

VISION 
ZERO
Kingston's Road Safety Plan



June 2019



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1. Background and Introduction

With more than 300 injury collisions and an average of three fatal collisions each year in Kingston, the City recognizes the importance of a strategic plan to improve road safety. In April of 2016, City Council considered a recommendation to approve the installation of red-light cameras in the City. Council deferred the motion and instead asked for staff to create the terms of reference for the development of a strategic road safety plan. The 2015 Kingston Transportation Master Plan recognizes road safety as a key component of effective transportation systems management. Although the City has already implemented a wide variety of road safety initiatives, a comprehensive road safety plan has never been completed.

The terms of reference for a “Vision Zero” Road Safety Plan (RSP) were accepted by Council in March 2017 and shortly afterwards, the consulting firm CIMA+ was retained to lead the study. The City acknowledges that a formal structure, including stakeholder agencies external to the City, combined with a broad-based approach, is critical to the development of a Vision Zero Road Safety Plan.

Vision Zero is an approach to road safety that has been adopted in various forms around the world and can be summarized as no loss of life or injury on our roads is acceptable. Vision Zero is based on the simple fact that humans make mistakes. The road system needs to be efficient to transport people but it must be designed to protect users from human error. As such, the foundation of Vision Zero is to:

- Prevent collisions from occurring in the first place; and
- Design the road network to be “forgiving” to minimize the consequences of collisions that do occur.

The purpose of this Road Safety Plan (RSP) is to:

- Develop a long-term vision and goal statement that considers a progressive reduction towards zero fatal and zero serious injury collisions with a focus on improved safety for vulnerable road users such as pedestrians, cyclists and motorcyclists;

- Analyze collision data to identify factors that contribute to collisions in Kingston;
- Build upon the City’s existing road safety programs by determining the key emphasis areas for which safety can be enhanced;
- Recommend effective safety measures, using the four E’s (Engineering, Education, Enforcement and Engagement) including new guidelines, policies, programs, actions and the use of technology;
- Provide a comprehensive set of countermeasures (safety improvements) for each emphasis area that form part of a long-term strategy to work towards the elimination of all fatal and serious injury collisions;
- Provide a framework to coordinate available resources to maximize success through planning, prioritizing and implementing road safety projects that will be integrated with active transportation initiatives and incorporated within the multi-year work plans of the Transportation and Public Works Group.

To gain a better understanding of public concerns and road safety priorities, public engagement has been an important component throughout the development of the RSP. Since road safety is a joint responsibility, the project team established a Road Safety Advisory Group (RSAG) that included local partners and stakeholder agencies.

The Vision Zero approach requires significant cultural and legislative change in the approach taken towards traffic and road safety, road design, enforcement and the education of road users. In a Vision Zero jurisdiction, safety is prioritized over other factors such as cost, speed, delay, level of service and convenience. The adoption of Vision Zero requires cultural changes such that safety is a top priority in every decision made regarding the transportation system.

Figure 1 outlines the key steps in the development of this RSP.

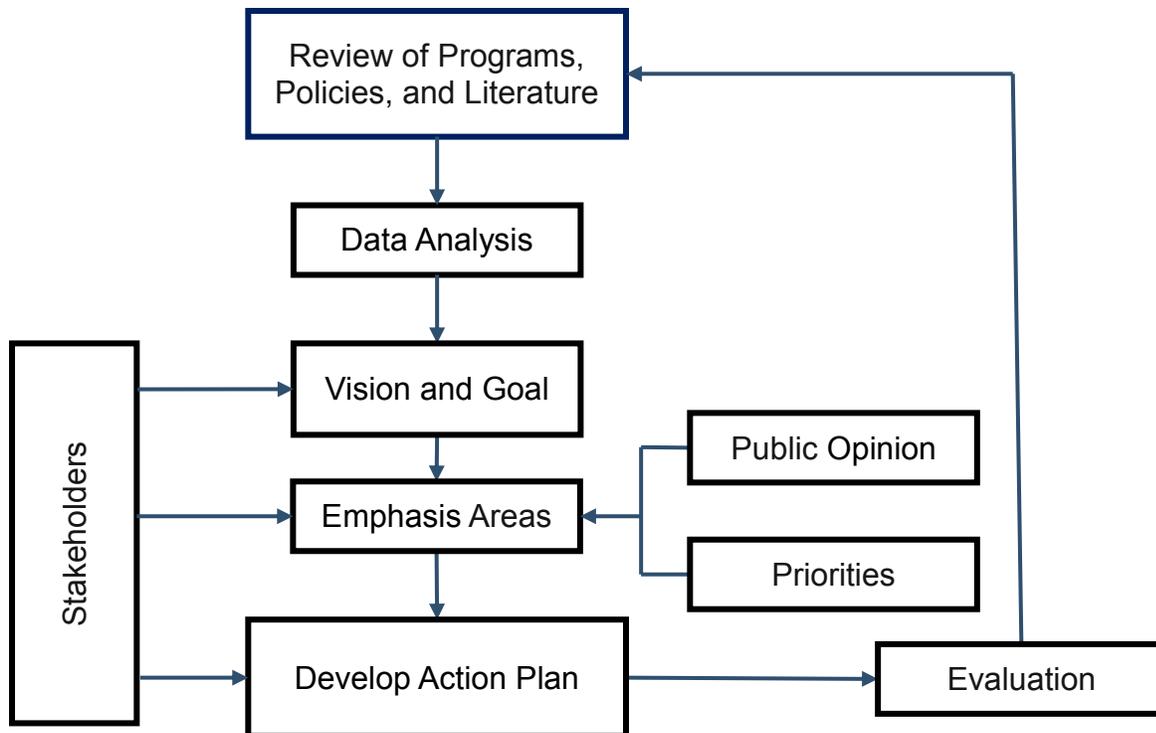


Figure 1: RSP Development Process

2. Literature Review

To assist in the development of the Road Safety Plan (RSP) for Kingston, a review of Vision Zero type plans from the following jurisdictions was completed in order to identify the common elements and best practices of a successful road safety plan:

- City of Toronto
- City of Ottawa
- Peel Region
- City of Hamilton
- City of London (Ontario)
- City of Edmonton
- City of Calgary
- New York City
- Washington D.C.

- City of Seattle
- City of Chicago
- City of San Francisco
- City of San Jose
- Sweden

The project team also reviewed Canada's Road Safety Strategy 2025 and guidelines developed by the Federal Highway Administration (FHWA) for State Departments of Transportation.

Information from the road safety plans from the jurisdictions noted above helped the project team understand the details and range of choices in developing the RSP for Kingston.

In addition to reviewing Vision Zero plans for other areas, it was also important to review the road safety programs and capital programs that the City of Kingston has already implemented or plans to implement. Knowledge of existing road safety programs and capital programs helped create a foundation from where the project team could consider incorporating road safety programs into existing projects.

3. Data Analysis

Since the Road Safety Plan (RSP) is a data-driven study, a detailed analysis of Kingston's collision data for a five-year period (2012 to 2016) was required to determine the types of collisions occurring, causal effects and locations of collisions in the city. It is important to note that the collision data analyzed for this RSP does not include collisions on Highway 401 since this highway is owned and operated by the Ministry of Transportation Ontario (MTO) and is not included in the scope of this study.

The collision data was analyzed based on various criteria such as age group of persons involved, impact type and potential cause of collision. Overall trends in the data were also observed in order to identify the largest groups of collisions. This collision analysis was also necessary to identify the areas to be targeted for improvement known as emphasis areas which in turn provides support for where resources should be allocated.

The results of the collision analysis identified that the top 10 collision categories, in order of highest occurrence, are as follows:

1. Intersection Collisions
2. Aggressive Driving
3. Young Demographic
4. Distracted Driving
5. Pedestrians
6. Cyclists
7. Winter Conditions
8. Impaired Driving
9. Motorcyclists
10. Heavy Truck Collisions

4. Public Engagement

The City of Kingston’s Public Engagement Framework states that public engagement identifies ways that residents, councillors and City employees can be involved and participate collaboratively in problem-solving and decision-making processes. It should be based on the following criteria:

- Clarity of purpose: Participants must be clear on the role they play in the process.
- Reflective of diverse populations and opinions: Efforts will be made to engage the community’s demographic diversity to the greatest extent possible.
- Purpose: Raise awareness with residents and ensure that all participants’ perspectives are heard, taken into consideration and help to inform decision-making.
- Based on accurate information: Ensure information about the major elements of any issue or initiative is accurate so that participants can refine their perspectives, voice their points of view and better understand those of others.

- Organized and well-facilitated: Processes should be facilitated by someone who will encourage participation that is respectful and equitable so that discussions stay focused and sufficient time is given to the most important issues.
- Communication of results: Results will be shared with residents. This includes reporting back after individual sessions and offering explanations of how input from participants informed final recommendations and/or decisions.

4.1. Public Engagement Tools and Events

To gain a better understanding of the public concerns and road safety priorities, public engagement was a critical component throughout the completion of the RSP. The project team worked with City Communications to create an appealing Vision Zero branding scheme that was used in notifications about the project through social media, print media, postcards, roadside signs and on the City’s website. The public was also notified about the Vision Zero project through radio ads, local television and an educational video. In addition, a Q & A was opened on the City’s Get Involved engagement platform where information about the RSP was provided along with a link to the road safety survey. City staff also responded to more than 50 road safety questions on the Get Involved site.

The public engagement plan included a public open house at City Hall, five “pop-up” Vision Zero engagement events, the creation of a Road Safety Advisory Group (RSAG) and the completion of a public road safety survey.

The public open house and the “pop-up” engagement events provided the public with the opportunity to learn more about the Vision Zero RSP and to discuss road safety concerns in person. The public open house was held at City Hall on Oct. 24, 2017 (6 to 8 p.m.) and the five Vision Zero “pop-up” engagement events occurred as follows:

- INVISTA Centre – Nov. 22, 2017 – 6 to 8:30 p.m.
- Centre 70 - Reddendale Public Information Center (Flooding Issues and Improvement Plans) – Nov. 23, 2017 – 6 to 8 p.m.
- YMCA Progress Avenue – Nov. 27, 2017 – 10:30 a.m. to 1 p.m.

- YMCA Wright Crescent – Nov. 29, 2017 – 9 a.m. to 12:30 p.m.
- Motorsport Plus motorcycle event (Drivers Against Distraction “DAD”), June 7, 2018 – 6 to 8 p.m.

4.2. Road Safety Survey

As part of the engagement plan for the RSP, a public road safety survey was conducted to better understand the road safety concerns and priorities of the residents who live, travel, work and go to school in Kingston. In combination with the collision data analysis, the results of the survey were used to identify and confirm the road safety emphasis areas for the RSP.

The road safety survey was promoted through social media, print advertising, a media research company (Research Now) and the City’s website. Residents were also provided with the online survey link and the opportunity to complete a hard copy of the survey at the public open house and at the five “pop-up” Vision Zero engagement events.

Survey participants were asked to rank the importance of addressing each of the 24 areas of road safety concern (listed in no order of preference) as follows:

1. Aggressive driving
2. Speeding in residential areas
3. Speeding on major roads in the urban area
4. Speeding on rural roads
5. Running red lights
6. Distracted driving
7. Impaired driving
8. Pedestrian safety
9. Cyclist safety
10. Motorcyclist safety
11. Elderly drivers
12. Young demographic
13. Wayfinding (signage that helps you get around the City)

14. Seat belt usage
15. Intersection collisions
16. Construction zone collisions
17. School zones
18. Park and playground areas
19. Rural roads
20. Collisions with wildlife
21. Collisions with trains
22. Collisions with trucks
23. Weather-related collisions
24. Collisions at night

Participants were then asked to choose what they believe are the top five road safety concerns and rank them in order of priority. The survey also asked what the participants believe they can personally do to help the City achieve its vision of zero fatalities and injuries; which of Kingston's existing road safety measures they believe could be improved and which existing road safety measures they believe work well.

In order to reach out to a wide cross-section of local residents, the road safety survey was also distributed to Kingston residents by "Research Now", a market research firm that utilizes a permission-based digital data collection process using a panel of verified participants. Participants were contacted by email and interested participants were directed to the online road safety survey.

The survey on the City's website was open for almost seven weeks, from October 24, until Dec. 15, 2017 and Research Now's survey was conducted between November 20 and Dec. 15, 2017.

A total of 600 road safety surveys were collected; 158 through the City's website, 430 via Research Now and 12 hard copies from the City's pop-up events. The survey asked participants if they live within Kingston and if they work or go to school within Kingston. Out of the responses, 85 surveys were incomplete and 56 participants did not live, work, or go to school in Kingston and these survey results were not used in the analysis.

Therefore, the total number of valid survey results included in the analysis was 459 which included people who either live, work, or go to school in Kingston.

The results of the public road safety survey showed that the top 10 areas of concern, in order of highest priority, are as follows:

1. Distracted driving
2. Impaired driving
3. Pedestrian safety
4. Running red lights
5. Cyclist safety
6. Aggressive driving
7. Speeding in residential areas
8. Elderly driving
9. Intersection collisions
10. Speeding on major roads in urban areas

4.3. Road Safety Advisory Group (RSAG)

Road safety is a shared responsibility throughout the City. A wide range of organizations can contribute to improving road safety in a jurisdiction, including those whose mandates are engineering, law enforcement, public health, education and advocacy.

The development of Kingston's RSP was a collaborative process where input and feedback of partners in all of these fields was critical to the development of the plan. To facilitate this process, a Road Safety Advisory Group (RSAG) was established that would work together and play an important role by collaborating and contributing to the development of Kingston's first Road Safety Plan.

The project team invited a wide range of partners and stakeholders to join the RSAG. These stakeholders were chosen based on their ability to implement and deliver road safety measures and programs.

The Road Safety Advisory Group for the Road Safety Plan (RSP) included the following participants:

- City of Kingston
- Kingston Police
- Ontario Provincial Police (OPP)
- Ministry of Transportation Ontario (MTO)
- Kingston Coalition for Active Transportation (KCAT)
- Cycle Kingston
- Kingston, Frontenac and Lennox & Addington (KFL&A) Public Health
- Municipal Accessibility Advisory Committee (MAAC)
- Drivers Against Distraction (motorcycle safety)
- Algonquin & Lakeshore Catholic District School Board
- Limestone District School Board
- Tri-Board Transportation
- Canadian Automobile Association (CAA)
- Young Drivers of Canada

The purpose and mandate for the members of the Vision Zero RSAG were established as follows:

- Have a clear understanding of the Vision Zero Road Safety Plan development process;
- Participate in a culture of partnership and shared responsibility between stakeholders;
- Create the vision and goal for the RSP;
- Commit to promote and support the vision and goal of the RSP both inside their organization and in public;
- Confirm the road safety emphasis areas to become the focus of the RSP;
- Propose road safety countermeasures to be delivered by partner organization;

- Provide technical information or advice wherever it assists in the development of the RSP;
- Review and provide comments on the RSP;
- Ownership and commitment by all stakeholders in delivering the components of the RSP.

To accomplish the scope of work within this mandate, the project team hosted a series of three workshops for the RSAG on the dates below. Each workshop was approximately five hours in length. RSAG members were also required to complete road safety countermeasure sheets outside of the workshop sessions.

- Workshop 1 – Oct. 4, 2017
- Workshop 2 - April 11, 2018
- Workshop 3 – Sept. 26, 2018

5. Vision and Goal

Vision Zero is an approach to road safety that has been adopted in various forms around the world and can be summarized as ‘no loss of life or injury on our roads is acceptable’. Vision Zero is based on the simple fact that humans make mistakes. The road system needs to be efficient to transport people but it must be designed to protect users from human error. As such, the foundation of Vision Zero is to:

- Prevent collisions from occurring in the first place; and
- Design the road network to be “forgiving” to minimize the consequences of collisions that do occur.

Once the members of the Road Safety Advisory Group (RSAG) had been confirmed, participants were invited to attend a workshop to learn more about their roles and to collaborate as a group to confirm the long-term vision and the short-term goal for the RSP. Several options were developed by the project team for discussion to determine what would align with the City’s strategic goals.

The confirmed vision and goal statements developed through collaboration with the project team and the RSAG are as follows:

Vision Statement:

Zero fatal and injury collisions involving any type of road user and zero collisions with vulnerable road users such as pedestrians, cyclists and motorcyclists.

The vision of the RSP was developed to align with the Vision Zero philosophy. The vision is a high-level long-term goal that the RSAG members recognize is an idealistic and ambitious vision that will take time to achieve. The ultimate goal is that no one should be injured or killed in Kingston as a result of a motor vehicle collision.

Goal Statement:

Over five years, at least a 10 per cent reduction in fatal and injury collisions involving any type of road user and at least a 10 per cent reduction in collisions with vulnerable road users such as pedestrians, cyclists and motorcyclists.

This short-term goal is designed to lead to the broader vision and was selected based on typical goals found in the literature review of other jurisdictions and the success of their plans. The goal is intended to be a measurable guide such that the progress of the RSP can be evaluated. It is expected that the RSP program would revisit this goal at least every five years but may do so more frequently based on the success of the implementation of road safety initiatives.

6. Emphasis Areas

The collision data analysis and the results from the road safety survey were reviewed and compared by the project team and the Road Safety Advisory Group (RSAG) in order to choose road safety emphasis areas for the Road Safety Plan (RSP). Emphasis

areas are the highest priority collision types, or groups with opportunities to improve safety from a technical, political and social perspective, for which actions will be developed and implemented to improve road safety. By focussing on emphasis areas, the City deploys resources most efficiently and has the greatest chance for success to reduce collisions.

The selection of emphasis areas is the foundation of moving towards the RSP goal. Typically, six to eight emphasis areas are selected in road safety programs. The number of emphasis areas is established to ensure that adequate resources can be allocated where they are most needed to reduce serious collisions.

The City should focus resources on the chosen emphasis areas to improve road safety in Kingston. Table 1 illustrates, in order of priority, the comparison of prioritized emphasis areas that were identified through the collision data analysis versus the emphasis areas identified by the public road safety survey.

Table 1: Emphasis Area Comparison

Collision Data	Public Survey
1. Intersection collisions	1. Distracted Driving
2. Aggressive Driving	2. Impaired Driving
3. Young Demographic	3. Pedestrians
4. Distracted Driving	4. Red Light Running
5. Pedestrians	5. Cyclists
6. Cyclists	6. Aggressive Driving
7. Winter Conditions	7. Speeding in Residential Areas
8. Impaired Driving	8. Elderly Drivers
9. Motorcyclists	9. Intersection Collisions
10. Heavy Truck Collisions	10. Speeding on Major Roads in Urban Areas

It was noted that the emphasis areas identified in the road safety survey were very similar to the emphasis areas highlighted by the collision data analysis with respect to common priorities. Although there were differences in emphasis areas and order of priority, the public has a relatively good understanding of the road safety concerns in the City.

The project team and the RSAG collaborated to choose seven emphasis areas and one awareness area as described below in no order of priority. The efforts of the RSP will be focused on reducing the number of injury and fatal collisions in the chosen emphasis areas, which are described below.



- **Intersections:** Collisions occurring within an intersection.



- **Aggressive Driving:** Collisions which involve one or more drivers with one or more of the following actions leading to a collision: following too close, exceeding the speed limit, driving too fast for conditions, disobeying a traffic control, failing to yield the right-of-way and improper passing.



- **Distracted Driving:** Collisions documented by the police officer as inattentive on the motor vehicle collision report (example: texting, eating, using a GPS). Recent research on the human factors of driving has identified distracted driving as having a much larger role in collisions than previously thought and suggests it is likely underreported.



- **Impaired Driving:** Collisions where the at-fault drivers are impaired or under the influence of drugs and/or alcohol.



- **Pedestrian Collisions:** Collisions which involve any person that is not riding in a motor vehicle or on a bicycle.



- **Cyclist Collisions:** Collisions that involve a person riding a bicycle.



- **Young Demographic:** Collisions involving young drivers, young pedestrians and young cyclists. People up to 25 years old are considered within the young demographic.

Collisions in school zones were not identified by the collision data analysis as a priority area. School zones were however identified as a perceived area of concern by the RSAG and by members of the public. School zones will therefore be considered as an “awareness area”, such that the action plan will be mindful of school zone safety while addressing each of the seven emphasis areas.



- **School Zones:** Collision involving a pedestrian and a vehicle that occur within the vicinity of a school.

A single collision might involve multiple emphasis areas, so there are overlaps among emphasis area collision totals. For example, if a pedestrian were involved in a collision with a young driver at an intersection, this collision would be represented in the three emphasis areas: pedestrian collisions, young demographics and intersection-related collisions.

In the future, after the countermeasures of the RSP are implemented, emphasis areas and priorities may change based on the collision data and concerns from residents. The list of emphasis areas is expected to be revisited whenever the RSP is updated since a reduction in collisions is expected. The RSP must be adaptable to future changes in road safety priorities.

7. Countermeasures

The plan to deliver road safety improvements in the City through the Road Safety Plan (RSP) requires a high number of individual initiatives called countermeasures.

Countermeasures are actions taken to reduce the incidence or severity of motor vehicle collisions. The Road Safety Advisory Group (RSAG) was assembled to deliver countermeasures with the intent that members would initiate actions within their organizations that would lead to countermeasure development and implementation.

After the identification of the seven emphasis areas and one awareness area, the project team and the RSAG developed an action plan focussed on countermeasures.

Once the RSP is approved, the Road Safety Plan would be utilized to inform the work plans of the Transportation and Public Works Group at the City and in particular, the implementation plan for active transportation and supporting enforcement initiatives.

Once implemented, the countermeasures developed by the RSP partners will help contribute to a reduction in the number of serious collisions within the City and moving towards the City's transportation and safety goals.

7.1. Countermeasure Development

A countermeasure is an action taken to reduce the frequency or severity of motor vehicle collisions. The countermeasures chosen for the RSP have two characteristics:

1. A high likelihood of contributing to the reduction of collision frequency or severity of one or more of the chosen emphasis areas; and
2. Either the City or a partner agency is prepared to support and deliver the countermeasures.

The countermeasures identified and selected by the organizations in the RSAG are intended to reduce the severity and frequency of collisions for one or more emphasis areas.

7.2. Countermeasure Types & Categories

Transportation safety is a diverse and complex field that requires the involvement of stakeholders and partners from a variety of backgrounds. Using the four E's (Engineering, Enforcement, Engagement and Education) approach provides a broad range of actions that address collisions from different perspectives. This also provides the best possible set of solutions to address road safety and facilitates a program delivery that ranges from short-term to long-term.

There is a fifth "E" of road safety that is still an important factor to consider; "Evaluation" that should be considered as a part of the implementation and monitoring plan, rather than as a part of the countermeasure development.

The four "E's" of road safety are described as follows:

Engineering countermeasures are changes to the physical format of the roadway, such as traffic calming measures, changes to traffic control devices such as traffic signal timings, warning devices or pavement markings, policy and practice changes, or changes to regulations, such as traffic flow or parking regulations. Some engineering actions are site-specific or limited to a group of similar sites, such as intersection improvements. Other engineering countermeasures are targeted for all roadway networks within the city, such as sign inspections. Depending on budget and schedule, some engineering countermeasures, especially those that are integrated within planned active transportation and intersection projects, may be implemented within a short period of time.

Enforcement countermeasures typically include police enforcement as well as automated enforcement such as red-light cameras and photo radar. Enforcement aims to reduce collisions and improve compliance with the existing rules of the road, with the secondary aim to educate drivers about the consequences of their actions. Enforcement can be continuous or completed within targeted campaigns and can be limited to specific locations or be widespread.

Education countermeasures aim to change road user behaviour so that road users are more aware of their surroundings and reduce or avoid risky actions. There are many

options for education and the type of communication chosen depends largely on the target audience (e.g. social media, on-site, internet videos, etc.). Education campaigns tend to be broader, more targeted to specific users and reach more users than specific engineering countermeasures. They may also take longer to develop and take longer to create quantifiable change than engineering or enforcement measures, but usually have a significant overall impact in establishing or changing the road safety culture.

Engagement countermeasures include the road users actively participating in the campaign or the event that promotes road safety for all road users. Often engagement countermeasures are tied closely to the education countermeasures, since the purpose for some engagement countermeasures is to raise awareness and to educate residents about road safety. It is important to note that public engagement must be genuine and provide an opportunity for the public to be involved in the decision-making process.

In addition to the 4 E's, countermeasures can be further categorized as:

- New policies
- System-wide improvements (systemic)
- Location specific
- Demographic specific

These categories relate to how the countermeasure is developed and applied as outlined in **Table 2**.

Table 2: Types of Countermeasures

Type of Countermeasure	Description	Example
New Policies	<ul style="list-style-type: none"> ● New policies specific to Kingston. ● Research suggests that new policies or specific agency approach will improve road safety. 	<ul style="list-style-type: none"> ● Strategic traffic enforcement - zero tolerance policy.

Type of Countermeasure	Description	Example
System-Wide (Systemic)	<ul style="list-style-type: none"> Countermeasures that are implemented across the entire jurisdiction. Can be rolled out in stages. Can be implemented in conjunction with other projects. 	<ul style="list-style-type: none"> Revised pedestrian signal timings at all signalized intersections.
Location Specific	<ul style="list-style-type: none"> Countermeasures to improve safety at one or more specific sites. Detailed collision analysis required to identify locations and the type of countermeasures. 	<ul style="list-style-type: none"> Implement left-turn signal phasing at locations with high rates of left-turning collisions.
Demographic Specific	<ul style="list-style-type: none"> Countermeasures based on a selected age group or mode of transportation. Detailed collision analysis and sometimes geographic analysis required. 	<ul style="list-style-type: none"> Educational campaign for young pedestrians (age 18-25).

While all countermeasures are important to road safety, not all countermeasures can be implemented in the short-term as some will require funding or formal approvals or are

tied to the schedule of other larger projects, such as road reconstruction or provincial outreach campaigns.

The proposed Road Safety Plan (RSP) countermeasure program includes 3 types of countermeasures related to status as follows:

- Existing actions to be continued at the current level of effort (“Existing”)
- Existing programs to be expanded (“Expanded”)
- New initiatives (“New”)

New and expanded programs will improve the level of safety by increasing the effort expended toward new engineering, enforcement and education measures. Some of the existing programs, such as repainting of roadway lines or assessing the condition of road signs, result in maintaining safety at current levels but may not contribute toward reaching the goal of the RSP. Other existing programs, such as the ongoing program to add intersection lighting, will improve safety even if the existing level of resourcing is maintained.

7.3. Emphasis Area Specific Countermeasures

Although countermeasures are typically selected for one specific emphasis area, it is important to note that multiple emphasis areas may be impacted by the same countermeasure. For example, a countermeasure designed to prevent vehicle-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. For enforcement measures, 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 in reaching the target audience in terms of the medium and the duration of the messaging.

Ultimately, the degree of success of the Road Safety Plan (RSP) in reducing collisions will be one of the most important factors to determine the on-going cost and effort for the road safety program. If the collision and injury numbers are not decreasing as rapidly as the goal requires, additional resources will need to be considered.

7.3.1. Intersections

Intersections are the emphasis area with the highest number of collisions. **Figure 2** summarizes the type and frequency of intersection collisions in Kingston. Rear-end collisions are the most frequent intersection collision; these collisions are often caused by aggressive or distracted driving. Turning movement and angle collisions are the second most frequent collision types. Engineering countermeasures may address many of these intersection collisions.

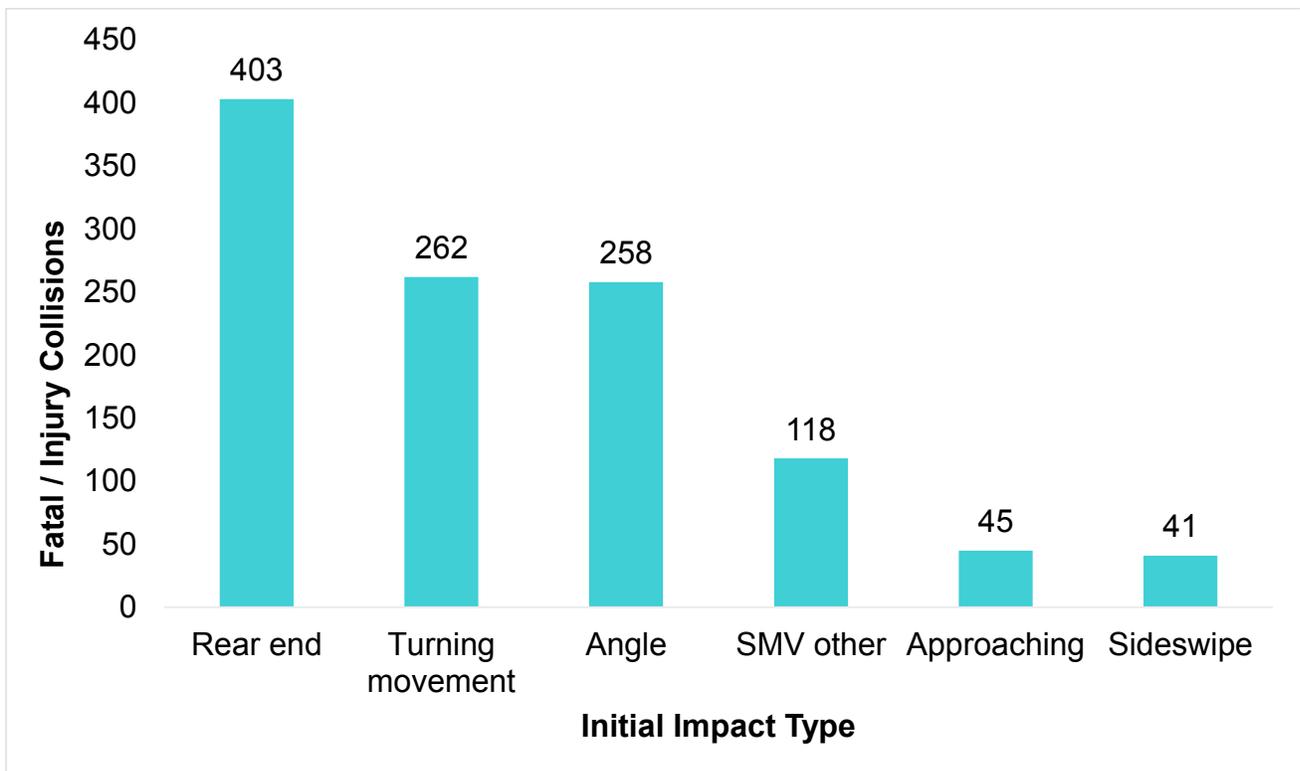


Figure 2: Intersection Collisions by Impact Type (2012-2016)

Table 3 below lists the countermeasures that were developed for intersection collisions and are included as part of the RSP action plan.

Table 3: Intersection Collision Countermeasures

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Vegetation Management	Engineering	Location-Specific	Existing	City Public Works
Selective Reactionary and Complaint Driven Enforcement & Site Selection Analysis	Enforcement	Systemic	Existing	Kingston Police
Sign Inspection	Engineering	Systemic	Existing	City Public Works
Sign Repairs	Engineering	Systemic	Existing	City Public Works
Traffic Control Signage	Engineering	Systemic	Existing	City Traffic & Public Works
Communication and Education	Education	Demographic-Specific	Existing	KCAT
Intersection Lighting	Engineering	Location-Specific	Existing	City
Street Lighting	Engineering	Systemic	Existing	City
Sight Distance Triangles	Engineering	Location-Specific	Existing	City Traffic, Engineering
Review Traffic Signal Timing Parameters	Engineering	Systemic	Existing	MTO, City Traffic
Install traffic control (stop signs, traffic signals)	Engineering	Location-Specific	Existing	City Traffic
Traffic Signals - Left Turn Phasing	Engineering	Location-Specific	Existing	City Traffic
Over-Sized Stop Signs	Engineering	Systemic	Existing	City Traffic
Pavement Markings	Engineering	Systemic	Existing	City Public

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
				Works
Dedicated Turning Lanes	Engineering	Location-Specific	Existing	City Traffic & Engineering
Routine Road Patrol	Engineering	Systemic	Existing	City Public Works
Roundabouts	Engineering	Location-Specific	Expanded	City Traffic & Engineering
Intersection Improvements	Engineering	Location-Specific	Expanded	City Transportation & Engineering
Red-Light Camera Program	Engineering	Policy	New	City Traffic

7.3.2. Aggressive Driving

Aggressive driving leading to a collision includes one or more of the following driver actions:

- Failure to yield right-of-way,
- Following too close,
- Disobeying traffic control,
- Speeding or driving too fast for conditions, or
- Exceeding speed limit.

Figure 3 illustrates the type and frequency of collisions in Kingston in which aggressive driving occurred.

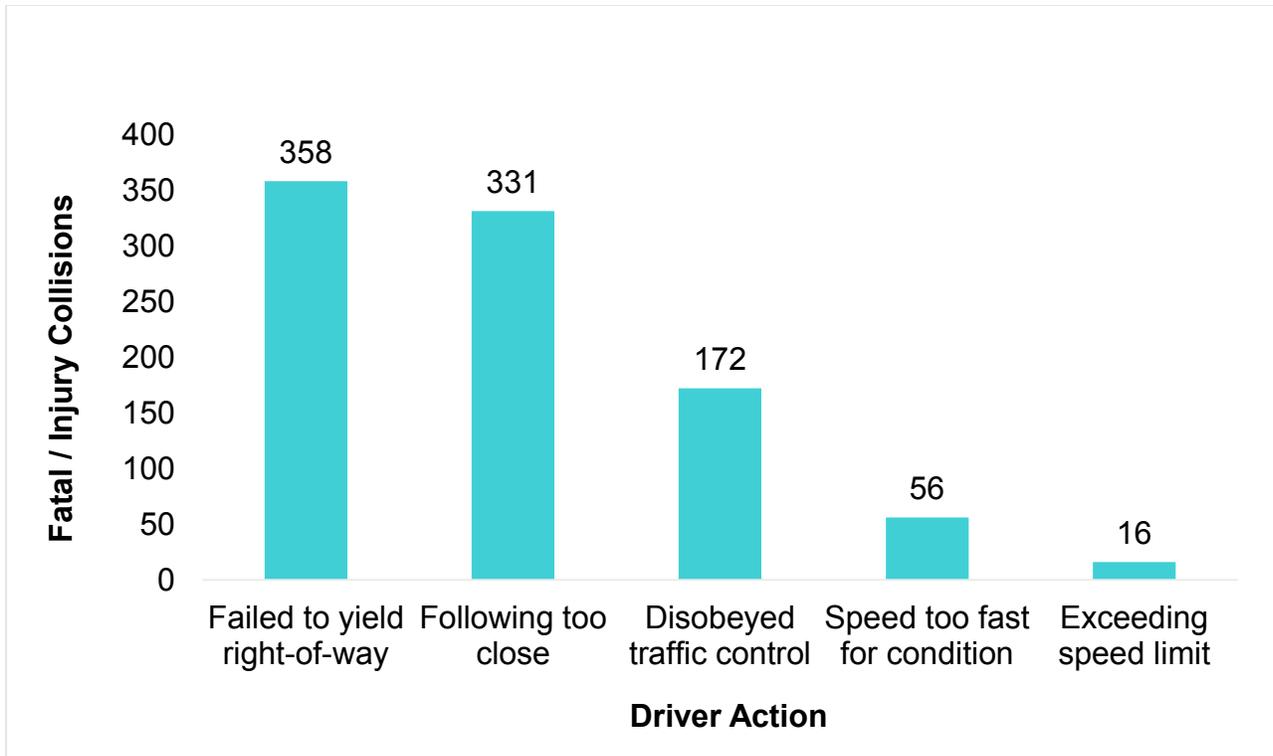


Figure 3: Aggressive Driving Collisions by Driver Action (2012-2016)

Table 4 lists the countermeasures for collisions related to aggressive driving that are included as part of the RSP action plan.

Table 4: Countermeasures for Aggressive Driving Collisions

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Traffic Calming Policy	Engineering	Policy	Existing	City Transportation
Strategic Traffic Enforcement - Zero Tolerance Policy	Enforcement	Policy/Study	Existing	Kingston Police
Drive Safe Campaign	Education / Engagement	Demographic -Specific	Existing	Kingston Police
Automatic License Plate Reader (ALPR)	Enforcement	Systemic	Existing	Kingston Police
Variable Message Boards	Education	Systemic	Existing	City Traffic
Automated Speed	Enforcement	Systemic	Existing	City Traffic

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Enforcement (ASE) Working Group				
Site Specific Geometric Design for Safety Improvements	Engineering	Location-Specific	Expanded	City Traffic, Engineering
High Friction Pavement	Engineering	Location-Specific	Expanded	City Engineering
Reduced Lane Widths	Engineering	Location-Specific	Expanded	City Traffic, Engineering
School Travel Planning	Engagement	Location-Specific	Expanded	KFL&A Public Health
Photo Radar	Enforcement	Policy	New	City Traffic

7.3.3. Distracted Driving

Distracted driving has become one of the leading causes of injury and death on Ontario roads. Collisions involving distracted driving are coded by police officers as the driver being inattentive and may include any of following driver actions:

- Following too close
- Failing to yield right-of-way
- Improper turn
- Disobeying traffic control
- Exceeding speed limit/ driving too fast for conditions/ driving too slowly
- Losing control
- Improper lane change
- Improper passing

Police officers note that it is still likely that this type of collision is underreported, since it is difficult in many cases to confirm distracted driving as a causal factor. A summary of reported distracted driving collisions in Kingston is shown in **Figure 4**.

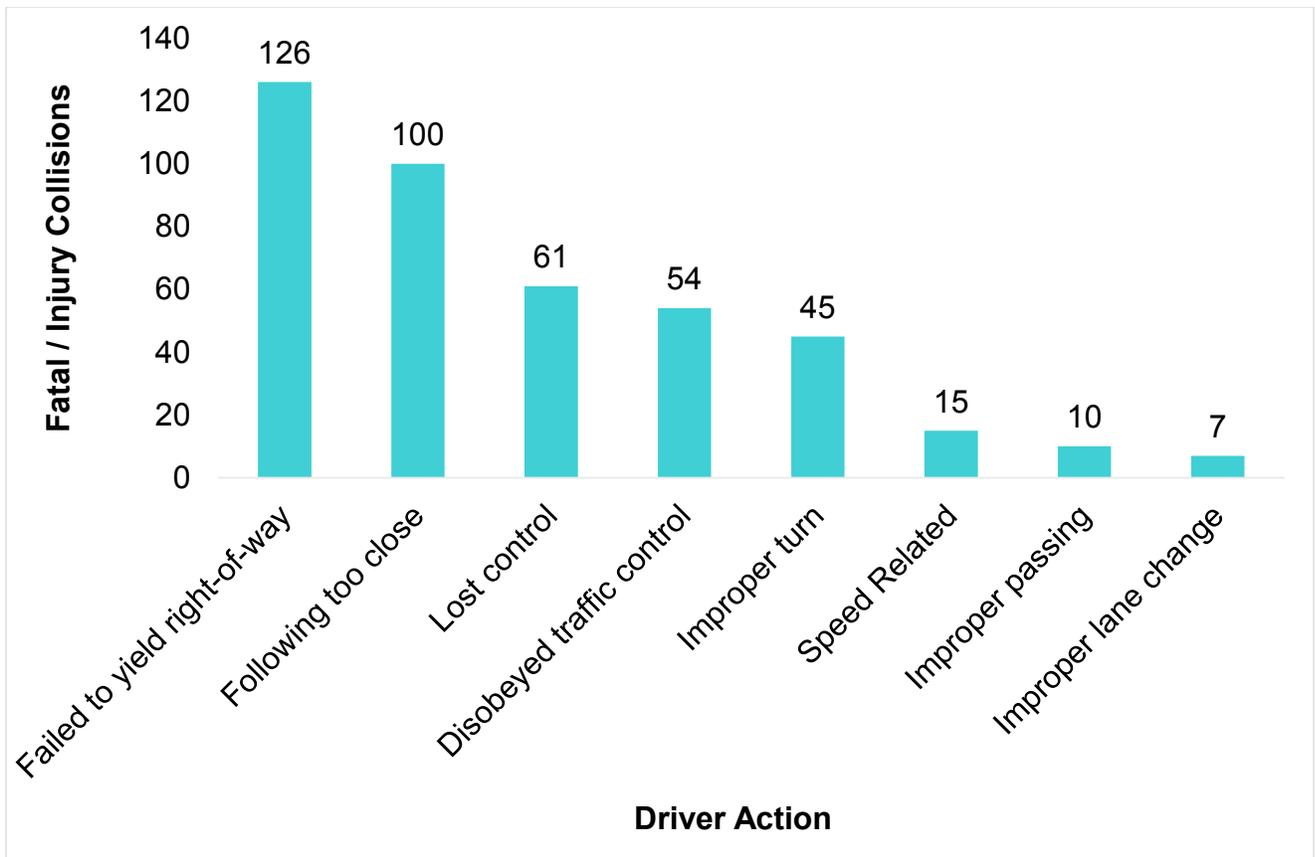


Figure 4: Distracted Driving Collisions by Driver Action (2012-2016)

Table 5 lists the countermeasures for collisions related to distracted driving that are included as part of the RSP action plan. The countermeasure types are primarily education and enforcement, to raise awareness of the danger of driving while distracted.

Table 5: Distracted Driving Countermeasures

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Regular Enforcement	Enforcement	Enforcement	Existing	Kingston Police / OPP
Public Education Grants Application	Education	Systemic	Existing	Kingston Police
Continued Involvement with Partnering Agencies	Education	Systemic	Existing	Kingston Police
Public Education	Education	Systemic	Existing	Kingston Police, KFL&A Public Health
Distracted Driving Programs	Education	Demographic Specific	Existing	Kingston Police
Information Website	Education	Demographic Specific	Existing	KFL&A Public Health
Interagency Texting and Driving Working Group Campaign	Education	Demographic Specific	Existing	KFL&A Public Health, OPP, Kingston Police, School Boards, MTO, KPSC

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
OPP Distracted Driving Week Campaign	Education / Engagement	Demographic Specific	Existing	OPP
Stop Texting YGK (Kingston)	Education / Engagement	Demographic Specific	Existing	KFL&A Public Health
Road Safety Challenge	Education / Engagement	Demographic Specific	Existing	KPSC
Regulatory and Warning Sign Reflectivity Assessments	Engineering	Systemic	Existing	City Public Works

7.3.4. Impaired Driving

Collisions defined as impaired driving include one or more involved drivers who were reported as any of the following:

- Driver’s ability impaired due to alcohol usage
- Driver’s ability impaired due to drugs usage
- Driver medical or physical disability
- Driver fatigue

Figure 5 illustrates the type and frequency of impaired driving collisions in Kingston.

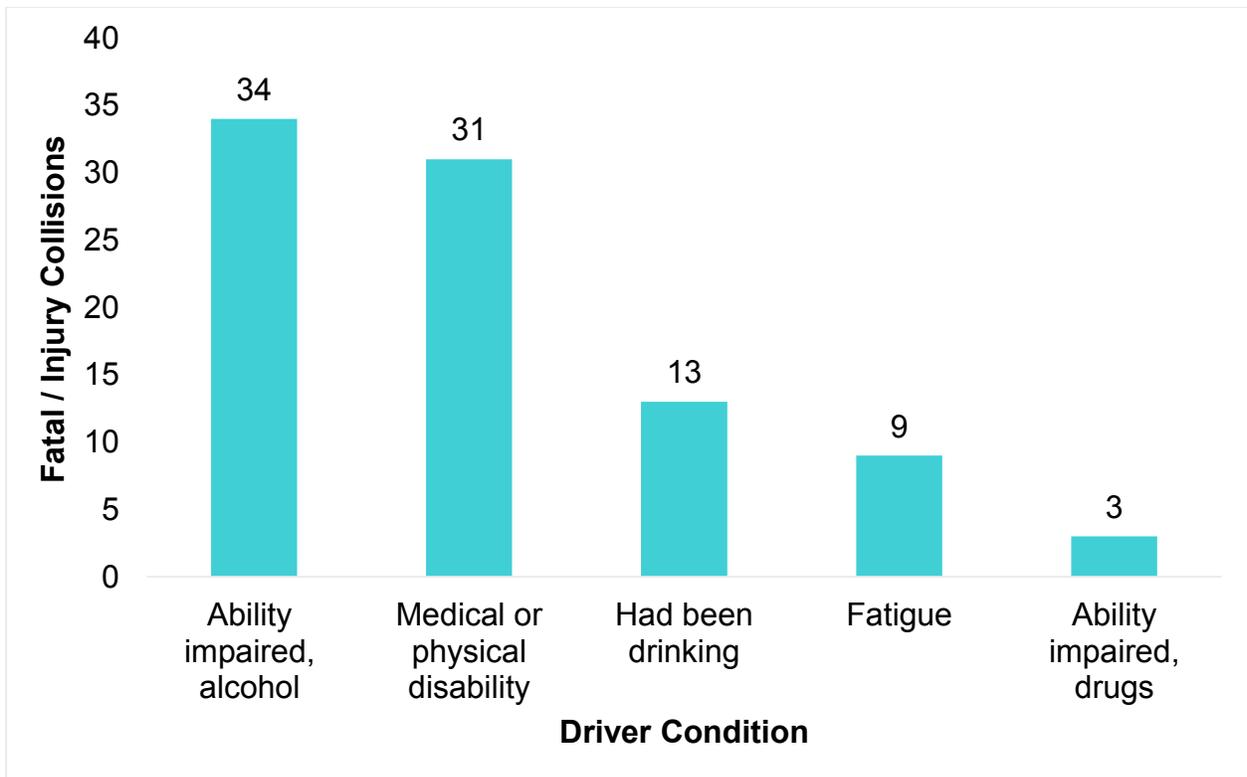


Figure 5: Impaired Driving Collisions by Driver Condition (2012-2016)

Table 6 lists the countermeasures for impaired driving collisions that are included as part of the RSP action plan. The countermeasures for impaired driving are primarily in the education and enforcement categories.

Table 6: Impaired Driving Countermeasures

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Enforcement Using Sobriety Testing	Enforcement	Systemic	Existing	OPP
Kingston Municipal Alcohol Policy	Engagement	Policy	Existing	KFL&A Public Health
Community Coalition	Education	Systemic	Existing	KFL&A Public Health
Education Programs	Education	Demographic-Specific	Existing	Kingston Police / OPP
Drive 4 Life	Education	Demographic-Specific	Existing	KFL&A Public Health
Preventing Alcohol Related Trauma in Youth (PARTY) Program	Education	Demographic-Specific	Existing	KFL&A Public Health
Maintain KFLA Public Health Website	Education	Systemic	Existing	KFL&A Public Health
Reduce Over-Serving of Alcohol	Education	Demographic-Specific	Existing	KFL&A Public Health
RIDE Program	Enforcement	Demographic-Specific	Existing	Kingston Police & OPP
Off-road Vehicle Information (includes all-	Education	Demographic-Specific	Existing	KFL&A Public

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
terrain vehicles and snowmobiles				Health
Operation Red Nose Program	Enforcement	Systemic	Existing	Kingston Police
Cannabis Consultation	Education	Policy	New	KFL&A Public Health, Kingston Police
Cannabis Campaign	Education	Demographic-Specific	New	KFL&A Public Health, OPP, Kingston Police

7.3.5. Pedestrians

Pedestrian collisions refer to collisions between a motor vehicle and a person on foot. Pedestrians are vulnerable users of the transportation system; 77 percent of pedestrian collisions result in injuries. Injuries to a pedestrian in a collision with a vehicle are often very serious.

Approximately 50 percent of pedestrian collisions occur during the day, in the hours between 7 am and 4 pm. Most pedestrian collisions in the city occur at an intersection where traffic controls are present. **Figure 6** shows the frequency of total pedestrian collisions and of fatal and injury pedestrian collisions in Kingston.

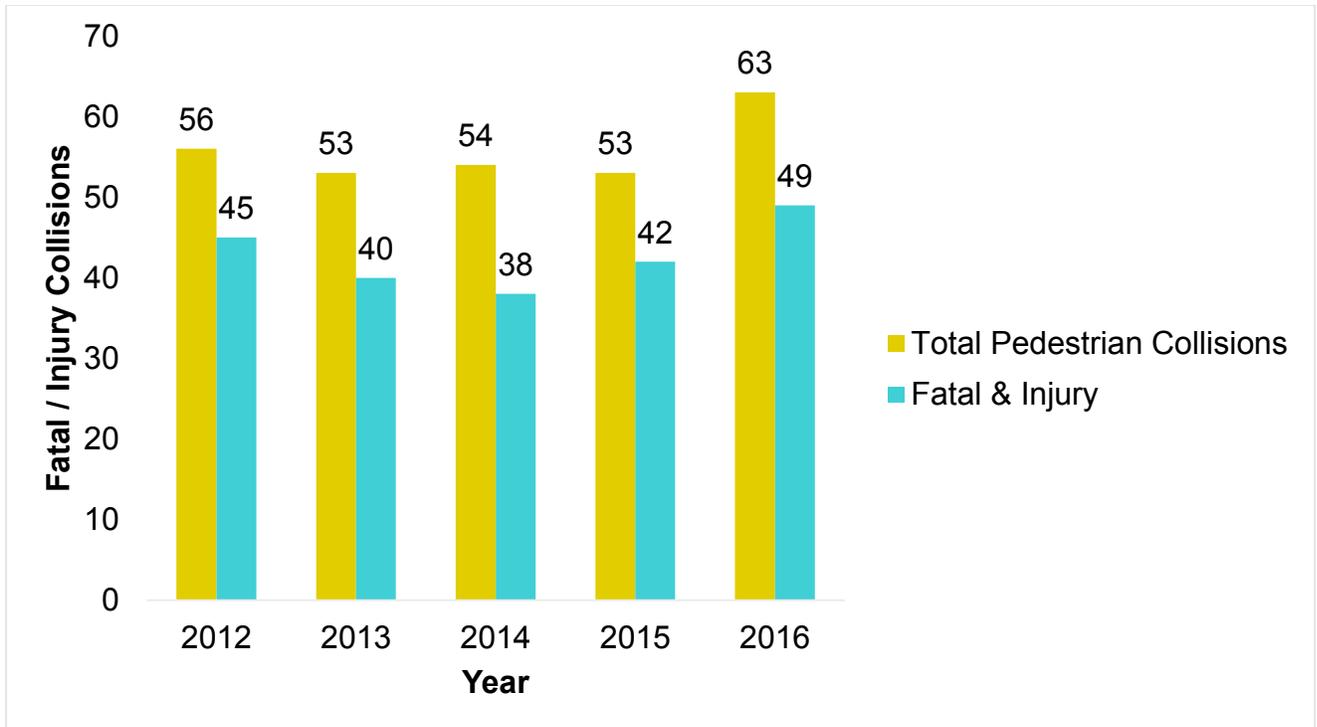


Figure 6: Pedestrian Collisions by Year (2012-2016)

Table 7 lists the countermeasures for pedestrian collisions that are included as part of the RSP action plan. The countermeasures for pedestrian collisions are primarily in the engineering and education categories.

Table 7: Pedestrian Collision Countermeasures

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Targeted Enforcement	Enforcement	Systemic	Existing	Kingston Police
Enhanced Website	Education	Demographic Specific	Existing	Kingston Police
Enhanced Education Material	Education	Demographic Specific	Existing	Kingston Police
Pedestrian Safety Campaign / Road Safety Challenge	Education / Engagement	Demographic Specific	Existing	KPSC
MTO’s Road Safety	Education /	Demographic	Existing	MTO

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Challenge	Engagement	Specific		
Williamsville On the Move	Education	Demographic Specific	Existing	KFL&A Public Health
Walk/Bicycle Friendly Community Applications	Education	Demographic Specific	Existing	City, KFL&A Public Health
Signage Repair and Replacement	Engineering	Systemic	Existing	City Public Works
Minor and Routine Repairs of Sidewalks	Engineering	Systemic	Existing	City Public Works
Sidewalk Plowing and Sanding	Engineering	Policy/Study	Existing	City Public Works
Active School Travel Planning	Education / Engagement	Demographic Specific	Expanded	KFL&A Public Health
Pedestrian Signal Timings	Engineering	Systemic	Expanded	City Traffic
Traffic signals for pedestrians	Engineering	Location Specific	Expanded	City Traffic
Pedestrian Crossover Bollard Installation	Engineering	Systemic	Expanded	City Traffic & Public Works
Curb Extensions	Engineering	Location Specific	Expanded	City Transportation, Engineering
Eliminate Right-Turn Channels	Engineering	Location Specific	Expanded	City Transportation, Engineering
Accessible Pedestrian Signals (APS)	Engineering	Location Specific	Expanded	City Traffic
Pedestrian Countdown Devices	Engineering	Location Specific	Expanded	City Traffic

Countermeasure Title	Type of “E”	Category	Status	Lead Agency
Leading Pedestrian Jump Intervals at Traffic Signals	Engineering	Location Specific	Expanded	City Traffic
Pedestrian Crossovers (PXOs)	Engineering	Location Specific	Expanded	City Transportation
School Zone Safety	Engineering	Demographic Specific	Expanded	City Transportation
Crosswalk Pavement Markings	Engineering	Systemic	Expanded	City Transportation, Public Works
Expand Sidewalk Network	Engineering	Systemic	Expanded	City Transportation, Engineering
Neighbourhood Focus Areas	Engineering	Systemic	New	City Transportation

7.3.6. Cyclists

Cyclist collisions include collisions between a cyclist and a motor vehicle, as well as single cyclist collisions, although the latter tend not to be reported to police and are therefore not well represented in the collision database. As with pedestrian collisions, cyclist collisions almost always lead to injuries, often serious. **Figure 7** summarizes the frequency of reported cyclist collisions in Kingston.

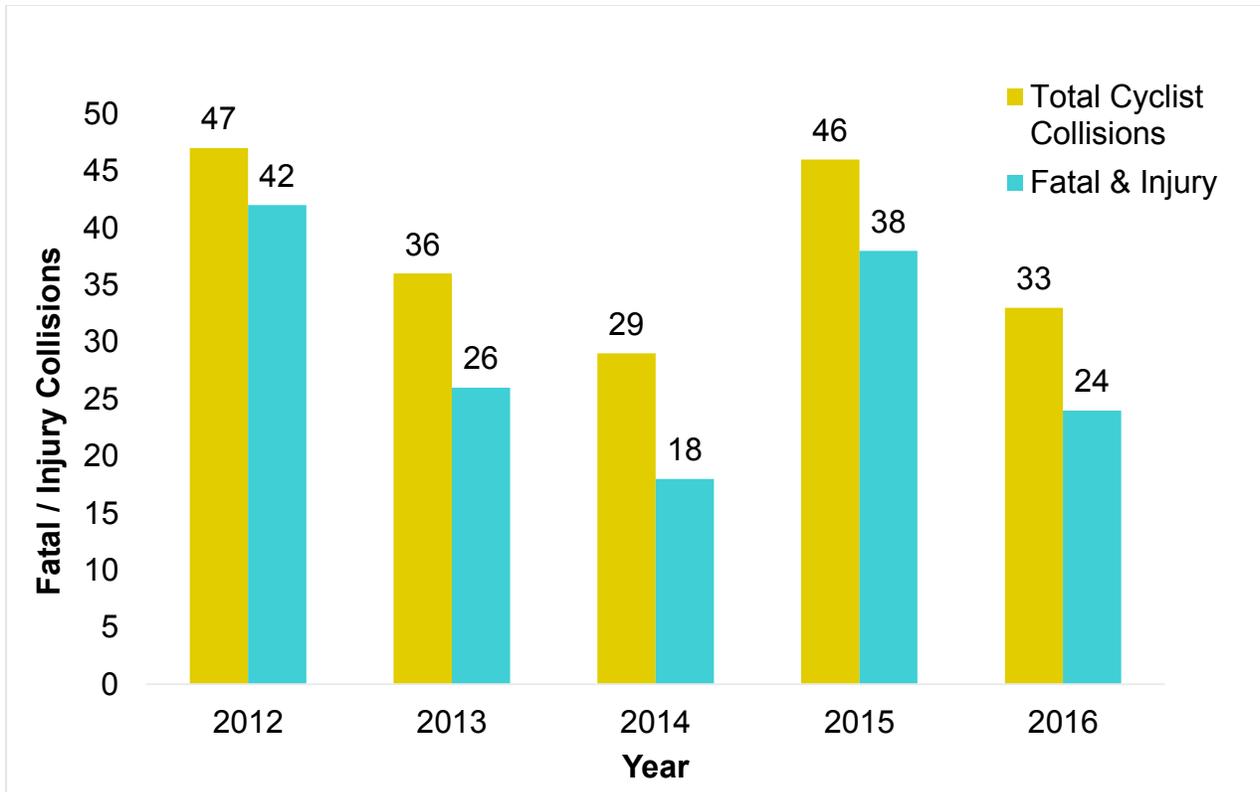


Figure 7: Cyclist Collisions by Year (2012-2016)

Table 8 lists the countermeasures for cyclist collisions that are included as part of the RSP action plan. The countermeasures for cyclist collisions are primarily engineering and education types. Cyclist education programs are oriented not only to cyclists riding on the road but toward drivers and other road users.

Table 8: Cyclist Collision Countermeasures

Countermeasure Title	Type	Category	Status	Lead Agency
Annual Bike Lane Line Painting Program	Engineering	Systemic	Existing	City Public Works, MTO
Advise on Cycling Safety Infrastructure	Engineering	Systemic	Existing	Cycle Kingston
Education and Enforcement Blitzes	Enforcement	Enforcement	Existing	Cycle Kingston, Kingston Police
Selective Reactionary	Enforcement	Enforcement	Existing	Kingston Police

Countermeasure Title	Type	Category	Status	Lead Agency
and Complaint Driven Enforcement				
Police Patrol on Bikes	Enforcement	Enforcement	Existing	Kingston Police
Maintain KFL&A Public Health Website	Education	Demographic Specific	Existing	KFL&A Public Health
Cycling Promotion	Education	Demographic Specific	Existing	Cycle Kingston
Youth Cycling Project	Engagement	Demographic Specific	Existing	KFL&A Public Health, MTO, Kingston Police
Light My Ride Campaign (Promote More Use of Bicycle Lights)	Education	Demographic	Existing	Cycle Kingston
Active Transportation Master Plan (ATMP) + AT Implementation Plan	Engineering	Policy	Expanded	City Transportation
Bike Lane Plowing and Sanding	Engineering	Policy	Expanded	City Public Works
Change existing lanes for cars to cycling lanes (road diet)	Engineering	Systemic	Expanded	City Transportation, Engineering
Cycling Network Improvements	Engineering	Systemic	Expanded	City Transportation
Bike Symbol Painting	Engineering	Location Specific	Expanded	City Public Works
Cycle Lane Sweeping	Engineering	Systemic	Expanded	City Public Works
Enhanced Education Material	Education	Demographic Specific	Expanded	Kingston Police

Countermeasure Title	Type	Category	Status	Lead Agency
Cycling Ambassador Program	Education	Demographic Specific	Expanded	Cycle Kingston
Cycling Safety for New Arrivals to Kingston	Education	Demographic Specific	Expanded	Cycle Kingston
In-School, On-Bike Cycling Safety Instruction	Education	Demographic Specific	New	Cycle Kingston, School Boards, Kingston Police, KFL&A Public Health
Green Bike Boxes/Lanes	Engineering	Location Specific	New	City Transportation
Cycle Watch Program	Engineering	Systemic	New	Cycle Kingston, KCAT

7.3.7. Young Demographic

Collisions involving the young demographic include collisions involving drivers between the ages of 16 and 25 and collisions involving any pedestrian or cyclist up to the age of 25. Based on the public opinion survey, the public was concerned about road safety related to young pedestrians within school zones. There are also concerns about the high number of university and college students living in Kingston who may not be familiar with the area or the rules of the road. **Figure 8** illustrates the frequency of collisions related to the young demographic in Kingston.

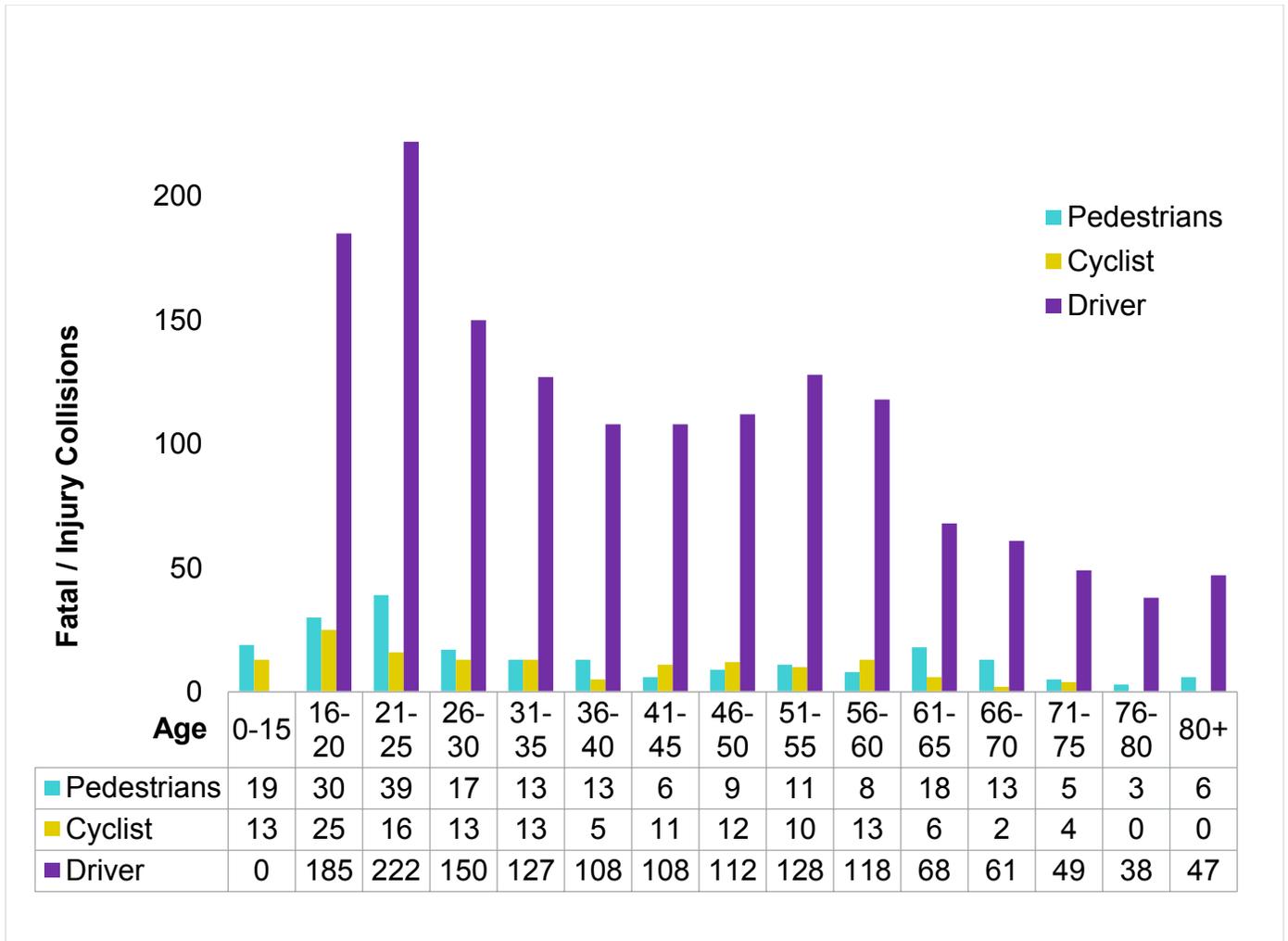


Figure 8: Collisions by Age (2012-2016)

Table 9 lists the countermeasures for collisions related to the young demographic that are included as part of the RSP action plan.

Table 9: Young Demographic Collision Countermeasures

Countermeasure Title	Type	Category	Status	Lead Agency
Preventing Alcohol Related Trauma in Youth (PARTY) Program	Education	Demographic Specific	Existing	KFL&A Public Health
New Driver Education Program	Education	Demographic Specific	Existing	OPP
Race Against Drugs	Education	Demographic Specific	Existing	Kingston Police
Public Request to Education and Engagement	Education	Demographic Specific	Existing	Kingston Police
Traffic Safety Public Display	Engagement	Demographic Specific	Existing	Kingston Police
Safe Bus Loading Zones	Education	Location Specific	Existing	School Boards
Safe School Crossings	Enforcement	Location Specific	Existing	School Boards

7.4. Countermeasures Important to the Road Safety Advisory Group

At the final workshop, the Road Safety Advisory Group (RSAG) reviewed the list of proposed countermeasures for each emphasis area and identified those considered to be the most important for improving road safety. The group recommended that primarily engineering and enforcement countermeasures be prioritized within future road safety work plans in order to ensure the following:

- That required future improvements are made to the transportation infrastructure that enhance road safety; and
- That there are tangible consequences for motorists who disobey road safety laws and regulations.

Table 10 lists the countermeasures noted as important to the RSAG that will be prioritized, when possible, as part of future transportation work plans.

Table 10: RSAG Priority Countermeasures

Emphasis Area	Countermeasure	Category
General	Regular and enhanced enforcement	Enforcement
General	Enhanced public education	Education
General	Road Safety Challenge/Campaign	Education
	Partnership for Road Safety Community Programs	Education
General	Intelligent transportation Systems (ITS)	Engineering
Intersections	Intersection improvements	Engineering
Intersections	Site-specific geometric design for safety improvements	Engineering
Intersections	Red-Light Camera Program	Enforcement
Pedestrians	Pedestrian Crossovers (PXOs)	Engineering
Pedestrians	Curb extensions	Engineering
Pedestrians	Accessible Pedestrian Signals (APS)	Engineering
Pedestrians	Neighbourhood focus areas	Engineering
Cyclists	Cycling facility maintenance	Engineering
Cyclists	Cycling facility geometry &	Engineering

Emphasis Area	Countermeasure	Category
	green bike boxes/lanes	
Cyclists	Dutch Reach Program	Education
Aggressive Driving	Automated Speed Enforcement (ASE) working group (Photo radar)	Enforcement
Aggressive Driving	Traffic calming & reduced lane widths	Engineering
Distracted Driving	Texting and Driving Prevention Campaign	Education
Young Demographic	(Active) School travel planning	Engagement

8. Road Safety Work Plan

As a high-level strategic document, the RSP will inform a prioritized list of future road safety measures that will be integrated with active transportation initiatives and incorporated within the multi-year work plans of the Transportation and Public Works Group. These annual work plans will include more detailed information about specific road safety measures, schedule, timing and budget.

The following items will be important to the overall success of the Road Safety Plan:

- Review existing data and develop updated and more detailed collision data;
- Prepare an annual road safety report that reports on collision and road safety data;
- Evaluate existing countermeasures and integration with ongoing work plans; and
- Continue road safety meetings with government agencies such as Kingston Police, Ontario Provincial Police, Ministry of Transportation Ontario, Kingston, Frontenac and Lennox & Addington (KFL&A) Public Health and local school boards.

These road safety meetings will include discussions related to the following:

- Review specific countermeasures;

- Identify funding opportunities;
- Review data on collisions and road safety programs;
- Adjust work plans where possible to accelerate goals;
- Research emerging safety technologies and advancements in road safety; and
- Support Vision Zero and the road safety culture in Kingston.

8.1. Collision Data Analysis

The strategic Road Safety Plan (RSP) is data driven and decisions related to road safety priorities should consider location and demographic specific countermeasures based on detailed collision analysis. The collision data analysis will be key throughout the development of road safety initiatives within the Transportation and Public Works Group's multi-year work plans.

Further collision analysis may lead to adjustments of the countermeasure program once current trends are viewed in detail as the data will provide additional information. Specifically, collision data analysis can confirm the best locations for engineering countermeasures and targeted enforcement along with the appropriate education and engagement tools related to demographics.

8.2. Evaluation and Monitoring

One of the key elements of future road safety initiatives will be monitoring and evaluation. The Road Safety Plan (RSP) goal has been established for the first five years of road safety initiatives within work plans and staff will be monitoring the progress and degree of success and reporting the progress with an annual road safety report.

While it is possible to measure the effectiveness of engineering-related countermeasures such as changes to the road environment, it is more difficult to measure the success of enforcement and education. It may be possible to measure outputs and the extent of the actions taken, but it is more challenging to predict the

expected degree of success related to enforcement and education countermeasures in terms of actual collision reductions.

The long-term nature of an RSP and many other factors influencing changes in road user behaviour make it difficult to separate the effectiveness of specific road safety programs. It is often impossible to measure 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. Therefore, it is difficult to produce a list of programs and precisely state that a suite of programs will produce the desired overall road safety improvement.

The longer timeframes on both implementation and programs mean that short-term or initial results cannot be considered truly indicative of the effectiveness of a countermeasure. Additionally, several years of collision data are required after the countermeasure has been implemented in order to accurately confirm an improvement. Therefore, once countermeasures from the RSP are implemented, it will be at least five years before the program's overall effectiveness can begin to be evaluated.

8.3. Countermeasure Prioritization

The City in collaboration with its partners in the Road Safety Advisory Group (RSAG), have identified numerous countermeasures in the Road Safety Plan (RSP). Factors that will affect the prioritization of these countermeasures include:

- Time frame;
- Planned projects and strategies and the ability to integrate with active transportation initiatives; and
- Budget and staff resources.

As part of the development of future multi-year work plans within the Transportation and Public Works Group, staff will be required to prioritize a wide-range of countermeasures. The implementation strategy should focus first on the “low-hanging fruit”, the projects that can easily and quickly be implemented in one year or less. The easiest countermeasures of these are the expanded versions of existing programs. Once those

programs are confirmed, the implementation of medium-term (one to five years) and long-term countermeasures (greater than five years) can be considered.

Factors that may impact the countermeasure implementation schedule include:

- Resources and timing for design, engineering and program development;
- Requirement for approvals and/or specific funding; and
- Coordination with planned capital projects such as road reconstruction and integration with active transportation projects.

It is expected that future multi-year transportation work plans would include many of the countermeasures from the RSP and consider proposed countermeasures on an annual basis over a four-year period along with schedule, additional staff resources, budget and any approvals required from Council.

In the final workshop with the RSAG, challenges to implementing the proposed countermeasures were identified as follows:

- Funding;
- Staff resources;
- Political support and approval;
- Public support;
- Ability to measure the effectiveness of countermeasures;
- Effort required to prioritize locations for engineering countermeasures;
- Uncertainty regarding the status of automated enforcement systems (red light cameras and photo radar); and
- Potential for lack of active participation for education and engagement countermeasures.

These challenges will need to be carefully considered during the development of multi-year transportation work plans that focus on road safety initiatives.

9. Summary

Kingston’s Vision Zero Road Safety Plan (RSP) provides a strategy to address the City’s specific road safety challenges and builds partnerships with community stakeholders to work towards the vision of eliminating all fatal and injury collisions on our roads.

The public engagement during the development of the RSP consisted of an open house, five “pop- up” engagement events, a public road safety survey, a Q & A on the City’s Get Involved platform and the creation of a Road Safety Advisory Group. Information gathered from this engagement was used to gain a better understanding of the public’s road safety concerns and priorities.

The collaboration with the Road Safety Advisory Group (RSAG) throughout the development of the RSP was integral to:

- Confirm the vision and goal of the Plan;
- Confirm the road safety emphasis areas;
- Develop and recommend countermeasures for each focus area to be delivered by each stakeholder group;
- Prioritize countermeasures that were deemed important to the group; and
- Identify challenges for the future implementation of proposed countermeasures.

The following seven emphasis areas and one focus area chosen for countermeasure development were derived from collision data analysis and supported by the priorities of the RSAG and of the public:

- Intersections
- Distracted driving
- Aggressive driving
- Impaired driving
- Pedestrians
- Cyclists

- Young demographic
- School zones (awareness area)

The RSP process created and confirmed a wide-range of road safety countermeasures based on the four E's of road safety (Engineering, Enforcement, Education and Engagement).

As a high-level strategic document, the RSP will inform a prioritized list of future road safety measures that will be integrated with active transportation initiatives and incorporated within the multi-year work plans of the Transportation and Public Works Group. These annual work plans will include more detailed information about specific road safety measures, schedule, timing and budget.

In order to evaluate the effectiveness of road safety measures, an annual road safety report that monitors progress and degree of success, will be developed and made available to the public. Since several years of collision data are required after countermeasures have been implemented in order to accurately confirm an improvement, it will be at least five years before the program's overall effectiveness can begin to be evaluated.