that short-term or initial results cannot be considered truly indicative of the effect of the program. Further, it takes several years of data after the countermeasure has been implemented to accurately determine, statistically, if a change has really occurred. Therefore, it will be a number of years (likely four or five) before valid evaluations of the program's overall effects can be stated.

The effect of the RSAP countermeasures on road safety will not always be immediate. Engineering countermeasures can often be implemented in short-term, but the physical areas impacted by changes are often small. The time frame to implement engineering countermeasures may be short in the case of simple pavement markings or signage changes (e.g. flashers over a stop sign) or may take a number of years if capital budgeting and/or public consultation is required (e.g. changes to the configuration of a signalized intersection).

Enforcement countermeasures can often be organized relatively quickly if a short, high-profile campaign is the intent. However, consistent, targeted, long-term efforts are more difficult to sustain and may require longer-range budgeting and planning. The effects of enforcement are largely dependent on the consistency and degree of effort.

Educational efforts typically have the longest time periods, but also hold the greatest opportunity for widespread societal and behavioral change. Changing road user behaviour is not easy but goes directly to the cause of the collision and holds great possibilities for collision reduction. More information on road safety behavioral change campaigns can be found in the Traffic Injury Research Foundation's publication: "Road Safety Campaigns, What the Research Tells Us"¹⁴

7.6. Annual Reporting

Ottawa has produced a Road Safety annual report for several decades. It has changed many times over the years but has always reported on collision statistics for the previous year, and the past 5 years. It summarizes the different collision characteristics for all the collisions in the City of Ottawa.

All Vision Zero and SSA cities produce a road safety annual report to increase accountability and report on progress. There are many examples that can be used to help create a template for Ottawa's updated annual report. In addition to the collision characteristic summaries, they will report on:

- Changes in collisions for each of the emphasis areas
- Good news stories for successful applications of countermeasures
- Lessons learned stories for less successful applications
- Results of resident surveys

7.7. Training

The City of Ottawa has been actively engaging in road safety engineering for several decades and has often been a leader in Canada. Previous iterations of the RSAP have been successful in building partnerships, and this iteration of the RSAP should continue to build on this. Training

¹⁴ https://tirf.ca/wp-content/uploads/2017/01/2015_RoadSafetyCampaigns_Report_2.pdf

is an excellent way to change the culture within the City and to institutionalize road safety into decision making.

7.8. Emphasis Area Specific Actions

Reducing FMI collisions in each of the emphasis areas will require a commitment to delivering on as many of the countermeasures listed in the countermeasure tables as possible. As is outlined in the countermeasures table, many of the programs are ongoing, and some are new, and need to be developed. The intention of this RSAP is to build upon previous iterations, as budget and resources will allow. New countermeasures should be based upon advancements in best practice, be evidence based, and be supported by either an internal or partner agency.

As discussed, many of the countermeasures can be considered to be contributing to more than one emphasis area. The following sections outline, in general terms, the existing strengths of the programs that support Road Safety and provide suggestions for pragmatic enhancements to those programs.

7.8.1. Intersections

The City of Ottawa has an effective and well-established program that specifically identifies high collision intersections, studies them, and implements modifications, called the Safety Improvement Program. Signalized intersections are supported by a sophisticated traffic signals operations team that implements red light cameras, and other road safety countermeasures at signalized intersections. The New Traffic Control Devices program studies the potential for implementing a roundabout at every location that is being considered for a new traffic signal. These programs are collaborating well, to support the RSAP objectives.

To advance the City's objectives for improving road safety, through the RSAP, the following suggestions can be considered:

- Update the identification of high collision locations to utilize industry best practice for Network Screening using Highway Safety Manual methods.
- Consider systemic countermeasure applications, such as left-turn protected-only phasing.
- Consider formalizing a process to conduct Road Safety Audits for intersections that are being reconstructed.
- Consider updating or formalizing an access management policy.
- Support resources to keep up with innovations in traffic and road safety, as well as incident management.
- Ensure funding availability to comply with Transport Canada regulations for at-grade rail crossings.

The City should continue to take advantage of resources available from other organizations and agencies, that support the SSA and Vision Zero.

7.8.2. High Risk Drivers

The high-risk driver emphasis area focuses on opportunities to interact with road users and motivate them to make good choices. Safer Roads Ottawa (SRO), the Ottawa Police and Ottawa Public Health have all been working actively on engagement and outreach programs over the years. Further, all three of these groups have strong partnerships with outside agencies that have their own mandates to promote the same kind of changes in driver behaviour that the RSAP is targeting. Partnerships with MADD Canada, and the Ottawa Safety Council support several ongoing road safety initiatives. Also notable is that the SRO and the Ottawa Police continue to work with new technologies, such as Automated Licence Plate Readers (ALPR), school bus cameras, the one-metre device to help enforce high risk driver behaviour.

During consultation, there was considerable discussion regarding the legalization of cannabis and the impacts that might have on road safety. The City and their partners have been working to develop engagement strategies to address some of the anticipated behaviors. It would be worthwhile to provide resources to study, as well as coordinate with other agencies to mitigate the impact.

From an infrastructure perspective, the City has well established programs supporting things like red light cameras, high friction asphalt and neighbourhood traffic calming. Recently, the City has passed a policy for Gateway Signage, to allow speed limit reductions in residential neighbourhoods. These actions all support reducing FMI collisions caused by high risk drivers.

To expand these efforts, it would be worthwhile to consider:

- Supporting efforts to ensure new communities are built with road safety in mind (minimize speeding opportunities).
- Investigating systemic safety countermeasures such as rumble strips and safety edge treatments on high speed rural roads.

Recently, the Provincial government updated the Highway Traffic Act to allow for the use of automated speed enforcement (ASE) in school zones and community safety zones. The Regulations must still be amended by the province before municipalities can use this form of enforcement. The City of Ottawa has been working with other Ontario jurisdictions to ensure a consistent and defensible approach to implementation.

7.8.3. Vulnerable Road Users

In this iteration of the RSAP, vulnerable road users refer to pedestrians, cyclists and motorcyclists. The City of Ottawa has many programs in place that support pedestrian and cycling safety, including the Pedestrian Safety Evaluation Program and the Cycling Safety Improvement Program. Both programs have received funding increases over the past several years and have worked on infrastructure changes that directly address safety issues impacting pedestrians and cyclists. Other programs that expand the cycling and pedestrian networks also support improvements to the safety of cyclists and pedestrians. Improving the network for pedestrians and cyclists directly contributes to the safety of the network as a whole, by reducing the number of overall vehicle trips. This has benefits from a safety perspective, but also a road

capacity perspective. Other programs that are pivotal in expanding the cycling and walking networks are programs such as the Pedestrian Cross-Over program (PXO), the Sidewalk and Pathways program and the Active Transportation Missing Links program.

Education also plays a large role in vulnerable road user safety. The City of Ottawa has many successful campaigns such as Be Safe Be Seen and Share the Road. Ottawa Safety Council delivers programs on behalf of the city that are funded by the city, such as the Walking School Bus, and Adult School Crossing Guard Program. OSTA also contributes to funding the Walking School Bus.

Motorcyclist safety is a bit different than the active modes of cycling and walking, because it uses the same infrastructure as motor vehicles and travels at the same speed. That being said, motorcyclists are a road user group that have shown a high increase in FMI collisions since the last iteration of the RSAP. Existing programs that support motorcycle safety include Project ERASE, which is a targeted enforcement campaign run by the Ottawa Police, as well as Motorcycle rider training courses managed by the Ottawa Safety Council. Given the increase in motorcycle FMI collisions, it would be worthwhile for the City to study motorcycle collisions in more detail, to help determine if there are trends that could help direct an expansion of effective countermeasures to reduce motorcycle collisions.

The biggest threat to pedestrian and cycling safety have to do with the fact that the existing road network facilitates motor vehicles traveling at high speeds, and a general lack of space to accommodate segregated facilities. Accommodating space for segregated facilities has many challenges and ultimately, can be very costly. In response to this, Ottawa has developed several policies (as listed in Section 6.3) that help to ensure that new roads consider all modes, and that opportunities to collaborate with renewal and life cycle maintenance are maximized.

- Complete Streets Implementation Framework - a process to ensure roadways are planned, designed, constructed, operated and maintained for everyone's safety and comfort regardless of people's age, ability, or mode of transportation. The approach aims to ensure that basic needs of all users are provided as a minimum, and then further improvements are considered within the scope of transportation projects.
- Multi-Modal Level of Service guidelines - include levels of service targets for all modes of travel given the location context (i.e. road classification, proximity to schools, parks, transit, adjacent land uses, etc.).
- Arterial Road Corridor Design Guidelines - includes cycle tracks as standard features for all arterial roads when they are constructed or renewed.
- Neighbourhood Collector Streets Design Guidelines - includes various road safety design features, including cycle tracks and traffic speed management guidance for all Collector roads.
- Transportation Impact Assessment Guidelines - provides guidance for road modifications required to support private development applications, further establishes the Complete Streets concept with new requirement to assess Level of Service for all users rather than reviewing only vehicle Level of Service.
- Building Better and Smarter Suburbs – provides guidance on speed management requirements for local roadways being constructed as part of new subdivisions.

Most other North American jurisdictions struggle with this issue, and thus there are ongoing improvements and enhancements to policies and guidelines. Ottawa should continue to evaluate opportunities to accommodate safer use within these networks, and participate in developing policies that support this.

It is also worthwhile to consider expanding the toolbox of systemic countermeasures directed at vulnerable road users such as:

- Ladder markings at pedestrian crosswalks.
- Leading pedestrian intervals at signalized intersections.
- No-Right-Turn on Red.
- Refuge islands to assist in pedestrian crossing.
- Protected-only left-turn arrows at signalized intersections.

Vulnerable road user safety is a large field of study, and similar to Ottawa, many cities are piloting new techniques. Often new ideas can seem promising and exciting, but may have little to no impact, or worse, make a situation less safe. Understanding the context that countermeasures are applied in, but still being open to trying new things is an important part of supporting vulnerable road user safety. This can be done with a well thought out pilot study, that ensures that investment that is made on new ideas does not take away from the investment into applications that are known to have safety benefits.

7.8.4. Rural Areas

Rural area is a new emphasis area for the Ottawa RSAP, that recognizes the large component of FMI collisions that happen on roadways outside the urban or suburban areas. Most cities that have adopted Vision Zero or SSA plans are primarily urban in nature. In fact, given the land use make up of Ottawa, it is easier to compare Ottawa to a small European country. Addressing rural road safety is challenging simply because the large geographic area, and relatively low traffic volumes, it is hard to identify collision hot spots based upon collision history. Implementing changes can also be very expensive.

Rural road collisions do lend themselves better to a systemic approach to road safety. Many rural roads have similar physical characteristics, therefore identifying countermeasures that can be applied to the entire network, in collaboration with resurfacing projects, or signage renewal projects are preferable. Examples that were identified in other emphasis areas but would help reduce rural FMI collisions include rumble strips and safety edge treatment.

It would be worthwhile to use the Highway Safety Manual methods for predictive safety analysis to prioritize rural locations, and then consider supporting programs on a priority basis that address issues such as:

- Streetlighting.
- Shoulder paving.
- Guiderails.
- Signs and pavement markings.

Enforcement and education with regards to drinking and driving is an area that can also be explored, given the higher proportion of drinking and driving FMI collisions in the rural areas compared to urban areas.

8. Conclusions

The City of Ottawa Road Safety Action Plan provides a strategy to address the City's specific road safety challenges and continues to build partnerships to work towards the common goal of improving road safety.

The RSAP process was able to build on the previous iterations of the strategic plans that Ottawa has created, which were comprised of many countermeasures. These actions are designed to provide success in achieving the immediate RSAP goal and making progress toward a significant reduction in FMI collisions. The emphasis areas chosen for collision reduction were derived mainly from data analysis, but also reflect public opinion and City priorities.

The RSAP is a living strategy for guiding the safety management process. For the RSAP to have an impact on road safety, regular meetings of the partners are needed, where collaboration opportunities can be identified, and decisions can be made with respect to budgets, priorities, and goals. These meetings provide an opportunity to evaluate progress and make sure all partners are delivering on their promises.



Appendix A: Technical Memo

City of Ottawa

Technical Memorandum

Ottawa Vision Zero Phase II

A000885A

November 2019

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1. INTRODUCTION

The purpose of this technical memorandum is to document the analysis and decisions used to establish the emphasis areas, which are top road safety priorities, for the City of Ottawa Road Safety Action Plan (RSAP) refresh. Three main tasks were undertaken to establish the emphasis areas:

- Resident Survey
- Collision Analysis
- Stakeholders' Workshop #1
- City Priorities

Emphasis areas are critical to any RSAP because they outline the direction and focus for the duration of the plan. They provide the framework to prioritize countermeasures, initiatives, and policies, and they ensure that the stakeholders involved in supporting the plan are working together with a common objective. Emphasis areas should encompass large groups of collisions that can be reduced with a focussed and collaborative effort from the 3 Es of Education, Enforcement and Engineering. Focussed and deliberate attention has been shown to be an effective means to achieving improvements in all types of models, from health care campaigns to police enforcement campaigns such as seat belt use and drinking and driving. This is part of the method that has been applied in Sweden for the past 20 years that has resulted in reductions in fatal and serious collisions, outpacing North American jurisdictions where resources are spread across as many services as possible.

Determining emphasis areas with the highest potential for fatal and major injury (FMI) collision reduction is not an exact science. It is an iterative process that includes input from many different sources. Further refinement of the emphasis areas will continue beyond what is documented in this report as continued inputs are considered. Further, in subsequent iterations of the RSAP, emphasis areas may be changed to reflect changes in priorities.

This is the second RSAP developed by Ottawa using Vision Zero principles and therefore, past emphasis areas were examined and evaluated to provide further direction to the current study. Additional insight was also provided by plans developed by other jurisdictions.

2. RESIDENT SURVEY

One of the tasks for the City of Ottawa RSAP was to conduct community outreach to understand the road safety priorities of the public who live in the City. As a part of this outreach, CIMA+ worked with Dynata (formerly ResearchNow), a leading market research firm, to conduct a survey that included approximately 1000 adults who live in the City of Ottawa. In addition to the Dynata surveys, the City conducted public outreach through their website and obtained over 2000 responses. The survey was open from February 20 to March 16, 2019. This section presents the findings of the survey through both Dynata and the City.

Dynata survey respondents were targeted based on their postal code to ensure that surveys received were from City of Ottawa residents. Additionally, postal codes were used to target a statistically valid cross-section of Ottawa residents to ensure neighbourhoods were not over or under represented, which was validated based on population and different area types within the City. It should also be noted that target participants were at least 18 years old and a resident of one of the specified area types in Ottawa.

The results from the same survey that the City freely distributed using their website and social media was not statistically validated; however, the collected information was compared to the results from the Dynata survey and it was found that the results were similar when compared to each other.

The City's public survey was made available through:

- The City of Ottawa website (Ottawa.ca);
- Public notices; and
- Social media.

The participants of the surveys ranged in age from 17 years old to 81 years and older. Figure 1 illustrates the distribution of participants by age. Note that not all respondents indicated their age on the survey, so the number of surveys in the following graph may not equal the actual total surveys.

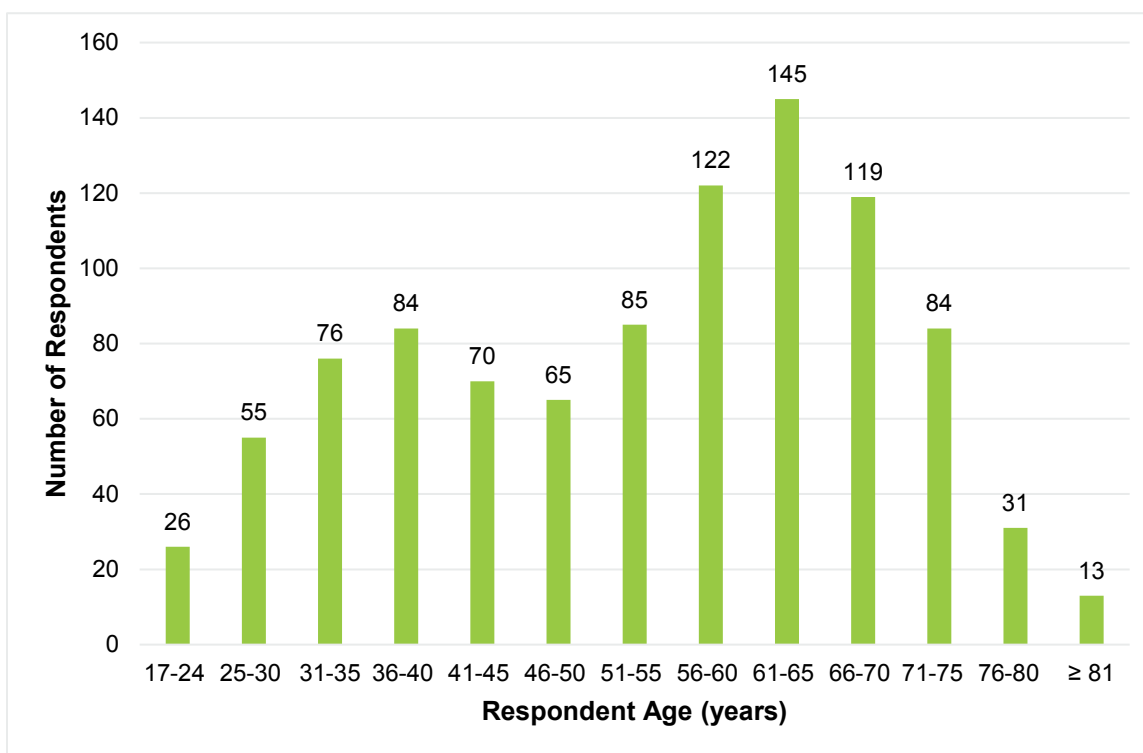


Figure 1: Distribution of Dynata Survey Participants by Age

2.1. Survey Results by Area Type

The survey was conducted to target respondents from different parts of the City based on their postal codes to ensure that the collected data covers each area type within the City of Ottawa. The area types that were included for the City in this survey are CBD (central business district), core residential, suburban inside greenbelt, suburban outside greenbelt, and rural. This provides data from different residential areas with different opinions about traffic safety concerns in each area due to the different nature of traffic conditions (e.g. rural traffic concerns versus urban traffic concerns). Figure 2 illustrates the area types within the City of Ottawa.

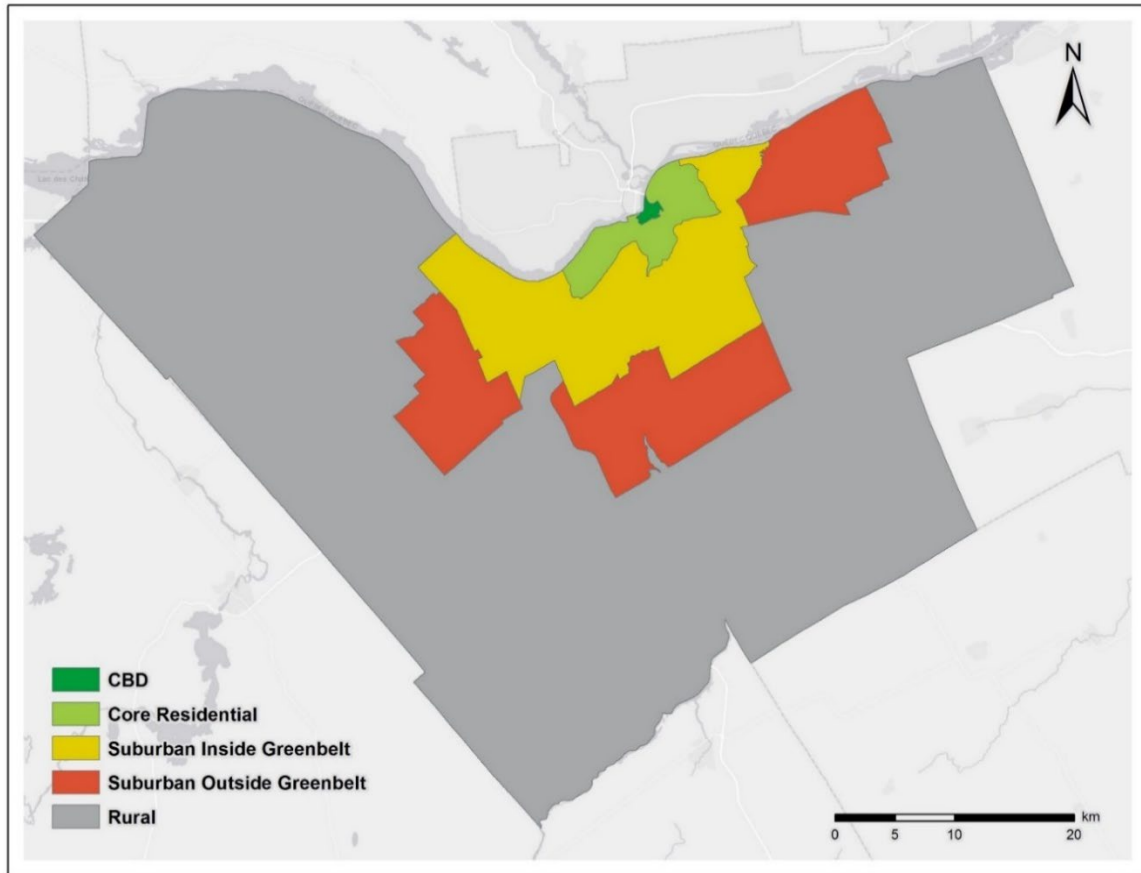


Figure 2: The Area Types Within the City of Ottawa

Figure 3 illustrates the distribution of the total number of surveys received from Dynata across all the area types within the City of Ottawa.

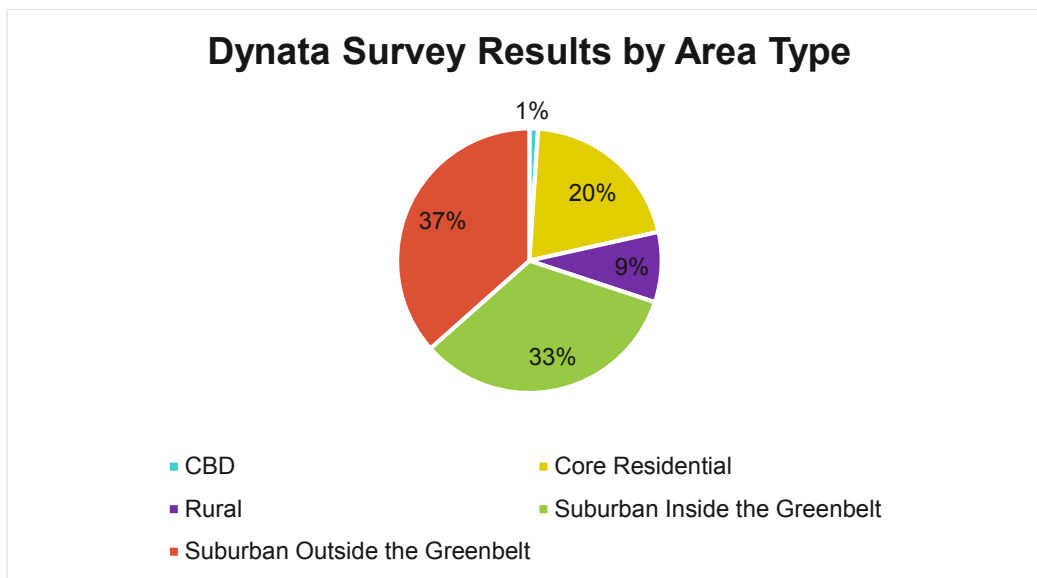


Figure 3: Dynata Survey Distribution

Based on the Dynata survey results by area type, 10 respondents were from the central business district, 81 respondents from the rural area, 193 respondents from the core residential area type, 345 respondents from suburban outside the greenbelt, and the suburban inside the greenbelt had 315 respondents. Although the rural area type is the largest based on geographical area, the survey respondents were proportionate to the population of residents living within that area.

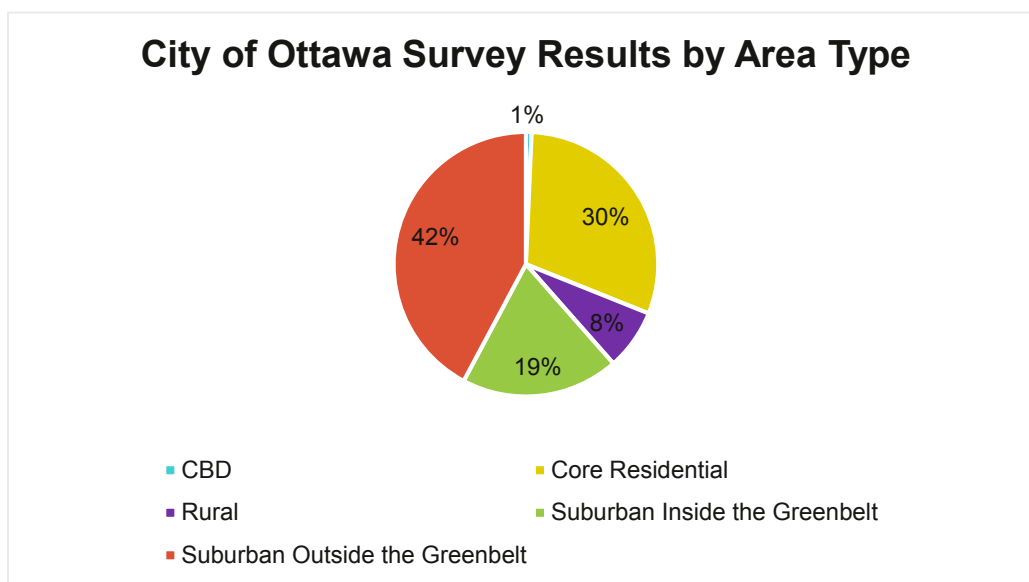


Figure 4: City Survey Distribution

Figure 4 illustrates the distribution of the total number of surveys received from the City's website across all the area types within the City of Ottawa. Based on the City's survey results by area type, 15 respondents were from the central business district area type, 161 respondents from the rural area, 658 respondents from the core residential area type, 914 respondents from suburban outside the greenbelt, and 418 respondents from suburban inside the greenbelt.

The following Figure 5 illustrates the distribution of the total number of surveys received (both from the City's website and Dynata) across all the area types within the City of Ottawa.

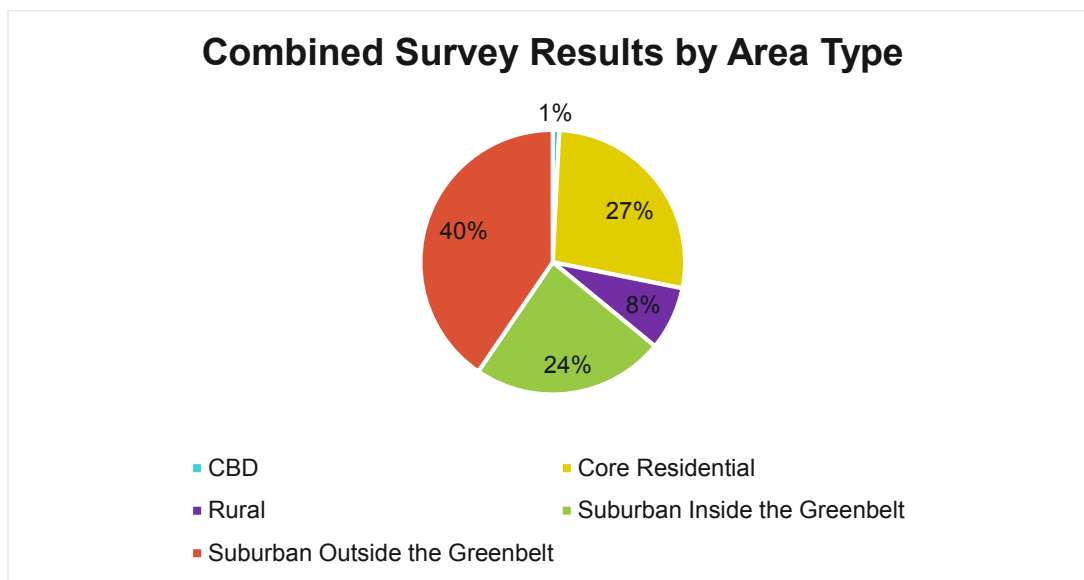


Figure 5: City and Dynata Survey Distribution

As shown in Figure 5, 25 respondents were from the central business district area type, 242 respondents from the rural area, 851 respondents from the core residential area type, 1,259 respondents from suburban outside the greenbelt, and 733 respondents inside the greenbelt. All the percentages shown in the figure are relatively proportionate to the overall population represented in each area type.

2.2. Emphasis Areas by Area Type

The following Table 1 summarizes the resulting rank of each emphasis area by area type in an order of highest priority to lowest priority (i.e. rank number 1 is the highest priority and rank number 18 is the lowest priority) from both the Dynata survey and City survey results. Highlighted in green and bold text are the top 5 priority emphasis areas, which were the resulting overall (city-wide) top-ranking priorities that are summarized in the next section of the technical memorandum.

Table 1: Average Emphasis Area Priority Ranking by Area Type

Rank	TOTAL	CBD	Core Residential	Suburban Inside Greenbelt	Suburban Outside Greenbelt	Rural
1	Distracted Driving	Distracted Driving	Distracted Driving	Distracted Driving	Distracted Driving	Distracted Driving
2	Impaired Driving	Bicyclists	Intersections	Impaired Driving	Impaired Driving	Impaired Driving
3	Aggressive Driving	Speeding	Speeding	Intersections	Aggressive Driving	Aggressive Driving
4	Intersections	Aggressive Driving	Impaired Driving	Speeding	Speeding	Speeding
5	Speeding	Intersections	Aggressive Driving	Aggressive Driving	Winter/Weather-Related Conditions	Winter/Weather-Related Conditions
6	Winter/Weather-Related Conditions	Public Transit	Public Transit	Winter/Weather-Related Conditions	Intersections	Bicyclists
7	Red Light Running	Red Light Running	Winter/Weather-Related Conditions	Red Light Running	Red Light Running	Intersections
8	Public Transit	Pedestrians	Bicyclists	Public Transit	School Related (Bus Zones, School Areas)	Red Light Running
9	Bicyclists	Winter/Weather-Related Conditions	Pedestrians	Bicyclists	Public Transit	School Related (Bus Zones, School Areas)
10	School Related (Bus Zones, School Areas)	Impaired Driving	Red Light Running	School Related (Bus Zones, School Areas)	Bicyclists	Pedestrians
11	Pedestrians	Driver Education/Training	School Related (Bus Zones, School Areas)	Pedestrians	Driver Education/Training	Public Transit
12	Driver Education/Training	Lane/Roadway Departure	Driver Education/Training	Driver Education/Training	Pedestrians	Driver Education/Training
13	Nighttime Visibility	Nighttime Visibility	Nighttime Visibility	Nighttime Visibility	Nighttime Visibility	Nighttime Visibility
14	Lane/Roadway Departure	School Related (Bus Zones, School Areas)	Lane/Roadway Departure	Lane/Roadway Departure	Seat Belt and Car Seat Usage	Lane/Roadway Departure
15	Seat Belt and Car Seat Usage	Motorcyclists	Seat Belt and Car Seat Usage	Seat Belt and Car Seat Usage	Lane/Roadway Departure	Seat Belt and Car Seat Usage
16	Motorcyclists	Train Crossings	Motorcyclists	Motorcyclists	Train Crossings	Motorcyclists
17	Train Crossings	Seat Belt and Car Seat Usage	Train Crossings	Train Crossings	Motorcyclists	Train Crossings
18	Wildlife-related Collisions	Wildlife-related Collisions	Wildlife-related Collisions	Wildlife-related Collisions	Wildlife-related Collisions	Wildlife-related Collisions

2.3. Overall Emphasis Area Priorities

Survey respondents were asked to prioritize eighteen emphasis areas using the following scale:

- 5 - Highest Priority**
- 4 - High Priority**
- 3 - Medium Priority**
- 2 - Low Priority**
- 1 - Not a Priority**
- 0 - No Opinion**

Based on the Dynata survey data received, nearly every emphasis area is viewed as a medium or higher priority by the public. The exceptions include wildlife collisions (score of 2.32), motorcyclist collisions (score of 2.73), train crossing collisions (score of 2.74), and loss of control leading to leaving the road or lane of travel (score of 2.85).

The average of the Dynata survey participants' ranking of the emphasis areas is depicted in Figure 6.

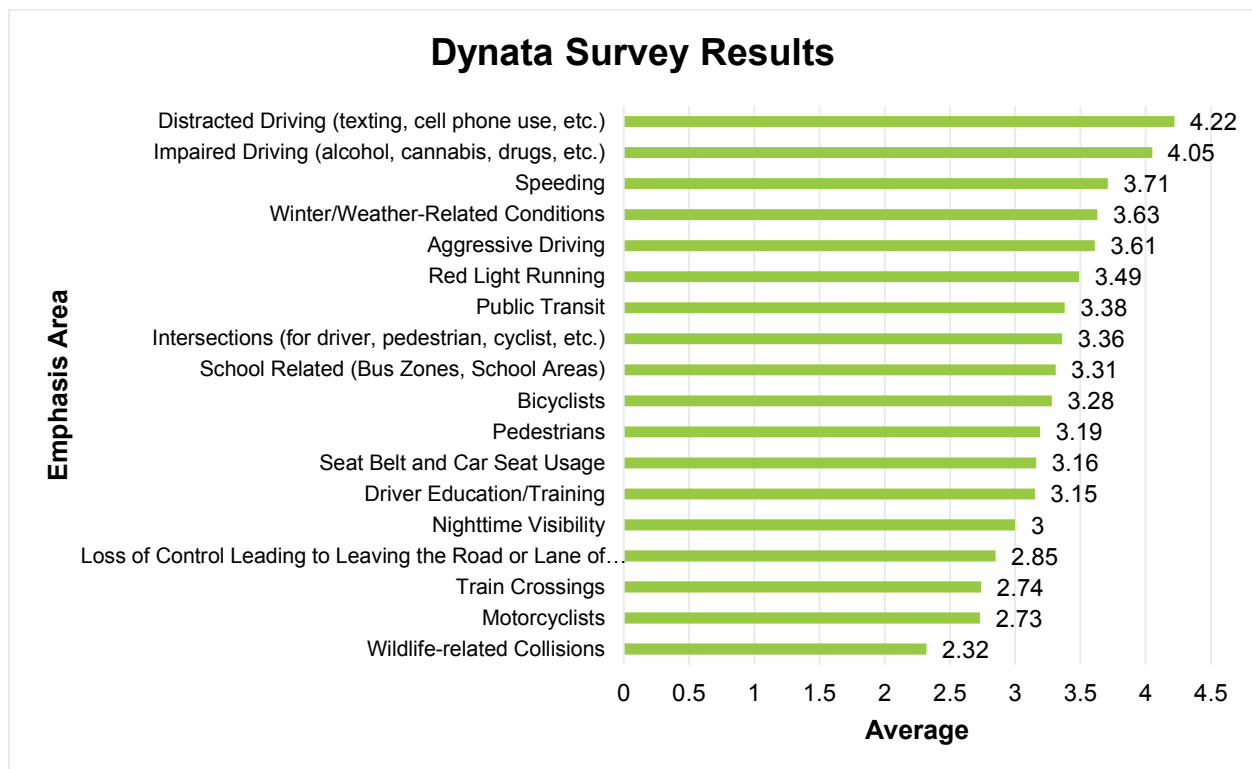


Figure 6: Average Emphasis Area Priority Ratings by All Survey Participants (Dynata Survey)

The weighted average for each emphasis area was calculated using the formula below:

$$\text{Weighted Average} = \frac{\sum_{i=1}^n x_i w_i}{\sum_{i=1}^n w_i}$$

Where:

x_i = priority weighting (5 = highest priority and 0 = no opinion)

w_i = frequency (number of respondents)

According to the results from the City's survey hosted on their website, almost every emphasis area was viewed as a medium or higher priority by the public, which is similar to the Dynata survey data.

The lower ranked emphasis area for the City's survey included wildlife collisions (score of 2.09), motorcycle collisions (score of 2.55), train crossing collisions (score of 2.53), loss of control leading to leaving the road or lane of travel (score of 2.82), and seat belt and car seat usage (score of 2.86).

The average of the City survey participants' ranking of the emphasis areas is depicted in Figure 7.

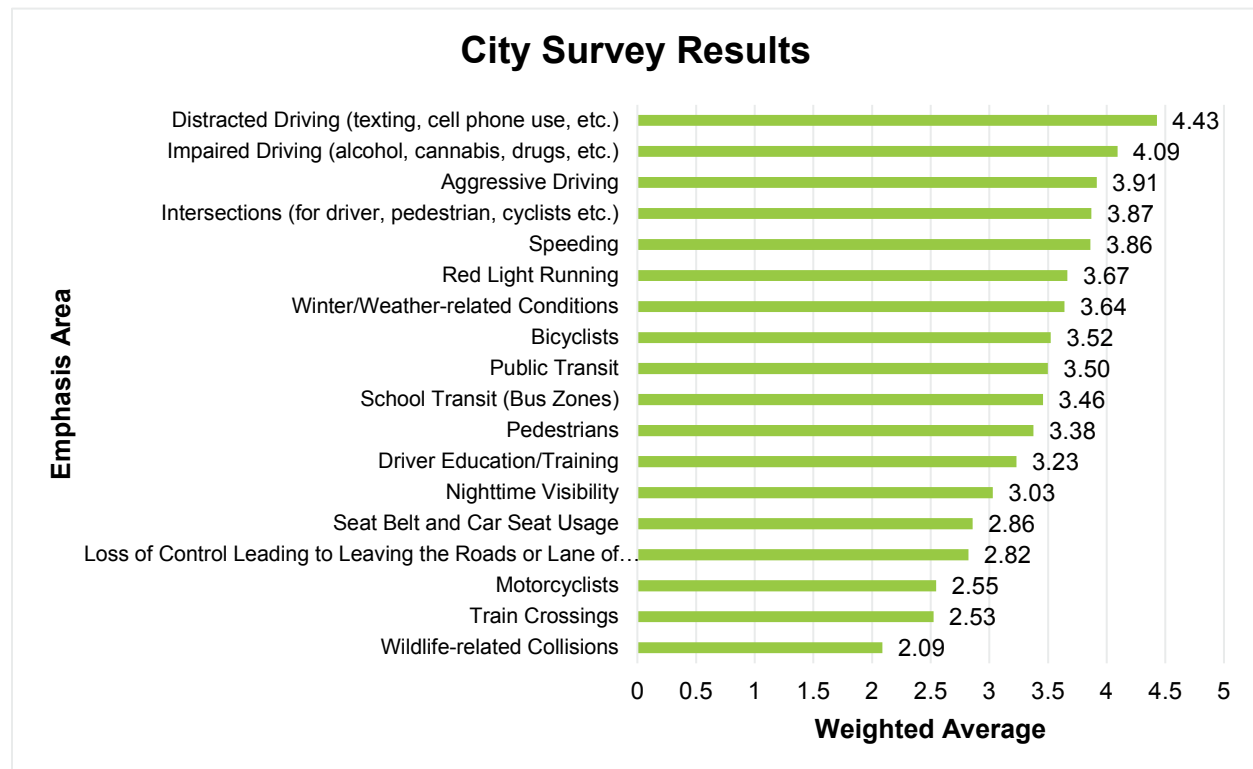


Figure 7: Average Emphasis Area Priority Ratings by All Survey Participants (City Survey)

Taking into consideration the average survey results for Dynata and the City's survey, Figure 8 illustrates the combined average emphasis area priorities, according to surveyed residents. The top 5 emphasis areas selected in the combined survey results are:

- Distracted
- Impaired
- Speeding
- Aggressive
- Intersections

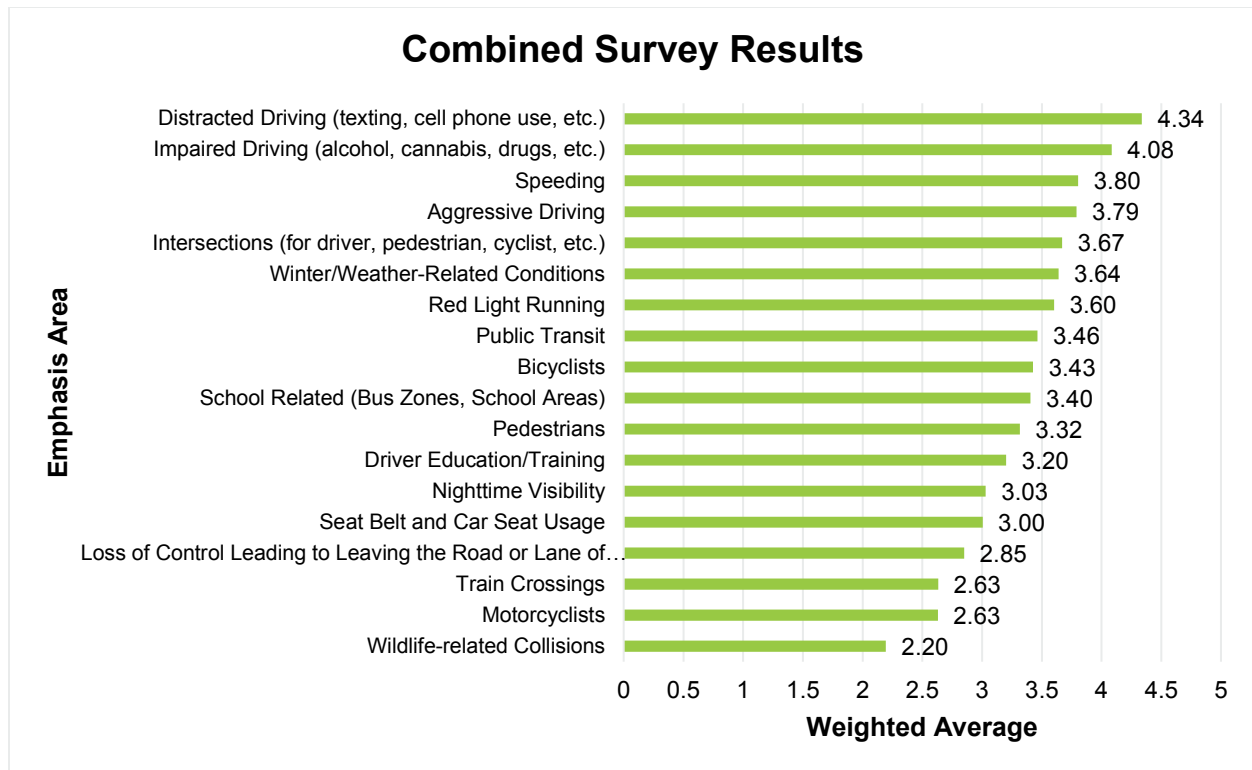


Figure 8: Combined Average Emphasis Area Priority Ratings by All Survey Participants

The top four highest priority emphasis areas, as deemed by the public, are all driver behaviours. Distracted driving is the highest ranked emphasis area, which may be due to the increased cell phone use in the last decade and the media attention on distracted driving.

3. COLLISION DATA

Historical collision data was provided by the City of Ottawa and was also used to determine emphasis areas for the RSAP. The provided collision data comprised of motor vehicle collision reports filled out by the police, which is maintained by the City of Ottawa Transportation Services department in a database. The motor vehicle collision reports contain many fields (or categories of data), which are validated by City staff for errors in reporting; however, errors do occur, and some fields can be left blank. Additionally, analysis methods can differ, and thus numbers can differ slightly. **For this reason, a collision analysis is conducted to only provide general trends and should not be considered a precise calculation. We apologize for any errors or omissions in this analysis.** To address the difficulty in replicating collision analyses from year to year, most cities include a disclaimer, such as the one found in the City of Edmonton's Vision Zero, Road Safety Annual Report: *The City of Edmonton provides this information in good faith but gives no warranties or representations that the information is correct, accurate, free from error, or suitable for any purpose. The City of Edmonton is not liable for any loss of any kind resulting from use of this information.*

Collision data provides details about the collisions happening within the City (including City, NCC, freeway ramps, and provincial freeways) and collision trends and patterns are used to help determine where the City should focus their resources in order to have the most impact on collision reduction. For analysis purposes and based on direction provided by the City, which aligns with Vision Zero principles and the safe systems approach (SSA), only fatal and major injury (FMI) type collisions were considered. It should also be noted that FMI collisions are more likely to be attended by police, and therefore, the reporting is considered to be more accurate.

The collision numbers provided in this report are based on the number of collisions that occurred, rather than the number of people involved in a collision. This changed through the course of the project, and therefore, some of the numbers originally reported were based upon people involved, rather than collisions. These numbers have been updated in this document, unless otherwise specified. Collisions were classified based on the highest level of injury sustained in the collision. For example, an FMI collision in which one person was fatally injured and two persons sustained major injuries, would be classified as a Fatal collision in the FMI database. A fatal injury is defined as an injury that results in death within 30 days of a motor vehicle collision. A major injury is defined as an injury that results in an involved person being admitted to the hospital and staying overnight. Ideally, a Vision Zero analysis would include a category for life-altering injuries. However, the Ontario data does not currently provide that level of detail.

Based on the provided data from the City, CIMA+ established 11 emphasis areas based on the highest number of FMIs in the data. These were presented in the stakeholder workshop #1. These initial emphasis areas closely matched emphasis areas that were developed for other jurisdictions and provided a starting point for the process of developing emphasis areas for the City of Ottawa.

The following Figure 9, and all of the collision analysis for this technical memorandum, is based on FMI collision data between the years of 2013 and 2017, the most recent data available at the start of the project.

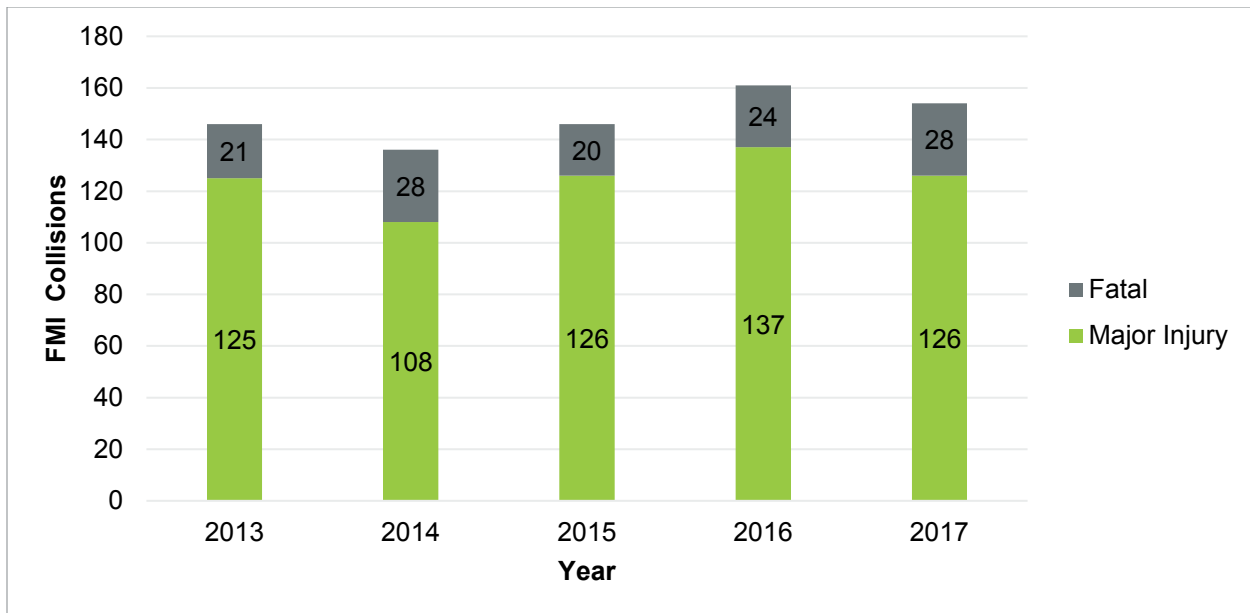


Figure 9: FMI Collisions per Year

A total of 73,480 collisions occurred within Ottawa between 2013 and 2017, and approximately 1% (743) were classified as fatal or major injury. There is some variation in number of FMIs but on average over the five-year period, 24 fatal and 124 major injury collisions occurred annually. The annual breakdown of fatal and major injury collisions is depicted in Figure 9.

The following Figure 10, Figure 11, and Figure 12 illustrate the FMI collisions per month, day of week, and hour, respectively. Based on the graphs, it seems that number of collisions are higher in the summer months, near the end of the week, and during peak rush hour periods, specifically the PM rush hour. These distributions are typical compared to other jurisdictions.

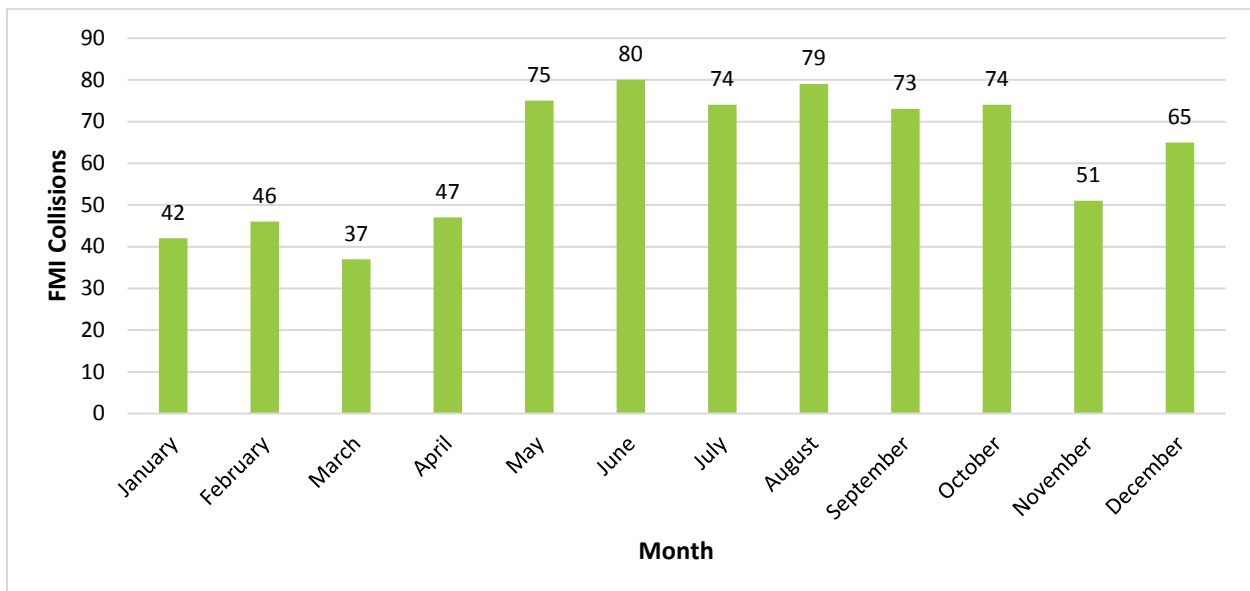


Figure 10: FMI Collisions per Month

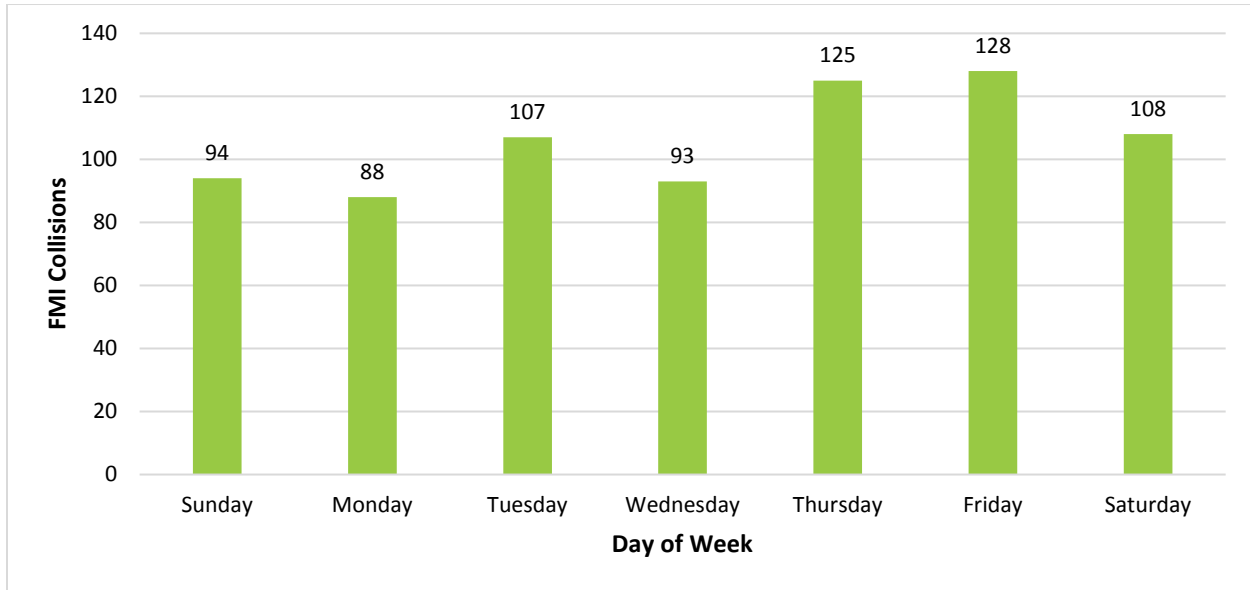


Figure 11: FMI Collisions per Day of Week

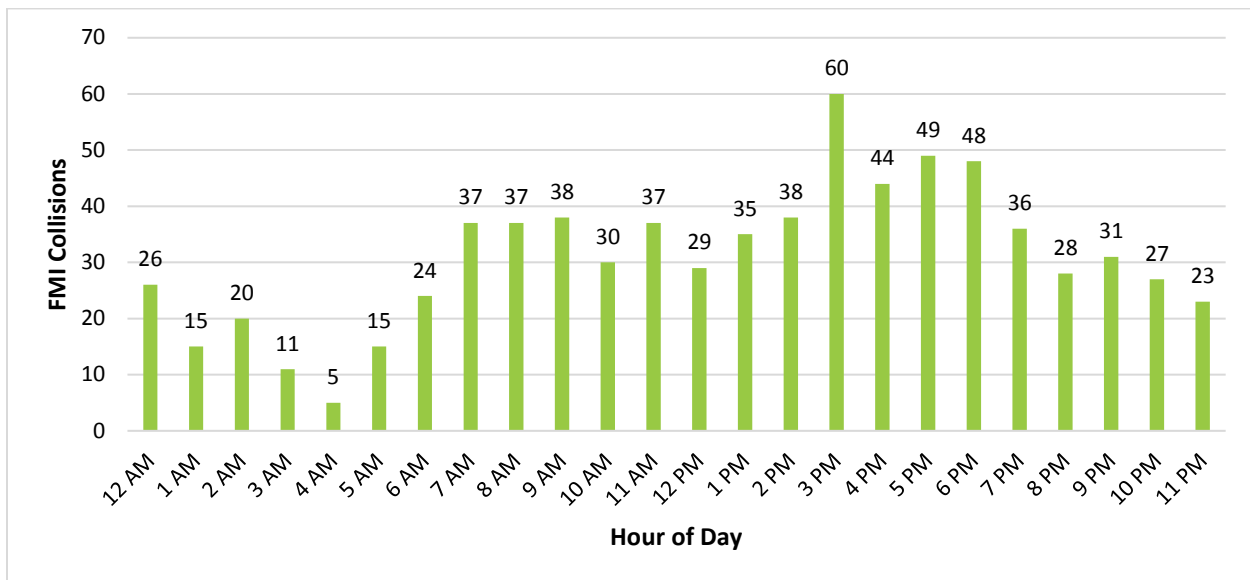


Figure 12: FMI Collisions per Hour

Ottawa is comprised of a very diverse transportation network that includes urban, suburban and rural roads. Most jurisdictions with a Vision Zero action plan are predominantly urban. The following Figure 13 depicts FMI collisions by area type within the City. These area types correspond to the survey area types shown in section 2.1.

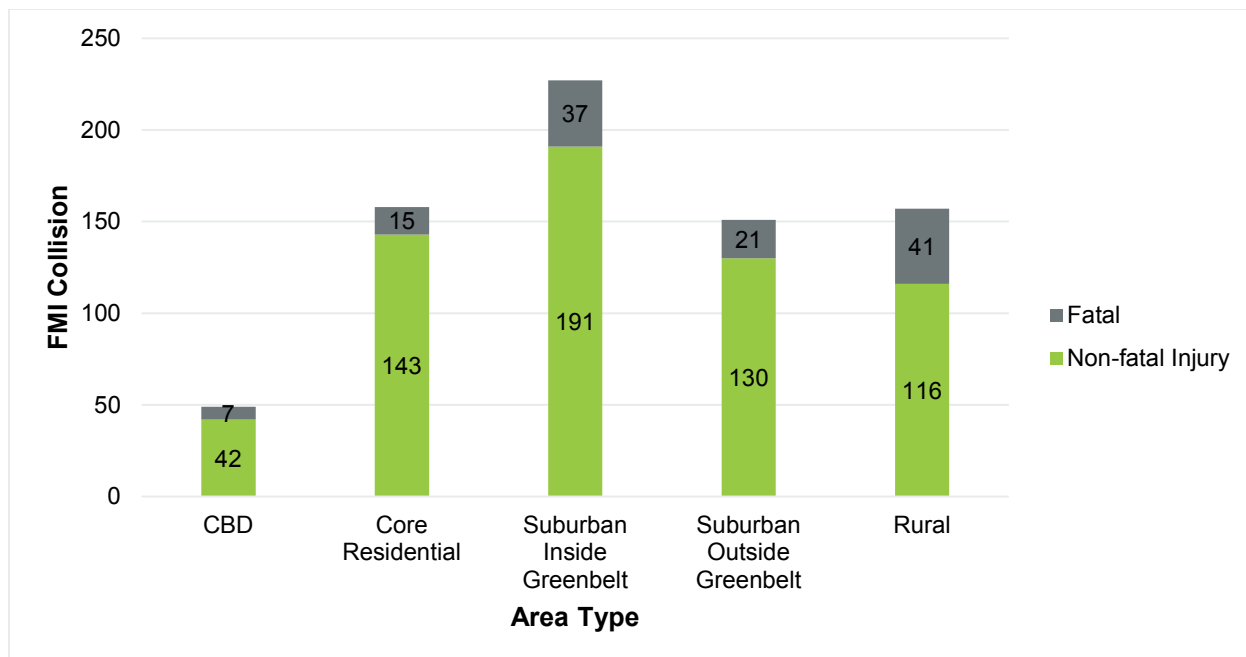


Figure 13: FMI Collisions by Area Type

As depicted in Figure 13, Ottawa's different road characteristics, transportation cultures, and infrastructure in the different area types results in notably different road safety experiences across the jurisdiction.

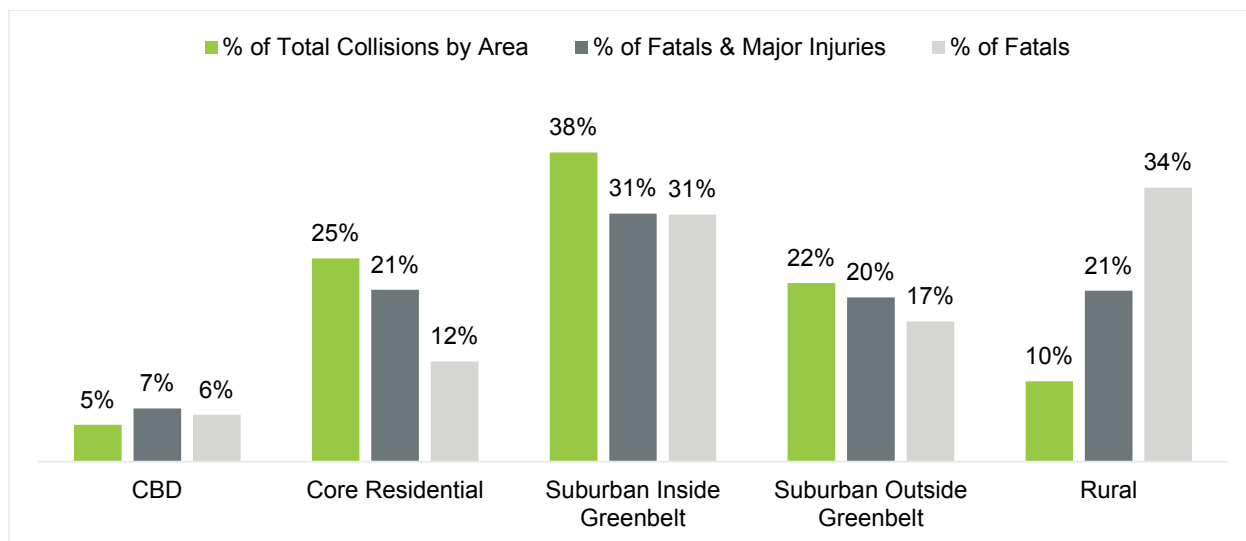


Figure 14: Breakdown of FMI Collisions by Area Type (2013-2017)

Figure 14 illustrates the collisions by area type broken down as a percentage of total collisions, FMIs and fatal collisions. This graph demonstrates some of the differences in collision types across the various areas. For example, 25% of all collisions occur within the Core Residential area, while only 12% of the fatal collisions occur in the same area. Compare that to the rural area which accounts for only 10% of total collisions within the city but 34% of the fatal collisions.

3.1. Emphasis Areas Based on FMI Collisions (2013-2017)

The following analysis of Ottawa's FMI collisions from 2013-2017 uses typical emphasis areas (as selected by other jurisdictions), which simply provides a starting point for refining Ottawa's list of emphasis areas. The following Figure 15 depicts Ottawa's 2013-2017 FMI collisions by typical emphasis areas.

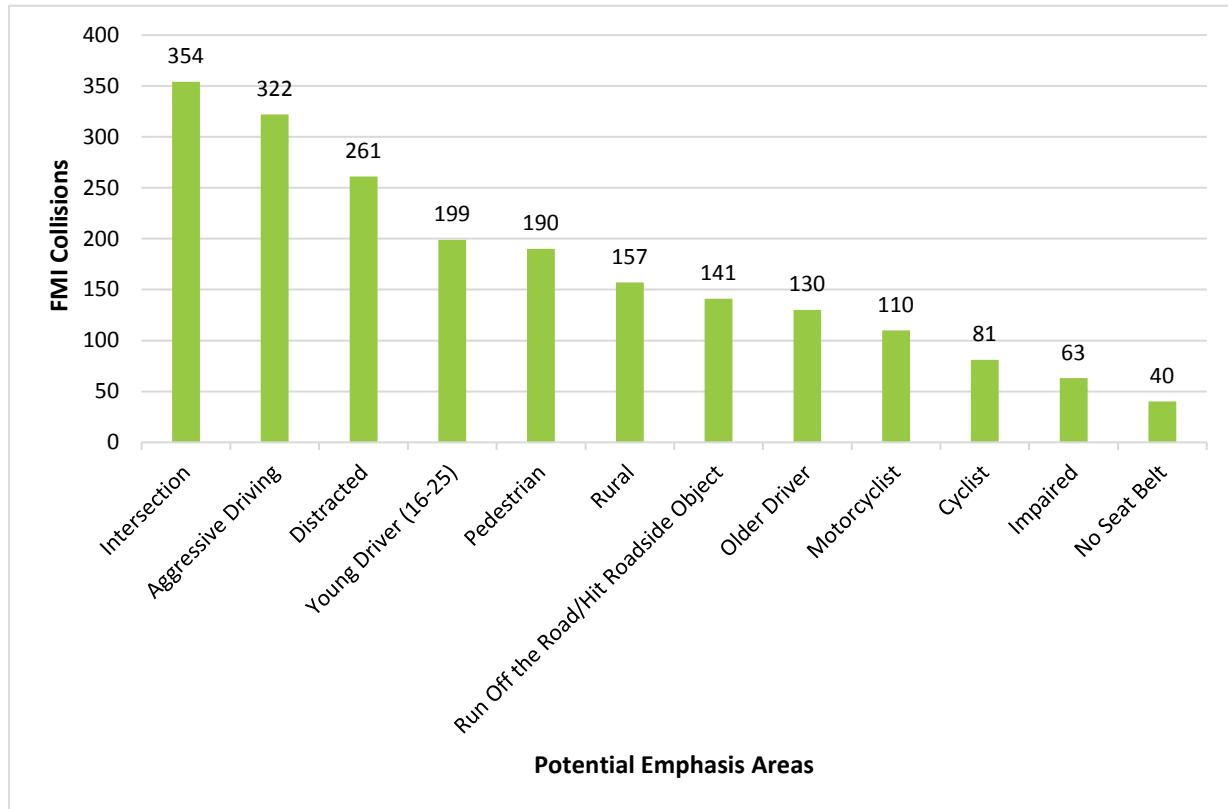


Figure 15: FMI Collisions by Typical Emphasis Area (2013-2017)

As shown in Figure 15, the top 5 emphasis areas based on FMI collisions in the City of Ottawa include:

- Intersection
- Aggressive Driving
- Distracted Driving
- Young Drivers
- Pedestrians

It should be noted that collisions may overlap several emphasis areas. For example, a 20-year-old driver on their cell phone hit a pedestrian at an intersection. This collision would fall under young drivers, distracted driving, pedestrians, and intersections. Therefore, collisions may be counted multiple times in this analysis. Differences in this data, compared to previously shared numbers resulted from different analysis methods. For example, previously, the No Seat Belt included all persons involved in an FMI, who were not wearing a seatbelt. This has been updated to show the number of FMI collisions that involved somebody not wearing a seatbelt. Pedestrian collisions have been updated to include all FMI collisions that involved a pedestrian, rather than just pedestrians that were part of the first event recorded on the police report.

3.1.1. Intersections

Figure 16 reveals that 354 (close to half) of the FMI collisions occur at intersections or are intersection related. Intersection related collisions are defined as collisions that occur within the area of influence of an intersection. For example, if a rear end collision occurs due to a motorist unable to stop from hitting a leading vehicle that is stopping for a red light, this should be considered intersection related, even though it did not occur within the intersection. Intersections are points of conflict, which is where vehicles going different directions intersect, resulting in higher chances of collisions occurring.

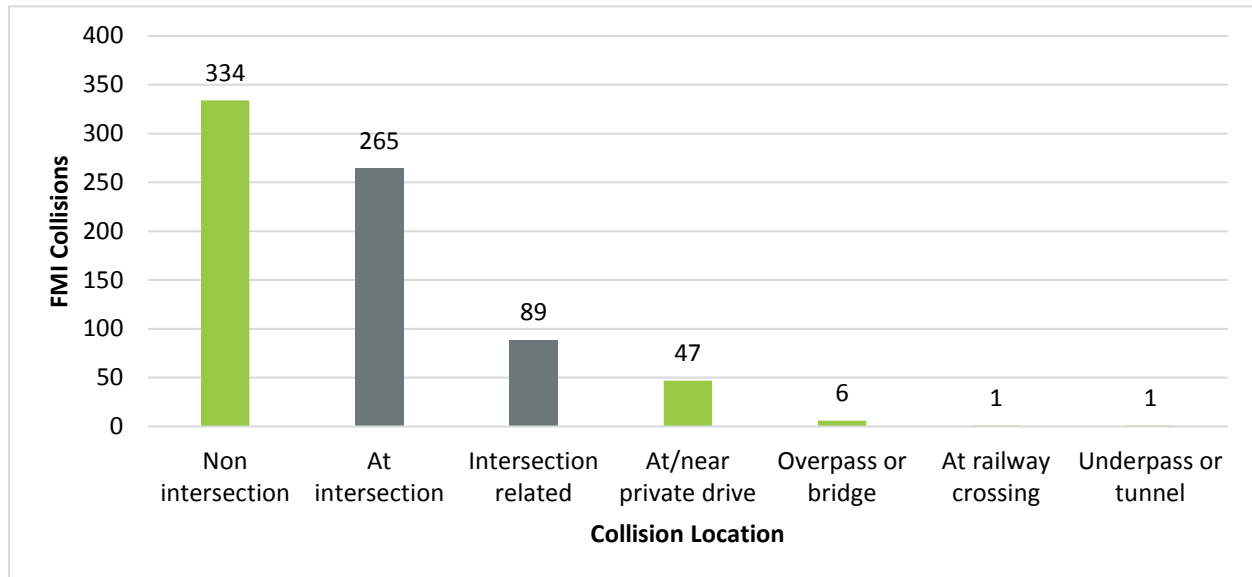


Figure 16: Collision Location Distribution FMI Collisions (2013-2017)

The following Figure 17 depicts the percentage of intersection or intersection related FMI collision in each area type.

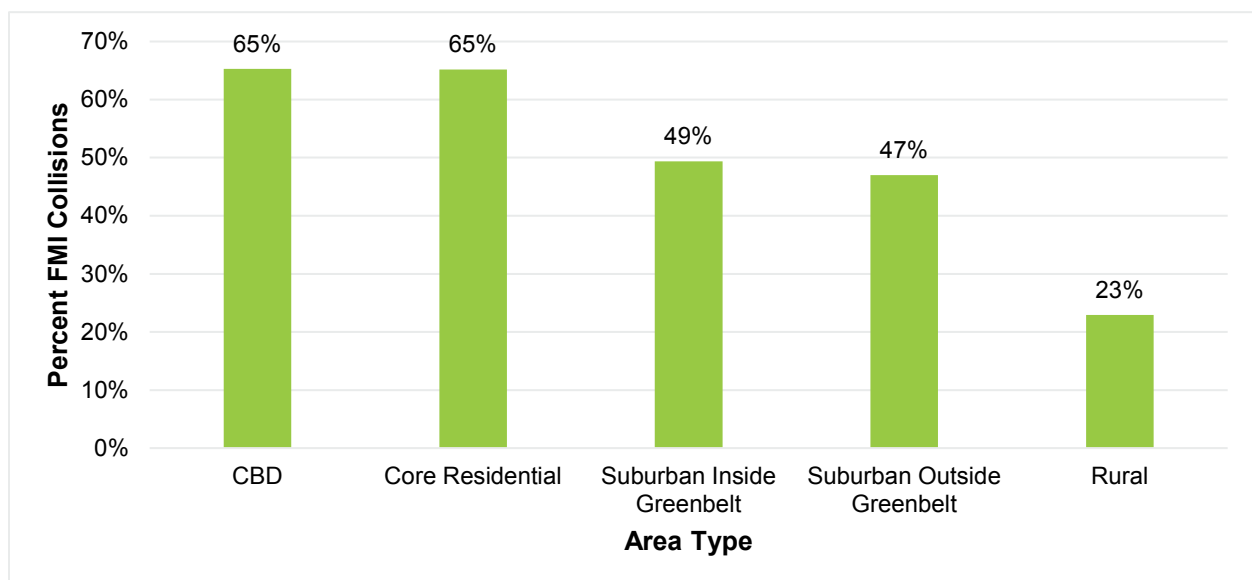


Figure 17: Intersection and Intersection Related FMI Collisions by Area Type

As shown in Figure 17, approximately 65% of FMI collisions in the CBD and core residential neighbourhoods occur at intersections or are intersection related. These area types have a higher concentration of vehicles on their road networks, compared to suburban and rural roadways.

3.1.2. Aggressive Driving

Figure 18 shows the high-risk driver “apparent driver action” reported on the collision report for FMI collisions in the City of Ottawa. A high-risk driver behaviour is based on the action on the police report excluding the category of “driving properly”, which would indicate that the driver was driving improperly. The apparent driver actions that are considered to indicate aggressive driving are:

- Failed to yield right of way,
- Disobeyed traffic control,
- Exceeding speed limit,
- Speed too fast for condition, and/or
- Following too close.

These driver actions were cited in 322 of the FMI collisions that occurred in Ottawa between 2013-2017. Sometimes, aggressive driving was cited more than once in a collision report (multiple drivers). That is why the sum of the columns in Figure 18 is 332.

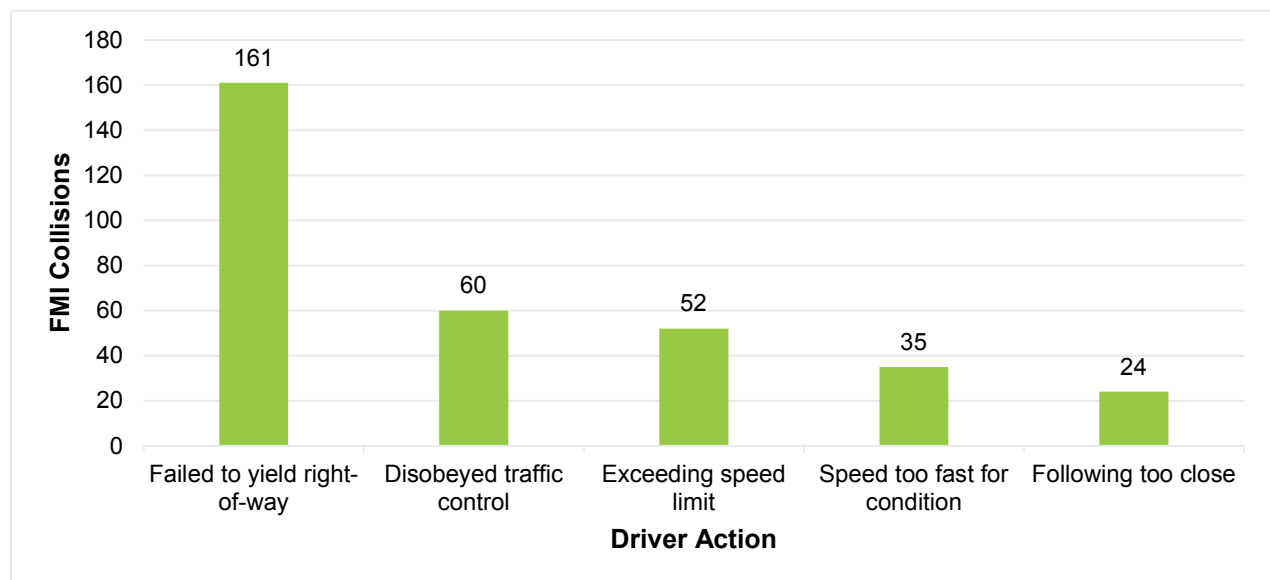


Figure 18: Aggressive Driving FMI Collisions (2013-2017)

3.1.3. Distracted Driving

Figure 19 shows the distribution of the high-risk driver “driver condition” category for the motor vehicle collision report. Distracted driving includes collisions cited as “inattentive” by the police. Inattentive driver condition could include the use of cell phone, eating, and other activities that take attention away from the task of driving. Of the 261 FMI collisions that included inattentive driving, 26 resulted in fatal injury and 235 resulted in major injury. According to the collision data, 261 (35%) of FMI collisions from 2013-2017 involved inattentive road users. It is known that distracted driving is significantly under-reported, because most people will not admit to using a device while driving.

Figure 19 illustrates the distribution of driver condition for all drivers involved in FMI collisions. Note that inattentive is the highest category of driver condition, other than normal.

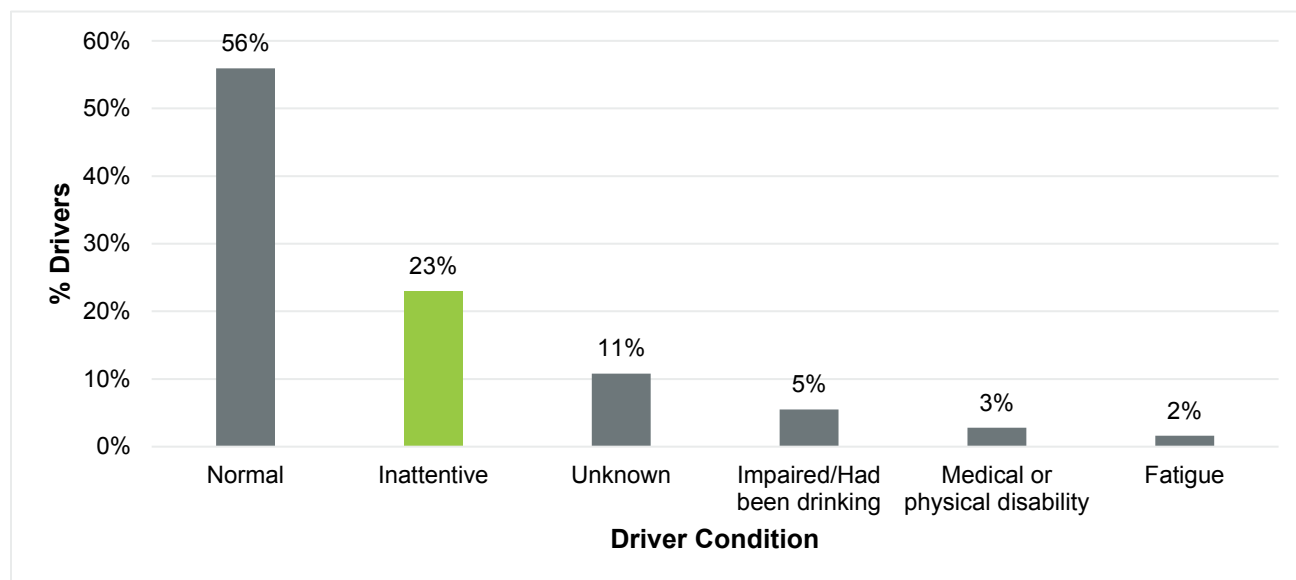


Figure 19: Distracted Driving FMI Collisions (2013-2017)

3.1.4. Pedestrian

As shown in Figure 20, there are 161 major injury collisions involving a pedestrian and 29 fatal collisions, for a total of 190 FMI collisions. On average there were 38 FMI collisions involving a pedestrian, annually. Pedestrian collisions have a higher chance of resulting in a fatality or injury, even at low vehicle speeds. Figure 20 below illustrates the FMI collisions that involved at least one pedestrian per year.

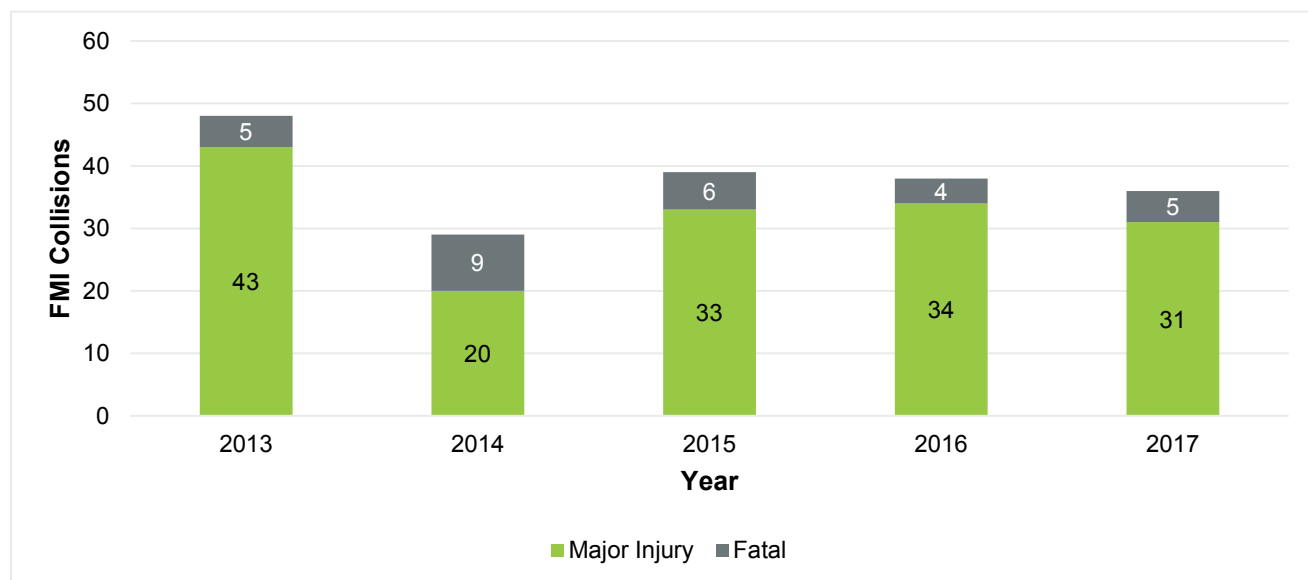


Figure 20: Pedestrian FMI Collisions (2013-2017)

3.1.5. Young Driver

A young driver is typically defined as a driver under the age of 25. According to the collision data, 22% of drivers who undertook high-risk behaviours are 25 years old and under and 35% are 30 years and under. Figure 21 below illustrates the FMI collisions per 1000 licensed driver with respect to age. Driver inexperience may be a factor in collisions involving younger drivers, which may be the reason for the high rate of young driver collisions. Again, experience may be the main factor for the decline in collisions as drivers get older.

Using the collision IDs from when the high-risk drivers were determined, we are able to determine the ages of these drivers using the information about each person in the collision, including their age.

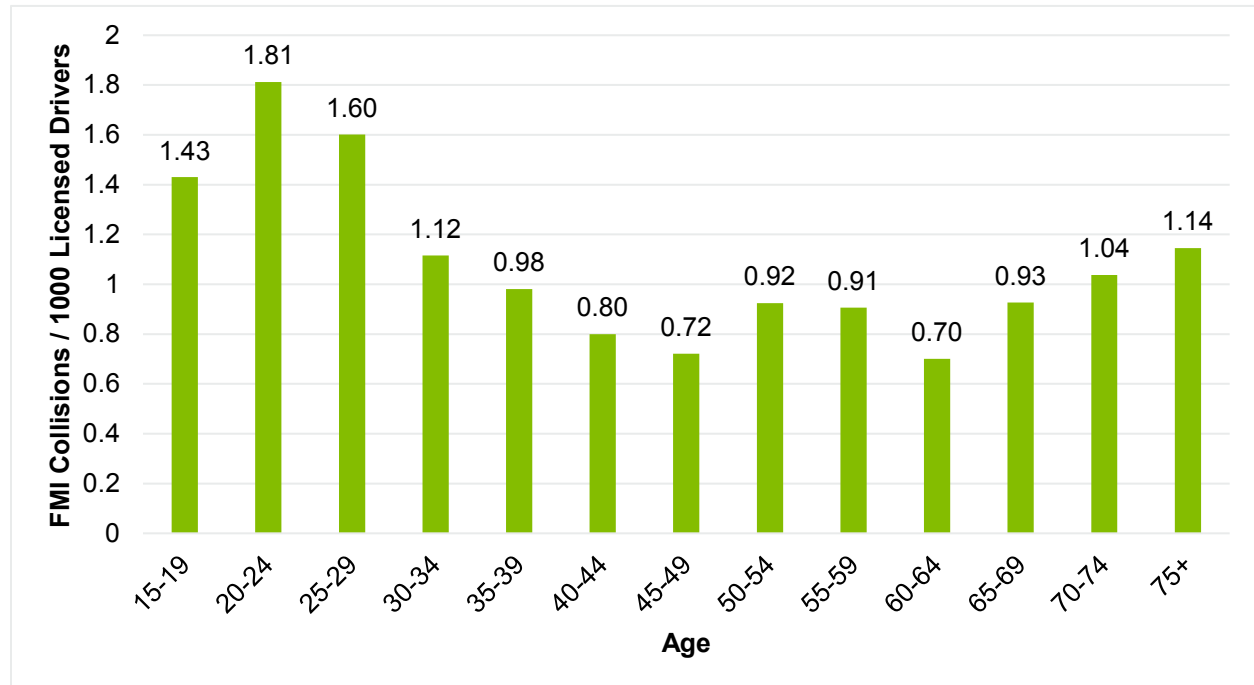


Figure 21: Driver Age FMI Collision Per 1000 Licensed Drivers (2013-2017)

3.1.6. Run Off the Road/Hit Roadside

Based on the collision data, 19% of Ottawa FMI collisions are categorized as “ran off road” or “hit a roadside object”, and 34% of those occur in the rural Ottawa area. Figure 22 below shows that “other motor vehicles” resulted in the greatest number of collisions with 316 FMI collisions. It should be noted that pedestrians may not always be coded on the police report at the first vehicle event, which is why the number of pedestrians in the graph in this section is different than the pedestrian graph in section 3.1.4, likewise for cyclist collisions. For example, a vehicle could be stopped at a signalized intersection and gets rear-ended, pushing the first vehicle into a pedestrian in a crosswalk who then suffers a major or fatal injury. This type of collisions would note “other motor vehicle” as the first event.

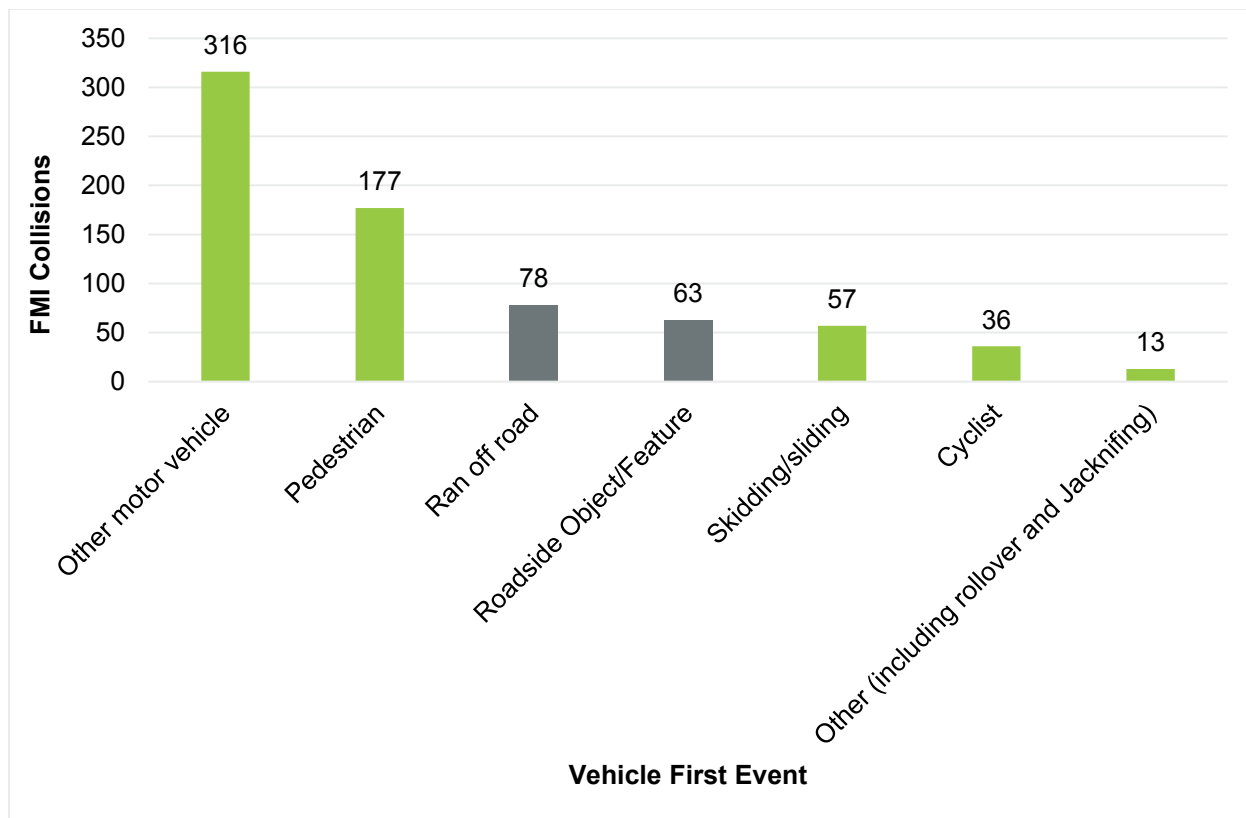


Figure 22: Run Off the Road/Hit Roadside FMI Collisions (2013-2017)

3.1.7. Motorcyclists

Motorcyclists were involved in 110 FMI collisions in Ottawa (2013-2017). It should be noted that 2% of all motorcycle collisions in Ottawa result in a fatality which is a higher rate than both pedestrians and cyclists. Figure 23 illustrates an increase in motorcyclists FMI collisions by year over the past five years.

Using a pivot table, vehicle types 1, 2, 3, 4 and 5 were analyzed to determine motorcycle collisions. For each vehicle type, the motorcycle category was counted for fatal and major injury collisions and summed together to create the total number of FMI collisions for each year.

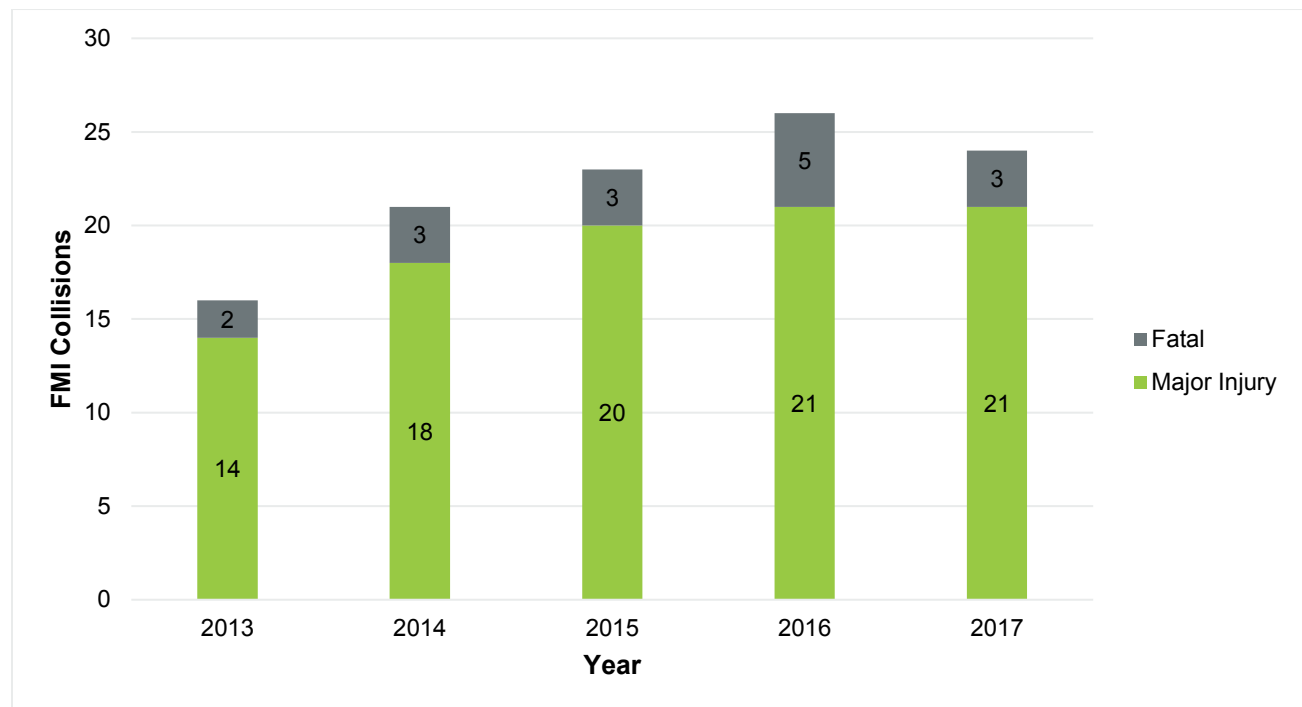


Figure 23: Motorcyclist FMI Collisions by Year (2013-2017)

3.1.8. Older Driver

Older drivers were not examined as part of this exercise. As shown in Figure 21 showing the drivers age by licensed drivers, older drivers are not more likely to cause FMI collisions than other age groups.

3.1.9. Cyclists

There were 81 FMI collisions involving cyclists, including 8 fatal collisions. Note that one of these FMI collisions involved a cyclist – motorcyclist collision. The motorcyclist had major injuries and the cyclist minimal. Therefore, there were 81 FMI collisions involving cyclists, but 80 in which a cyclist suffered a fatal or major injury.

Similar to pedestrians and motorcyclists, cyclists are highly likely to suffer injuries if involved in a collision with a motorized vehicle. Figure 24 shows the cyclists FMI collisions by year. Although over the years there has been an increase in cyclist volumes due to an increase in cycling infrastructure being built throughout the City, the cycling collisions have remained consistent.

Cyclist involved collisions are determined based on vehicle type data included in the police report.

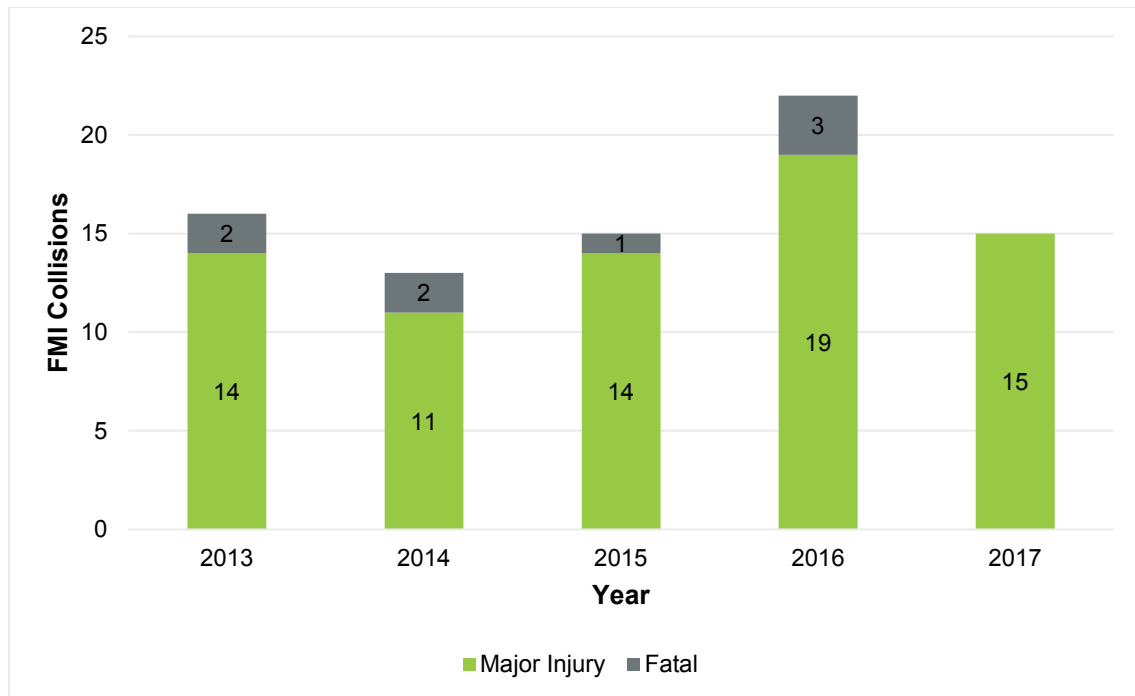


Figure 24: Cyclists FMI Collisions by Year (2013-2017)

3.1.10. Impaired Driving

Impaired driving is a factor in approximately 8% of the FMI collisions across Ottawa. Of the 63 FMI collisions in which drinking, or drug use was listed as a factor, 11 resulted in fatal injury and 52 resulted in major injury. Figure 25 illustrates the driver condition with the corresponding number of collisions for impaired driving FMI collisions. When examined in more detail, it was found that impaired driving in the rural areas of Ottawa accounts for 13% of the FMI collisions.

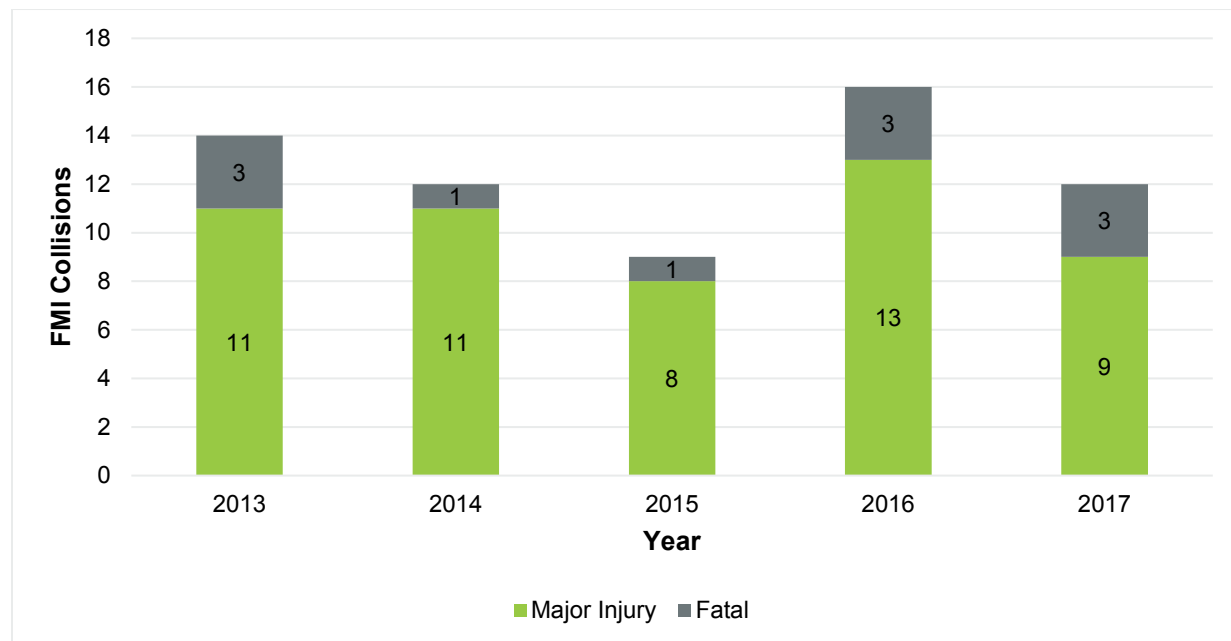


Figure 25: Impaired Driving FMI Collisions (2013-2017)

3.1.11. No Seat Belt

The safety equipment used by road users involved in FMI collisions is illustrated in Figure 26. The majority of vehicle occupants use a lap and shoulder belt. A small number of vehicle occupants are not wearing a seatbelt, which is captured in the category of “equipment not used, but available”. Note that the category of “no equipment available” generally refers to cyclists without helmets and pedestrians, not motor vehicles.

When analyzing equipment used in a collision, this information is provided in the database that looks at each person involved in a collision. The number of people in the graph that breaks down the use of equipment indicates each person involved in a collision and not the total number of collisions.

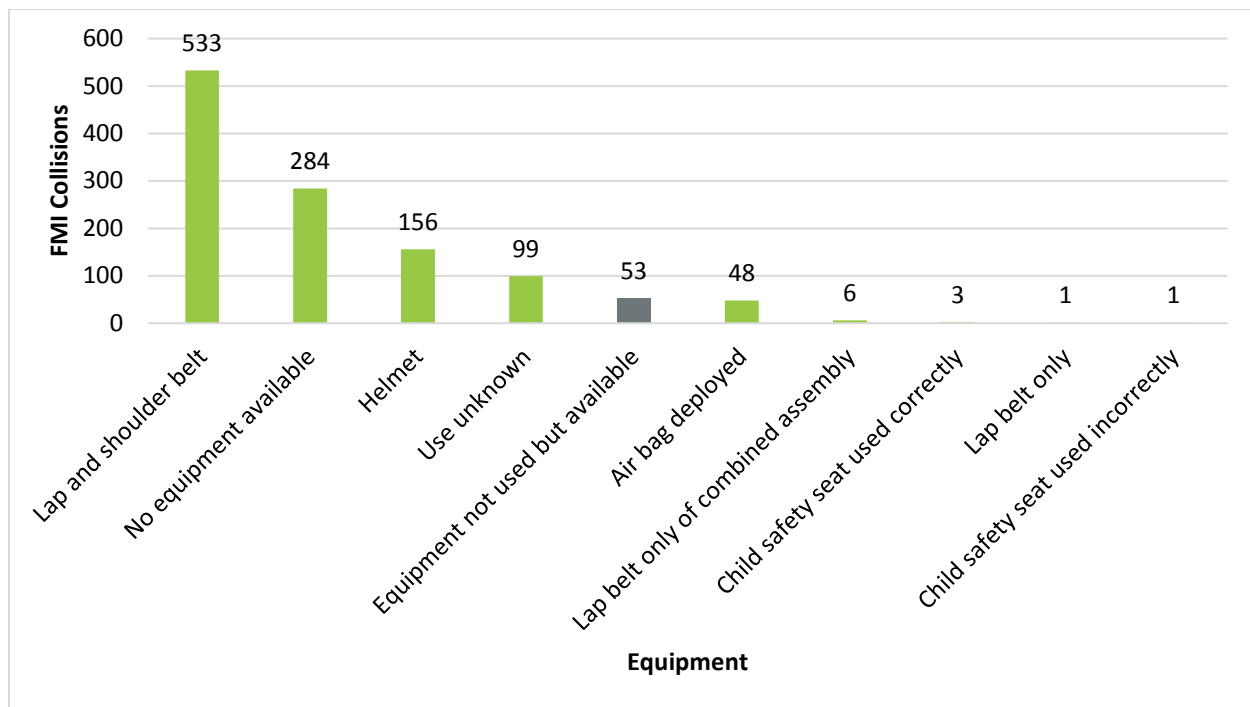


Figure 26: No Seatbelt FMI Collisions (2013-2017)

4. STAKEHOLDERS' WORKSHOP

The first stakeholders' workshop was held on Saturday, April 6, 2019. The purpose of the workshop was to introduce the RSAP to the stakeholders, discuss the development of the RSAP, review the survey and collision analysis results, and discuss emphasis areas. The following attended the workshop:

Elected Officials (for welcome remarks only):

- Mayor
- Chair of Transportation Committee

City of Ottawa /Presenters

- Transportation Services
- Ottawa Police Services
- Ottawa Public Health
- CIMA+

Community Invitees:

- Bike Ottawa
- Hans on the Bike
- National Capital Commission
- MADD Canada – Ottawa Chapter
- Ottawa Student Transportation Association
- Consortium de Transport d'Ottawa
- Walk Ottawa/ Healthy Transportation Coalition
- Ottawa Safety Council
- Ottawa Disability Coalition
- Centre de Ressources Communautaires de Vanier
- National Capital Heavy Construction Association
- Ottawa Hospital
- Council on Aging of Ottawa
- Society of Ottawa Area Riders (SOAR)
- Federations of Citizens Associations
- EnviroCentre
- RightBike/ Causeway
- IPromise

The agenda for the workshop was as shown in Table 2:

Table 2: Workshop #1 Agenda

Time	Agenda Item	Responsibility
9:00 AM	Welcome Remarks	Mayor & Chair Blais
9:15 AM	Introductions	All
9:45 AM	Review of Road Safety Action Plan (RSAP)	Ali Hadayeghi

Time	Agenda Item	Responsibility
10:00 AM	Collision and Survey Data Results	Suzanne Woo
10:30 AM	Break	
11:00 AM	Emphasis Area Development	Ali Hadayeghi
12:20 PM	Summary and Next Steps	Ali Hadayeghi

Stakeholders were asked to participate in prioritizing the emphasis areas, with an interactive exercise. They worked in 4 teams, based upon the table groups they were sitting at. They were asked to move to different tables if they were sitting with people from the same organization. Each table group included a City staff or member of the consulting team, to answer any questions that they might have and to facilitate the discussion. At the end of the discussion time, they were asked to pick their top 5 emphasis areas. Figure 27 below illustrates the results of the stakeholders voting.

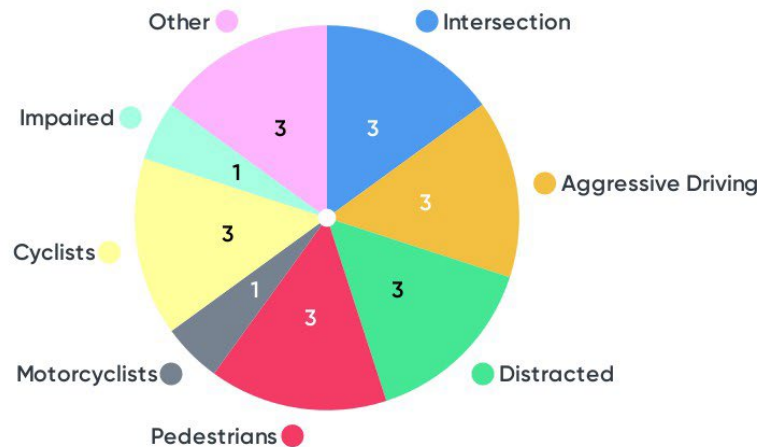


Figure 27: Stakeholders Emphasis Areas Interactive Exercise Results

Additional suggestions from the teams included:

- Data/Data Collection
- School Zones
- Vulnerable Road Users
- Winter Conditions
- Rail/LRT Safety

Data/Data Collection: Is there a way to integrate new data sources into monitoring and evaluation? And can data be made more readily available to the public? City answer is that new data sources are an ongoing area of study and will be integrated where it can be considered an acceptable and reliable practice. The city does host an open data portal on their website that has a number of data sets, including collision data.

School Zones: Can school zones be explored as an emphasis area? CIMA's answer is that for a vision zero plan to be effective, it should be supported by the data. Emphasis areas should include groups of high numbers of collisions and typically school zones do not have high numbers of collisions. However, school

zones will be captured as a part of the countermeasures for the emphasis areas such as intersections, vulnerable road users, etc.

Winter Conditions: Do winter conditions and winter maintenance play a role in FMI collisions? The data suggests the opposite. There are fewer FMI collisions and overall collisions in winter driving conditions. This may be the result of people avoiding driving, driving slower due to a poor road surface condition, and being more cautious.

Rail/LRT Safety: Is rail safety considered? Yes, collisions involving motor vehicles, pedestrians or cyclists on city roads intersecting with rail are considered. Currently the data does not suggest that it is critical, however, ongoing studies and future iterations of this plan may result in it becoming an emphasis area, if the data supports it.

5. FINAL EMPHASIS AREAS

Taking the input from the public, collision data, stakeholders, and internal discussions, City staff determined that the final emphasis areas should be:

- Intersections
- High Risk Drivers
- Vulnerable Road Users (including Cyclists, Motorcyclists, and Pedestrians)
- Rural Roadways

There were three (3) changes to the emphasis areas. Aggressive driving, distracted driving, and impaired driving were combined to be called “High Risk Driver Behaviour” This emphasis area focuses more on driver choices and behaviours. Cyclists, pedestrians, and motorcyclists were combined into the one emphasis area called “Vulnerable Road Users”, similar to Ottawa’s previous Towards Zero RSAP.

The addition of rural roadways as an emphasis area is due to the fact that, unlike most other Vision Zero cities, Ottawa has a large rural road network. Although most RSAPs focus on urban roadway safety issues, Ottawa’s rural roadway network suffers from an over-representation of FMIs when compared to the other area types. Therefore, it was considered important that this RSAP highlight this issue.

The following section provides a brief collision summary of the emphasis areas in addition to the collision analysis in the previous section. Figure 28 illustrates the final emphasis areas FMI collisions. As noted previously, there is a lot of overlap between the emphasis areas.

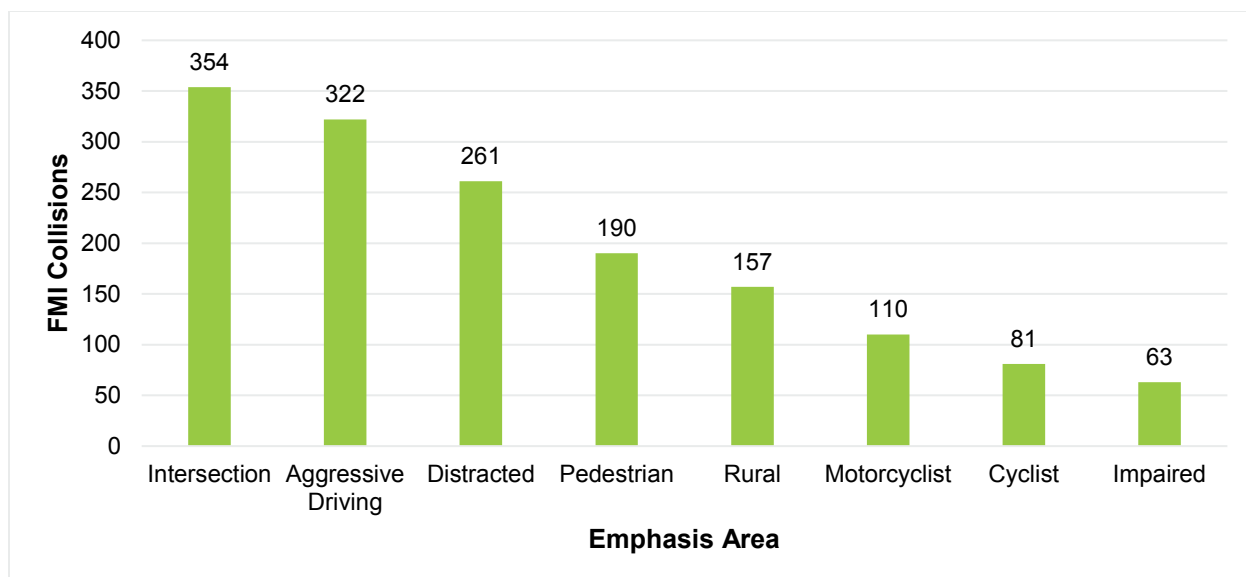


Figure 28: Final Emphasis Areas FMI Collisions in City of Ottawa

5.1. Intersections

Almost 50% of the FMI collisions occur at intersections in Ottawa. There are approximately 48 fatal and major injury (FMI) collisions that occur at signalized intersections annually. The collision data shows that an average of 6 cyclist and 18 pedestrian FMI collisions occur annually at signalized intersections.

When determining the number of FMI collisions at signalized intersections, the traffic signal category under the traffic control field on the police report is counted. Using a pivot table, the traffic control type is counted based on fatality, major injury, and year. In the collision data, indicators (in this case, “1”) were used to flag a collision as pedestrian or cyclist collision (each having their own column). When determining cyclist and pedestrian collisions at signalized intersections, these values were added to the pivot table so it could sum the total number of collisions based on the filters.

Figure 29 below illustrates the collision percentage related to the area type. As expected, intersection collisions make up a greater percentage of FMI collisions in the CBD and core residential areas, and less so in rural areas due to density of the roadway network. This figure demonstrates a difference in the collision characteristics between the urban, suburban and rural areas of the city.

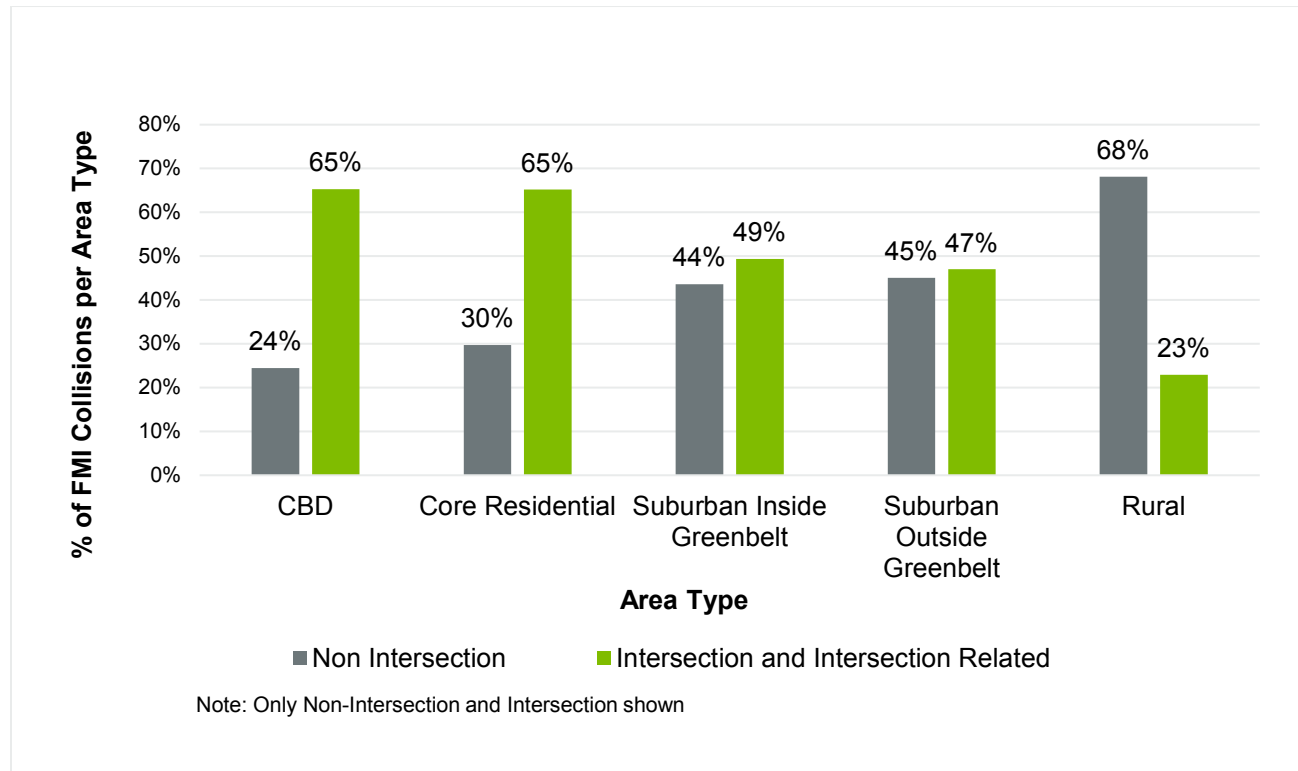


Figure 29: Intersection and Non-Intersection Collisions by Area Type

5.2. High Risk Driver Behaviour

In recognition that distracted, aggressive, and impaired driving all involve driver actions and behaviors that are best addressed by enforcement and education, the City of Ottawa combined these categories into one emphasis area.

The high-risk driver emphasis area includes the following collision information from the police collision report form:

- Apparent Driver Action:
 - Following too close
 - Exceeding the speed limit
 - Speed too fast for conditions
 - Disobeying traffic control
 - Failing to yield the right of way
- Driver Condition:
 - Inattentive (Distracted)
 - Impaired

Table 3 below shows the number of FMI collisions that cite aggressive, distracted or impaired factors. Both aggressive and impaired are relatively consistent, however, there is an increase in the number of distracted driving FMI collisions over the 5-year period. Overall, high risk driver behavior was cited in 451 of the 743 FMI collisions. However, because data from two different field categories in the police report are used to assemble this information, there is some overlap. Therefore, adding the three categories together, results in a higher number. This means that in 451 of the FMI collisions, at least one high risk driver behaviour was

cited. In 195 of those, there was more than one. For example, a driver could have been reported as disobeying traffic control and being distracted.

Table 3: High Risk Drivers FMI Collisions by Year

Year	Aggressive	Distracted	Impaired	Total
2013	66	40	14	120
2014	59	41	12	112
2015	54	41	9	104
2016	69	62	16	147
2017	74	77	12	163
Total	322	261	63	646

5.2.1. Aggressive Driving

Aggressive driving is included as part of the high-risk drivers emphasis area because 43% of fatal and major injury collisions in Ottawa are reported as having aggressive driving as a contributing factor. 27% of the collisions involve drivers between the ages of 21 to 30. It should be noted that 45% of FMI collisions due to aggressive driving occurred between the months of May to August. Approximately 161 collisions were reported as being aggressive driving due to failing to yield the right of way, and approximately 87 collisions citing aggressive driving were reported as a result of speed related offences.

5.2.2. Distracted Driving

35% of fatal and major injury collisions in Ottawa are reported as having distracted driving as contributing factor. Distracted driving was a key emphasis area in the previous towards zero plan. The analysis of before and after data from the 2012 plan showed a 49% increase, the highest increase of all emphasis areas. About one-third of distracted driving collisions involve drivers under the age of 30, also there is a notable spike for drivers between 51 and 55 years old.

5.2.3. Impaired Driving

With respect to the collision data, 63 FMI collisions are reported as having impaired driving as a contributing factor. Although this is not high when compared to the other emphasis areas, impaired driving was retained as part of the high-risk driver behavior category because it is a primary concern of Ottawa residents (as indicated in the resident surveys); there are well established programs and policies to target reductions in impaired driving; and there are concerns that collisions involving impaired driving will increase with the legalization of cannabis.

5.3. Vulnerable Road Users

For this study, the emphasis area of vulnerable road users includes collisions involving pedestrians, cyclists and motorcyclists.

5.3.1. Pedestrians



Figure 30: Pedestrian Collisions by Area Type (2013-2017)

There were 190 FMI collisions involving 202 pedestrians in Ottawa, for the years 2013-2017. In Ottawa 71% of FMI collisions in the commercial business district involve pedestrians, as compared to a city-wide average of 26%. 60% of fatal collisions in the Core Residential neighbourhoods involve pedestrians. Figure 30 shows the distribution of pedestrian FMI collisions based upon the area type in Ottawa. Based on the collision data, approximately 41% of pedestrians involved in FMI collisions are under the age of 30, as shown in Figure 31. Figure 31 below illustrates age distribution of pedestrians involved in FMI collisions.

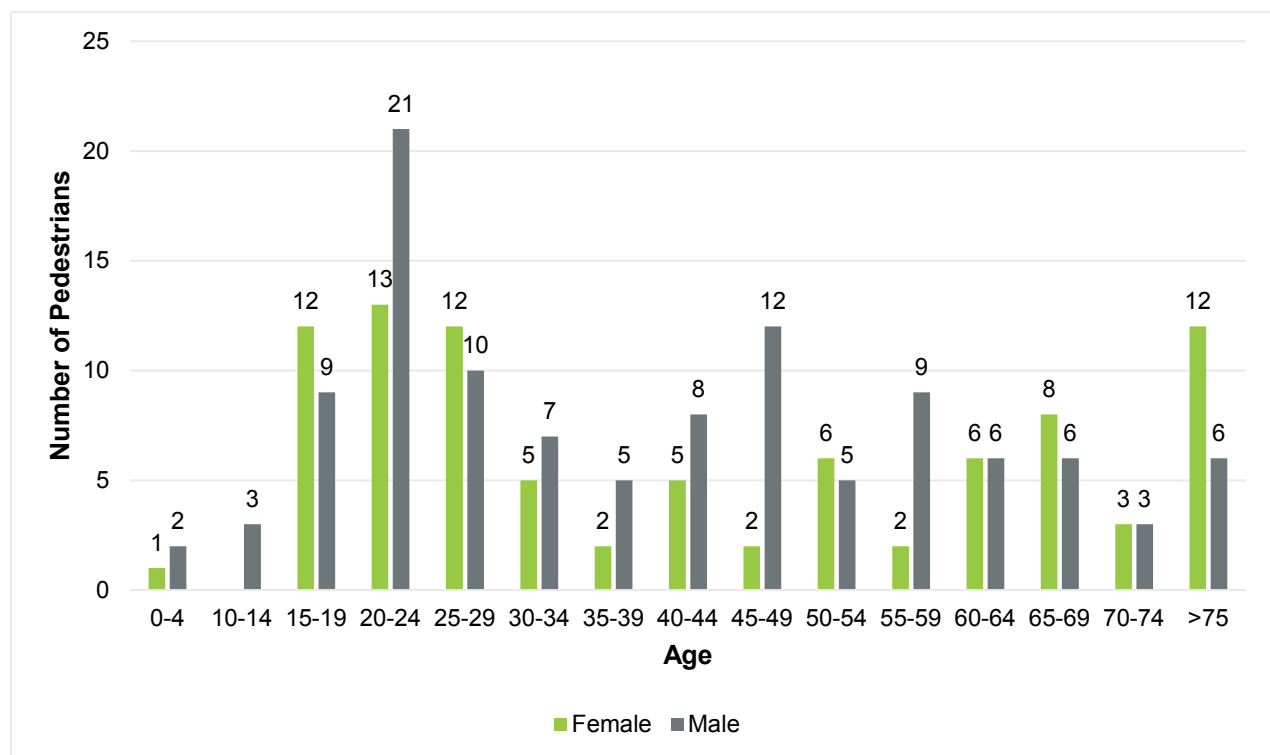


Figure 31: Pedestrian FMI Collisions by Age Distribution (2013 – 2017)

According to the collision data shown in Figure 31, the greatest number of injuries/fatalities was reported between the ages of 20 to 24 years.

As shown in Figure 32, pedestrians crossing with right-of-way resulted in 27% of injuries/fatalities within the category of pedestrian action. Figure 32 below illustrates pedestrian action with the corresponding number of FMI collisions for each action.

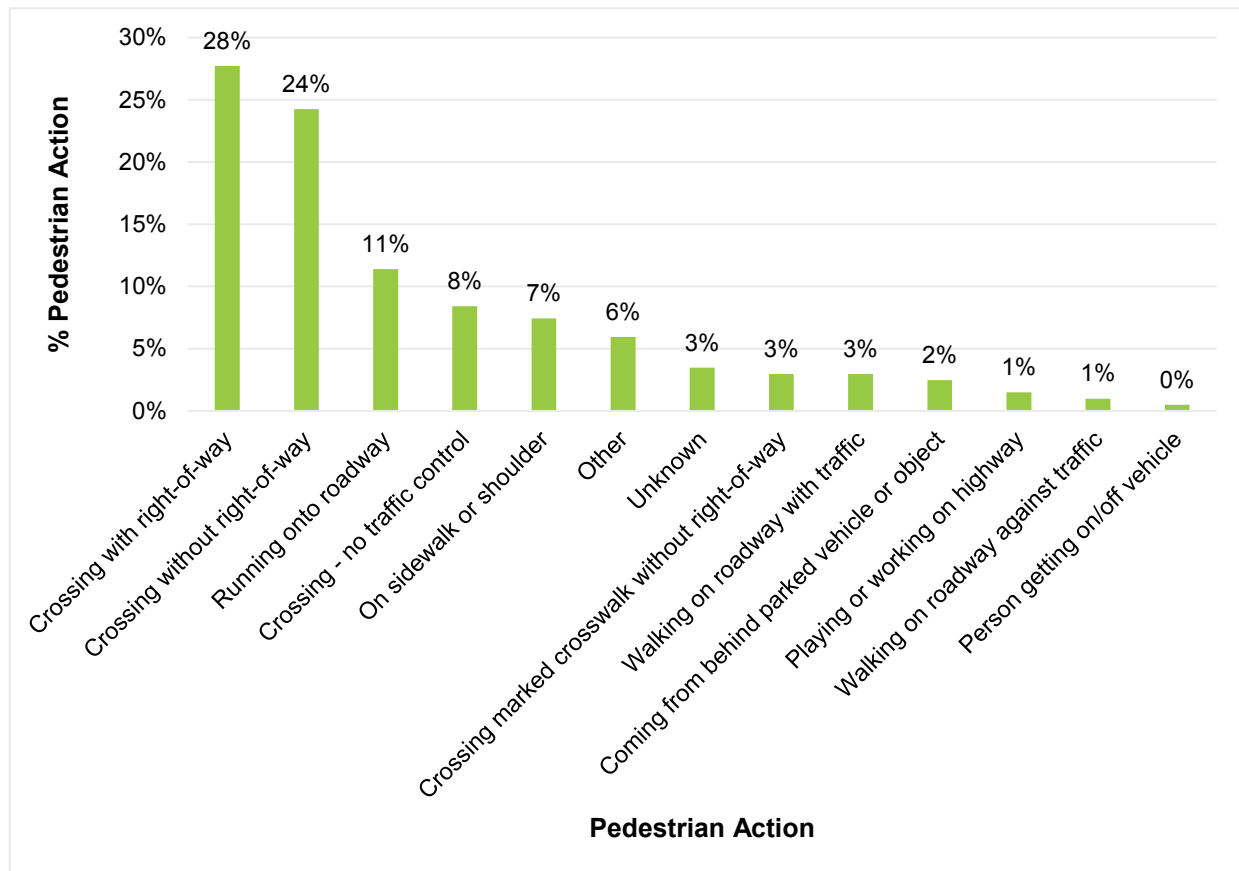


Figure 32: Pedestrian Action FMI Collisions (2013-2017)

5.3.2. Cyclists

With respect to the collision data, approximately 6% of all cyclists' collisions per year result in a major injury or fatality. It should be noted that 57 out of the 81 FMI collisions involving cyclists occurred in the core residential, and inside the greenbelt area types. 80 of the 81 FMI collisions involving cyclists resulted in the cyclist suffering fatal or major injury and one FMI collision, resulted in a motorcyclist sustaining the FMI. Figure 33 below illustrates the breakdown of all FMI collisions involving cyclists by area type in the City. Figure 34 and Figure 35 show the breakdown of cyclists who suffered major or fatal injury by gender and age, respectively.

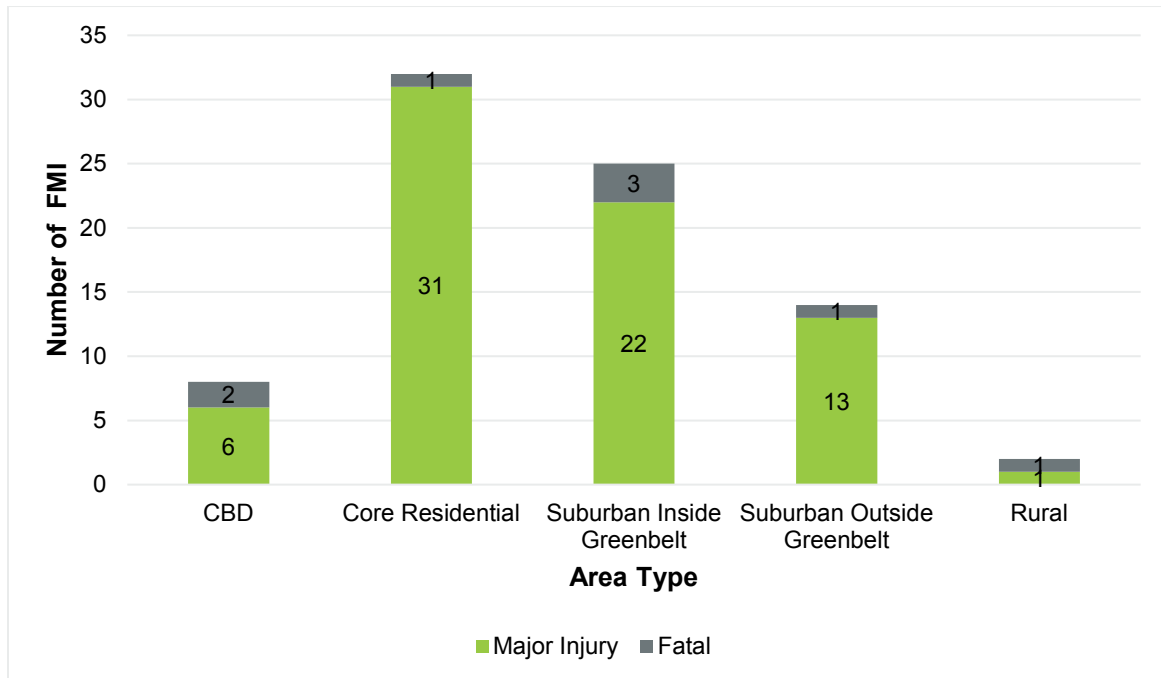


Figure 33: Cyclists FMI Collisions (2013-2017)

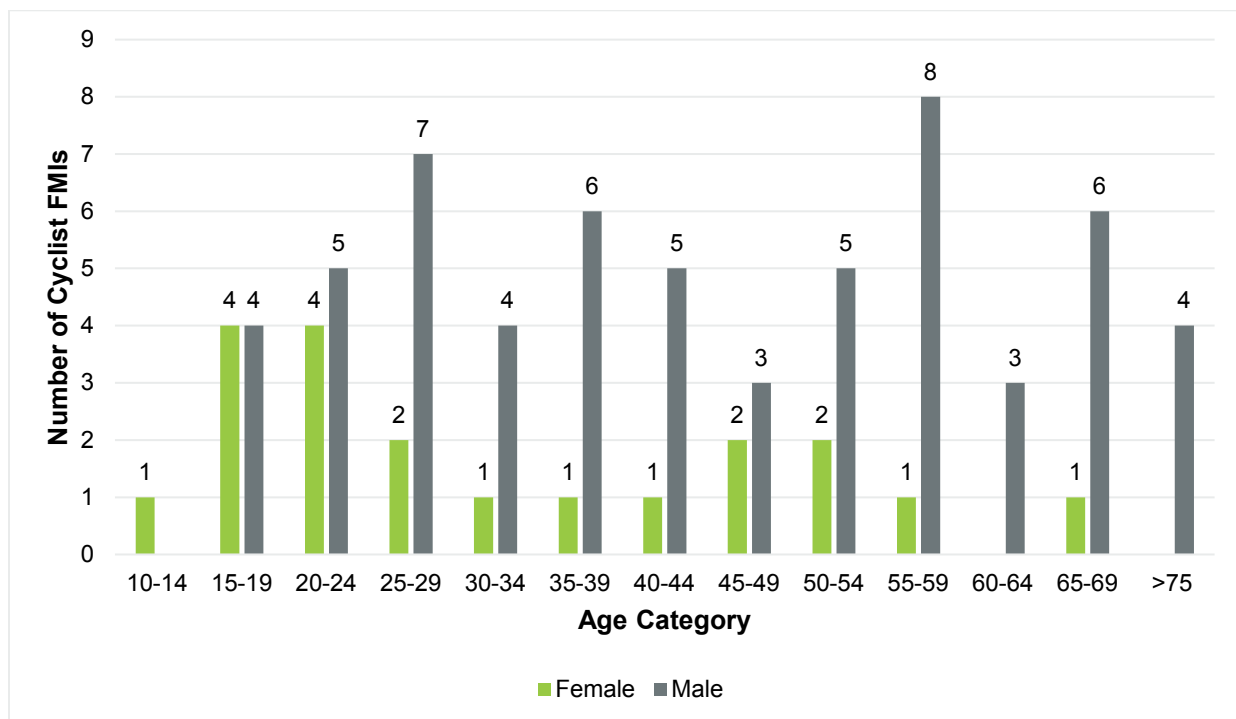


Figure 34: Cyclist FMI Collisions by Gender

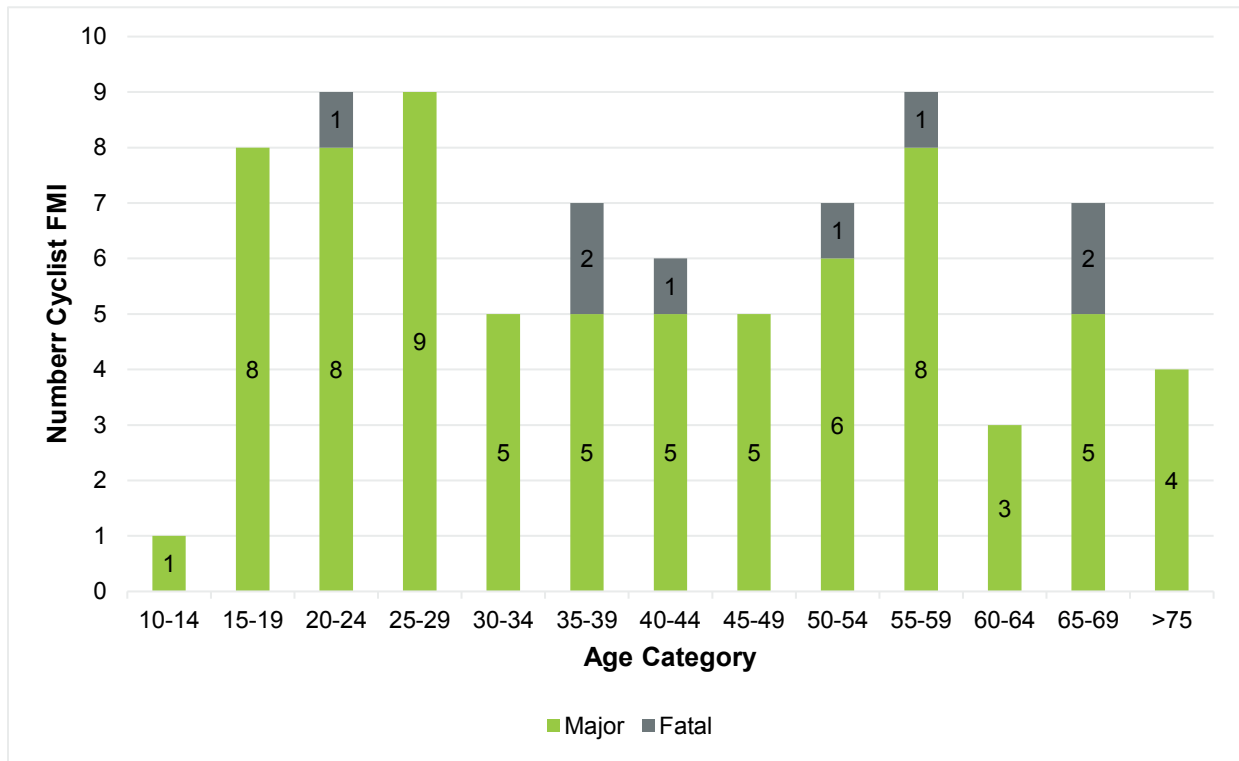


Figure 35: Cyclist FMI Collisions by Age

5.3.3. Motorcyclists

Figure 36 below illustrates 110 motorcycle fatal and major injury collisions by area type within the City. It should be noted that the highest proportion of FMI collisions were reported to be in the suburban inside greenbelt area, with 31 major injuries and 4 fatalities.

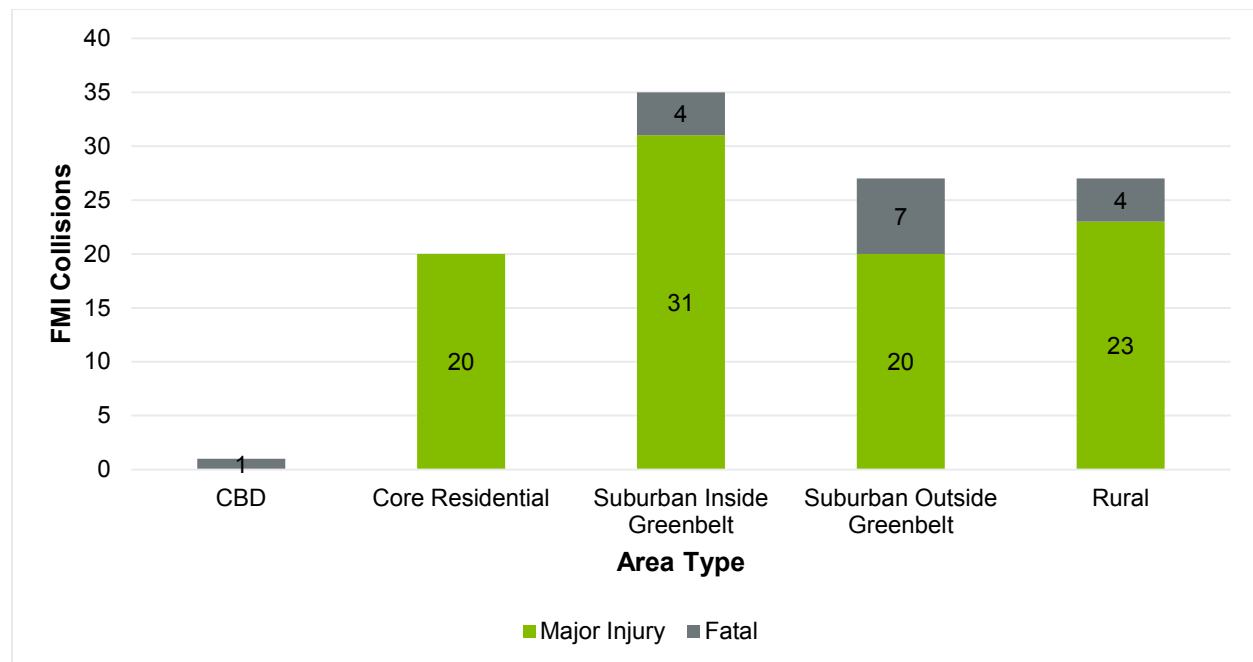


Figure 36: Motorcyclist FMI Collisions by Area Type

5.4. Rural Roadways

Although rural roadway collisions make up 10% of the total collisions (all collisions including property damage only, minimal injury, minor injury and FMI collisions) in Ottawa, they make up 34% of the fatal collisions in the City as shown in Figure 37. There was a total of 157 FMI collisions in rural areas, including 116 major injury and 41 fatal injury collisions.

Based on the results of the analysis, impaired driving is a factor in approximately 8% of FMI collisions across Ottawa, but 13% in rural areas. In addition, run off the road collisions accounted for 78 FMI collisions between 2013 and 2017. Figure 37 below illustrates the breakdown of FMI collisions for each area type within Ottawa, and Figure 38 shows the percentage of FMI collisions due to impaired driving conditions.

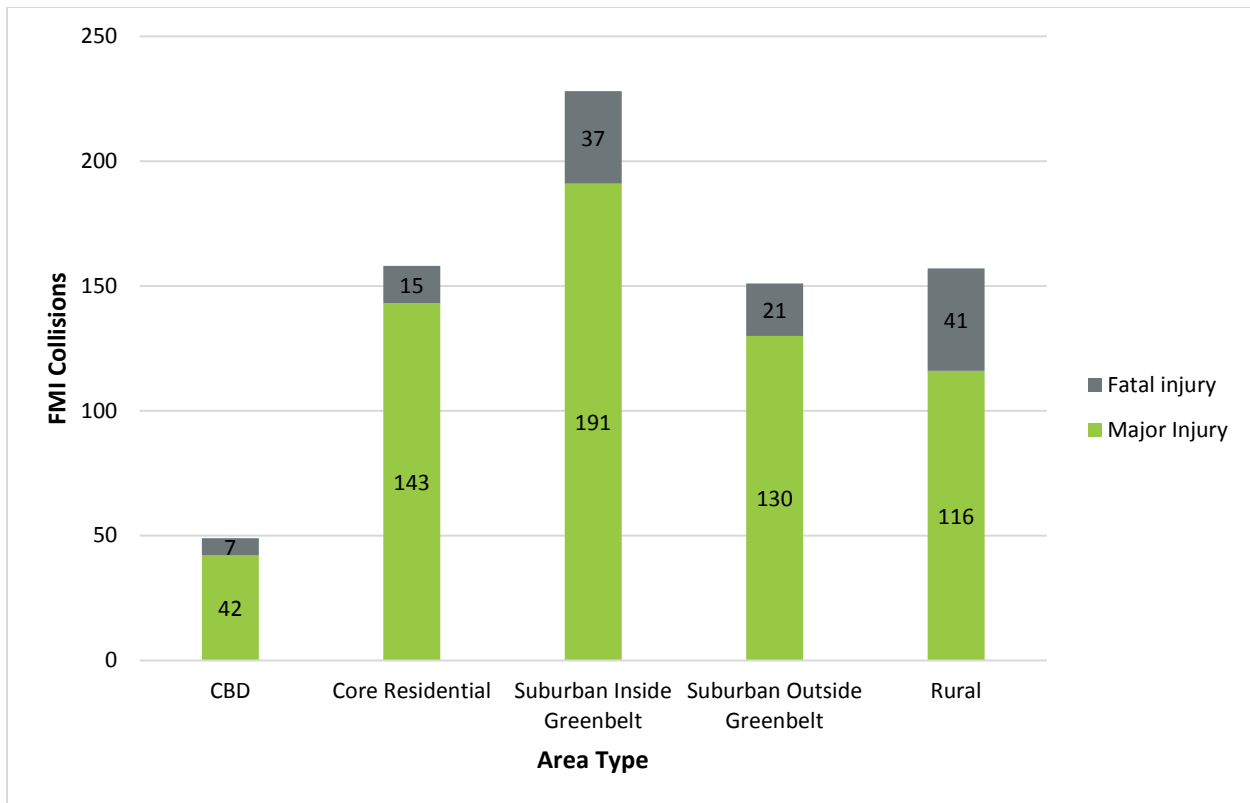


Figure 37: FMI Collisions by Area Type (2013 – 2017)

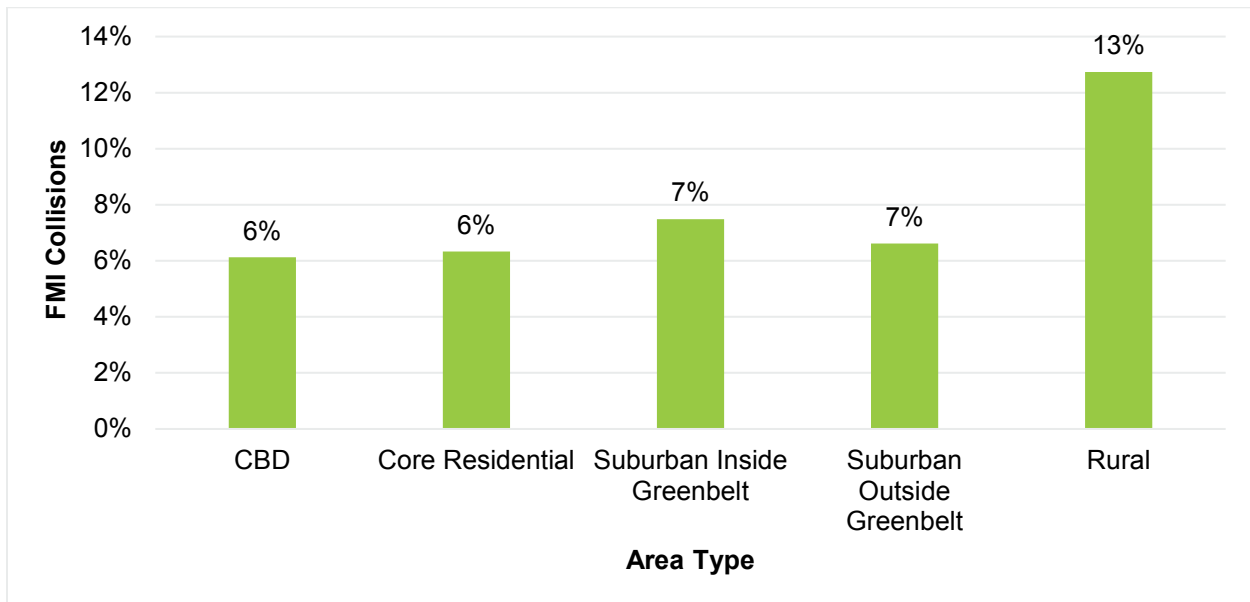


Figure 38: FMI Collisions due to Impaired Driving by Area Type

6. CONCLUSION

The technical memorandum summarizes the steps taken to create the emphasis areas for Ottawa's updated Road Safety Action Plan. Input was taken from a resident survey, collision analysis of FMI collisions and input from Stakeholders at a Stakeholder's workshop. The final emphasis areas are:

- Intersections
- High Risk Driver Behavior
- Vulnerable Road Users
- Rural Roadways

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