STRATHCONA COUNTY

Intersection Safety Action Plan 2017

2017

Executive Summary

The majority of serious and fatal collisions happen each year at Strathcona County intersections. Strathcona County cannot meet traffic safety goals without significant safety improvements at our intersections. Strathcona County has been building capacity to better address intersection safety over the last few years, and has taken some important steps in doing so.

Further action is needed. The ISAP has identified 15 actions based on best practice which have been chosen to be realistic, sustainable and actionable by June 2019 in support of reaching our overarching Traffic Safety Strategic Plan collision reduction targets by 2020.

Based on best practice and interdepartmental collaboration the following actions are planned to improve safety at Strathcona County's intersections:

Action #1: Consider developing a Roundabout Policy to encourage greater use of this design

Action #2: Implement Safe System based left turn signal assessment warrant guidelines

Action #3: Assess the speed limits on high collision corridors

Action #4: Update Transportation Design and Construction Standards to provide developers clear guidelines that reflect best practice in access management, as well as appropriate vegetation and street furniture placement

Action #5: Develop Strathcona County specific roadway markings guidelines

Action #6: Develop a stop sign strategy

Action #7: Remove advance warning signals that are no longer warranted

Action #8: Pilot/Expand the use of different surface treatments on intersection approaches

Action #9: Expand Intersection Safety Devices (ISD) program

Action #10: Increase capacity for data analytics to mine ISD data

Action #11: Update Traffic Safety Communications Plan

Action #12: Expand our Traffic Safety Advisory Team (TSAT)

Action #13: Improve data sharing regarding high collision intersections with internal stakeholders

Action #14: Engage with Alberta Transportation to find solutions to the safety concerns on the Highway 21 corridor.

Action #15: Improve intersection monitoring capacity

Contents

A. Introduction

An intersection exists where two road segments meet. The purpose of an intersection is to maximize efficient traffic movement, while at the same time providing a safe environment for all road users.

As per our Traffic Safety Strategic Plan 2020 (TSSP 2020), traffic safety in Strathcona County is guided by the Safer System philosophy. Under a Safer System approach, safe transport is considered the most important function of the road system, and serious injury and death are considered to be unacceptable outcomes. This approach acknowledges that humans will make mistakes when using the road-transport system and, given the limited biomechanical tolerance of humans, roads should be designed to be forgiving of human error (Corben et al., 2012).

Inherent in this approach is the need to ensure Safe System compliance is considered in decisions related to intersection management[1]. Often, traffic management choices can be made at intersections that improve safety without compromising efficiency. At times, however, safety necessarily will take precedence over efficiency to meet safety targets.

Every year in Strathcona County, 35-40% of collisions happen at intersections. Even more importantly, between 2008 and 2015, 84% of serious injury and fatal collisions in the Strathcona County occurred at an intersection. For this reason, intersections are a primary focus for traffic safety initiatives in our community.

Strathcona County is always working to improve efficiency on our road network, including intersections. The purpose of the Intersection Safety Action Plan (ISAP) is to focus on initiatives undertaken to improve safety at our intersections, specifically:

- to benchmark the current state of intersection safety in Strathcona County;
- to identify current strategies in place to address intersection safety;
- to identify specific actions to increase intersection safety that are realistic, sustainable and actionable;
- to identify resources needed to improve intersection safety; and
- to identify evaluation indicators that can be used to measure progress towards our overarching traffic safety goals.

Note that recommendations in this ISAP focus on arterial roads in Strathcona County, as this is where the majority of serious and fatal collisions occur. Actions to be undertaken as part of Strathcona County's Neighbourhood Traffic Safety Action Plan 2017 focus on improving overall safety on our residential and neighbourhood collector roads.

[1] As it is not feasible to completely eliminate the risk related to motor vehicle collisions, the generally accepted guideline for Safe System compliance is when the probability of a fatality and serious injury occurring for the worst-case conflict type at each intersection is kept below 0.1 and 0.31 respectively. See Corben et al. (2012) for more details.

I. Traffic Crash Data Collection and Analysis

Detailed collision data collection and management is the foundation upon which this Intersection Safety Action Plan is built. Strathcona County has been tracking collision data since the 1980s. In 2013, Strathcona County implemented the Traffic Crash Location System (TCLS) to Database crash data in Strathcona County. Processes are now in place for data input, data cleansing, and system maintenance.

The implementation of this system has increased our capacity for data driven decision making, having given us the ability to accurately represent crash trends, both spatially and by cause. A formalized Network Screening program is now in place for the analysis of data provided by TCLS. The detail of collision data in TCLS allows our Traffic Safety Engineer to identify locations with high crash frequencies and to evaluate the network and identify sites that have potential to benefit from a specific countermeasure.

Strathcona County is in the process of transitioning to the new provincial E-Collision reporting system. Once in place, the data from E-Collision will be received electronically for entry into TCLS, which will be more accurate and provide information much faster than the manual entry system currently in place. This will allow us to be even more responsive to safety concerns on our road network.

II. Development of the Intersection Safety Action Plan

Development of the ISAP was driven by collision data which indicated that intersection collisions are a top contributor to death and serious injury on our roads.

An interdepartmental team was put together consisting of representatives from

- Transportation Planning and Engineering (lead)
- RCMP and Enforcement Services
- Transportation and Agriculture Services
- Transit
- Planning and Development Services
- Emergency Services

The team participated in a paper survey and half day workshop to identify issues at our intersections and suggest solutions. A literature review of best practices in intersection safety generally and in specific countermeasures to address problems identified at our intersections was used to supplement team expertise on intersection safety.

The results of this process have resulted in the 15 Actions recommended in this plan.

B. Current State of Intersection Safety in Strathcona County

In 2016, almost half of all collisions in Strathcona County were intersection-related. About 2/3 of injury collisions occurred at intersections. The 2016 Fatal and Major Injury Maps are included in the Appendix. It is obvious Strathcona County cannot meet traffic safety goals without significant safety improvements at our intersections.

Table 1: Intersection-Related Collisions 2015/2016

SEVERITY	2015	2016	% change
Fatal	2	3	50.00%
Major injury	37	39	7.19%
Minor injury	334	360	-0.04%
PDO	670	785	4.66%
All collisions	1043	1187	2.89%

Table 2: Intersection-Related Collisions as a Percentage of Total Collisions

SEVERITY	2015 (%)	2016 (%)	% change
All Collisions	47.89	49.27	2.89
PDO	41.49	43.42	4.66
Minor Injury	67.07	67.04	-0.04
Major Injury	61.67	66.10	7.19
Fatal	40.00	60.00	50.00

The top three intersections for collision frequency are among the higher volume arterial to arterial road intersections in Sherwood Park. Five of the top collision frequency locations are on Sherwood Drive, and five are on Baseline Road.

Table 3: Top 10 Intersections for Collision Frequency 2016

RANK	PRIMARY STREET	INTERSECTING STREET	FATAL	MAJOR	MINOR	PDO	TOTAL
1	BASELINE RD	BROADMOOR BLVD	0	0	21	20	41
2	SHERWOOD DR	BROADMOOR BLVD	0	0	10	25	35
3	BASELINE RD	SHERWOOD DR	0	1	8	18	27
4	WYE RD	BRENTWOOD BLVD	0	3	9	9	21
5	BASELINE RD	CLOVER BAR RD	0	0	5	17	22
6	LAKELAND DR	SHERWOOD DR	0	0	5	18	23
7	GLENBROOK BLVD	BASELINE RD	1	1	5	12	16
8	BRENTWOOD BLVD	SHERWOOD DR	0	0	8	11	19
9	BASELINE RD	SHIVAM RD/CHIPPEWA RD	0	0	4	12	16
10	SHERWOOD DR	MAIN/GATEWOOD	0	1	3	11	15

The top three intersections for frequency of rear-end collisions in 2016 were also among the higher volume arterial to arterial road intersections in Sherwood Park. Five of the top collision frequency locations are on Sherwood Drive, and four are on Baseline Road.

Table 4: Top 10 Intersections for Rear End Collisions 2016

RANK	PRIMARY STREET	INTERSECTING STREET	REAR END
1	BASELINE RD	BROADMOOR BLVD	32
2	SHERWOOD DR	BROADMOOR BLVD	19
3	BASELINE RD	SHERWOOD DR	17
4	WYE RD	BRENTWOOD BLVD	14
5	LAKELAND DR	SHERWOOD DR	13
6	BASELINE RD	CLOVER BAR RD	13
7	BRENTWOOD BLVD	SHERWOOD DR	12
8	BASELINE RD	SHIVAM RD/CHIPPEWA RD	12
9	SHERWOOD DR	MAIN/GATEWOOD	10
10	HWY 21	WYE RD	8

The top three intersections for side impact collisions were at collector to arterial intersections in 2016.

Table 5: Top 10 Intersections for Left-Turn Across Path (LTXP)/Right Angle Collisions 2016

NUMBER	PRIMARY STREET	INTERSECTING STREET	LTXP + RIGHT ANGLE
1	GLENBROOK BLVD	BASELINE RD	10
2	SHERWOOD DR	FIR ST	10
3	WYE RD	ASH ST	9
4	WYE RD	SHERWOOD DR	8
5	LAKELAND DR	SHERWOOD DR	6
6	HWY 21	WYE RD	6
7	BASELINE RD	SHERWOOD DR	5
8	WYE RD	BRENTWOOD BLVD	5
9	BASELINE RD	CLOVER BAR RD	4
10	BASELINE RD	17 ST	4

The number of fatal, major injury, pedestrian and bicycle collisions are relatively low. For the next two tables, ten year data is used for analysis of these collisions.

From 2007-2016, four of the top 12 intersections for fatal/major injury collision are located on Wye Road, four are on Sherwood Drive and three are on Highway 21.

Table 6: Top 12 intersections for Frequency of Fatal/Major Injury Collisions (2007-2016)

RANK	PRIMARY ST	INTERSECTING STREET	FATAL	MAJOR	TOTAL
1	WYE RD	BRENTWOOD BLVD	0	6	6
2	BASELINE RD	17 ST	0	6	6
3	WYE RD	HWY 21	1	5	6
4	SHERWOOD DR	MAIN/GATEWOOD BLVD	0	5	5
5	HWY 16	RNG RD 224	0	4	4
6	WYE RD	ASH ST	0	4	4
7	SHERWOOD DR	FIR ST	0	4	4
8	WYE RD	SHERWOOD DR	0	4	4
9	LAKELAND DR	SHERWOOD DR	0	4	4
10	LAKELAND DR	BROADMOOR BLVD	0	4	4
11	RNG RD 542	HWY 21	0	4	4
12	TWP RD 540	HWY 21	0	4	4

Sherwood Drive/Granada Boulevard intersection has almost double the incidence of any other location.

Table 7: Top 10 Intersections for Pedestrian and Bike Collisions (2007-2016)

PRIMARY ST	INTERSECTING ST	FATAL	MAJOR	MINOR	PDO	TOTAL
SHERWOOD DR	GRANADA BLVD	0	0	12	0	12
BROADMOOR BLVD	BROADWAY BLVD	0	0	6	1	7
SHERWOOD DR	MAIN/GATEWOOD	0	0	4	2	6
CLOVER BAR RD	DAVIDSON DR	0	1	4	1	6
CLOVER BAR RD	GRANADA BLVD	0	1	4	0	5
BROADMOOR BLVD	SIOUX RD	0	3	2	0	5
BASELINE RD	CLOVER BAR RD	0	1	2	1	4
BASELINE RD	SHERWOOD DR	0	1	3	0	4
GRANADA BLVD	GEORGIAN WAY	0	1	2	0	3
SHERWOOD DR	BETHEL DR	0	0	3	0	3
SHERWOOD DR	OAK ST	0	1	1	1	3
BROADMOOR BLVD	BEAUVISTA DR	0	1	0	1	2

C. Research and Trends in Intersection Safety

In 2011, the Capital Region Intersection Safety Partnership (CRISP) contracted Monash University Accident Research Centre to perform a literature review of the application of the Safe System approach to intersection design. This report suggests that intersection safety can be improved by adherence to four intersection design and operation principles:

1. Fewer vehicles – by reducing the number of vehicles in use, fewer opportunities for collisions will arise;

2. Fewer intersections – by minimizing the number of intersections within the road network, and concentrating more traffic movements at intersections with best-practice safety standards, fewer opportunities for high-risk conflict should arise;

3. Fewer conflict points per intersection – by simplifying intersections to produce fewer conflict points, the opportunities for collisions at a given intersection should fall. The resultant reduction in complexity should also have a positive effect on safety;

4. Impact speeds and impact angles constrained to biomechanically tolerable levels – by designing to create speed and angle combinations that result in a low risk of serious injury in the event of a collision. Analysis of the kinematics of traffic collisions shows that:

- *For 90° collisions, impact speeds should not exceed 50 km/h for vehicle-to-vehicle collisions. For conflicts between vehicles and unprotected road users (i.e. pedestrians, cyclists and motorcyclists), impact (and, therefore, travel) speeds should not exceed 30 km/h;*
- *For intersections located in speed limits greater than 50 km/h and not greater than 70 km/h, vehicle-to-vehicle conflicts must occur at less severe angles than 90° to ensure that the biomechanical tolerances of humans are not exceeded. Regardless of geometric layout to influence impact angles, travel speeds in areas where pedestrian and cycle traffic is allocated high priority should not exceed 30 km/h if pedestrian and cyclist risks of death are to remain below the nominated Safe System level of 10%.*
- *Where the above speed and angle combinations cannot be met, collision risk must be reduced to a negligible level (Corben et al., 2012, p.17).*

It is outside the scope of the ISAP to reduce the number of vehicles on the road. However, this is being addressed through Strathcona County's Integrated Transportation Master Plan (2012) as well as overarching planning and transit goals in our community. It is also difficult to reduce the number of intersections in built up areas, although it can be considered in future planning. Actions in this plan will focus mainly on the reduction of conflict points, impact speeds and more favourable collision angles.

Further effective countermeasures exist to improve visibility, consistency and road user understanding and compliance at intersections. Research conducted on these specific countermeasures is included with the recommended actions.

D. Current and Recommended Intersection Safety Initiatives

As per Strathcona County's TSSP 2020, traffic safety issues are addressed in Strathcona County through the "Five E's": engineering, enforcement, education, engagement and evaluation.

I. Engineering

Engineering initiatives have the potential to effect very large improvements in intersection safety, particularly through the use of geometric changes. Unfortunately, engineering countermeasures to improve intersection safety can also be the most costly. They may also take an extended period of time to implement where construction and/or budget approval is necessary, making them difficult to implement in response to emergent issues.

Strathcona County has been building engineering capacity to better address intersection safety and has taken some important steps in doing so. Most notably, our traffic safety team was strengthened by the addition of a Traffic Signal and ITS Engineer in 2014. This individual brings decades of traffic signal design experience and knowledge and is wholly dedicated to the safe and efficient operation of our traffic signal network. Included in these engineering initiatives are those related to maintenance. Regular brushing and vegetation control are important to maintain appropriate sightlines. Similarly, road maintenance and surface treatments can help support other intersection safety initiatives.

Current Engineering Initiatives for Intersection Safety

Strathcona County currently undertakes a number of initiatives directly related to intersection safety.

Table 1: Current Engineering Initiatives to Improve Intersection Safety

Initiative	Details
In-Service Road Safety Reviews (ISRSR)	An ISRSR is a formalized, multidisciplinary review to address safety of all road users at crash-prone locations. An ISRSR may result in the implementation any of the initiatives outlined in this Action Plan.
Road Safety Audits *TPE	Strathcona County has formal requirements for independent third- party RSAs during the planning and design phases of new arterial and rural grid roads.
Geometric Improvements *TAS/TPE	As resources permit and at intersections identified as a collision risk, geometric changes, such as the addition of curb extensions or improved alignment of left-hand turn lanes, are made to improve safety.
Installation of Traffic Signals and Pedestrian Crossings	Policy SER-009-021-Installation of Traffic Signals and Pedestrian Crossings ensures signals and appropriate pedestrian crossings are put in place to reflect best practice guidelines.
Way Finding Signs/ Backlit Road Name Signs	Clear signing of destinations and streets allows drivers to focus on safely navigating intersections. Strathcona County installs backlit road name signs at new intersections and is working to retrofit signs at existing arterial/arterial locations.
Traffic Signals Management	Many actions at our signalized intersections improve safety including protected left turn phasing, prohibited right turns on red, regular signal retimes, and audible pedestrian signals.
Enhanced Pavement Markings	Pavement markings, including stop bars, zebra crossings and shark's teeth yield lines, are placed strategically to improve intersection safety.

Table 1: Current Engineering Initiatives to Improve Intersection Safety (continued)

Initiative	Details
Traffic Control Signage	Upgraded traffic control signage (including flashing beacons and oversize signs) are used in areas of concern. Extra signage, such as the extension of No parking zones, is often used to improve road user visibility.
Rural Vegetation Control Program	Mechanical and chemical control of vegetation at rural intersections to maintain appropriate sightlines. This includes County maintained grid and subdivision intersections.
Road Surface Treatments	Public works uses calcium applications to decrease ice buildup at intersections.
Illumination	SER-009-012- Street Lighting ensures illumination at our intersections is guided by best practice.
Discontinue "flash" operation of nighttime signals	Formerly, many signals on our arterial roads operated in "flash" mode at night. This practice is inconsistent with best practice in traffic safety, as well as with signal operation in neighbouring municipalities. It was discontinued in August 2017.
Signal Pre-emption for emergency vehicles	Signal pre-emption systems allow emergency vehicles to travel more quickly and safely to their destinations. Currently, Strathcona County is transitioning from an infrared system to a Global Positioning System (GPS) system to improve effectiveness and reliability of our pre-emption system.
Pedestrian Countdown Signals	Pedestrian countdown signals are installed at all new signals. Pedestrian fixtures are upgraded during rehabilitation of existing intersections.
Upgrade signalized intersections with retro reflective tape	This is a countermeasure with the potential to give significant benefit with little cost. New intersections in Strathcona County incorporate retro reflective tape into the standard for installation, and a program has been developed to upgrade existing intersections.

Recommended Engineering Actions for Intersection Safety

Action #1: Consider developing a Roundabout Policy to encourage greater use of this design

Some municipalities have developed Roundabout Policies to encourage greater use of this design, including the City of Calgary. It is well-established that roundabouts increase intersection safety by slowing traffic, reducing the number of conflict points for pedestrians and motorists, reducing potential for side impact collisions, and eliminating head-on and high speed collisions. It is estimated that converting a stop-controlled intersection to a roundabout can decrease injury and fatal collisions between 75-87% (Opus, 2010).

Action #2: Implement Safe System based left turn signal assessment warrant guidelines

There is extensive evidence that protected left hand turn signal phases improve intersection safety. The City of Edmonton has changed 90 locations since 2009 to protected only left turns. Evaluation found left

turn engineering changes reduced collisions by 99% at 52 locations in Edmonton between 2009 and 2014 (City of Edmonton, 2015).

Six locations in Strathcona County found 78% decrease in LTXP crashes after the implementation of protected/prohibited left turn application. Protected left turns are now considered best practice wherever double left turn lanes exist.

In 2017, Strathcona County developed a Safe System based left turn signal assessment warrant guidelines. Transportation Planning and Engineering has started working to bring our network into compliance.

Action #3: Assess the speed limits on high collision corridors

The intersections on Baseline Road, Wye Road and Sherwood Drive corridors consistently experience a high incidence of serious collisions. Research conducted to examine the intersection trauma problem in the City of Edmonton, Strathcona County and City of St. Albert concluded that "the currently posted speed limits and those which are currently tolerated are beyond those which can be considered Safe System compliant" (Corben et al., 2012, p.2).

Reassess speed limits on these corridors to ensure they are appropriate to the changing conditions of our municipality and Safe System philosophy.

Action #4: Update Transportation Design and Construction Standards

Lack of direction in previous versions of Design and Construction Standards have left us with some access points that do not meet current standards. Some of these accesses have been allowed too close to major intersections and in other cases, less than ideal access spacing can lead to safety concerns. Update Design and Construction Standards to provide developers clear guidelines that reflect best practice in access management.

Similarly, inappropriate vegetation plantings or street furniture placement near intersections have created sightline issues at some intersections. Improve clarity in Design and Construction Standards to show appropriate intersection sight distance and indicate areas that require special care when placing street furniture or vegetation.

Action #5: Develop Strathcona County specific roadway markings guidelines

Roadway markings provide drivers with clear definitions of movement through our intersections. Over time, best practice in roadway markings have evolved. Developing Strathcona County specific guidelines will allow us to ensure our roadway markings are consistent across the municipality and region and reflect current best practice. Once developed, designs to bring intersections into compliance will need to be created to guide line marking crews.

Action #6: Develop a stop sign strategy

Many of our fatal and major injury collisions occur at rural stop-controlled intersections. Driver compliance with stop signs is low in Strathcona County, ranging from about 12-25%.

Research conducted in 2015 in collaboration with the Capital Region Intersection Safety Partnership, the University of Alberta and Strathcona County found stop sign enforcement resulted in a 35% reduction in total collisions at the enforcement sites (Sun and El-Basyouny, 2015)

Compliance with stop signs may be influenced by education, engineering and enforcement initiatives. Develop a comprehensive, integrated stop sign strategy based on best practices in order to improve stop sign compliance in our community.

Action #7: Remove advance warning signals that are no longer warranted

Unwarranted advance warning signals decrease intersection safety. They do this because some drivers respond to them by slowing appropriately and others by speeding up. These inconsistent actions results in more rear-end collisions at these locations. Signals where advance warning lights and ISDs co-exist show higher rates of both red light and speed on green infractions.

Action #8: Pilot/Expand the use of different surface treatments on intersection approaches

High friction surface treatment (HFST) has been tested in United States and been shown to reduce crashes significantly. Followed Too Close is the highest cause of collisions in Strathcona County. Pilot the application of HFST at trial locations with a high number of rear-end crashes, particularly at those which also have a downhill grade.

Traverse Rumble Strips can be placed across the surface of an approach lane to produce an audible and tactile warning of an impending intersection. Rumble strips can be an effective intervention when appropriately applied in the rural context. They have been applied in a limited capacity in Strathcona County, but more frequent use may be warranted.

II. Enforcement

Enforcement initiatives to improve intersection safety can be quite effective, particularly when enforcement efforts are sustained over long periods of time. Enforcement can be implemented relatively quickly in response to an identified safety concern and may be cost-neutral or at times generate revenue that can be directed to other traffic safety initiatives.

Current Enforcement Initiatives for Intersection Safety

Table 2: Current Enforcement Initiatives to Improve Intersection Safety

Initiative	Details
Intersection Safety Devices	Strathcona County currently operates 10 ISDs at 9 intersections. These devices are able to detect red light and speed on green violations.
Stop Sign Operations	The Integrated Traffic Unit regularly performs stop sign operations in rural, urban and industrial areas.

Recommended Enforcement Actions for Intersection Safety

Action #9: Expand Intersection Safety Devices (ISD) program

ISDs are a well-established countermeasure to manage intersection speeds and reduce the risk of severe collisions, particularly in areas where specific conditions exist. Research to evaluate the safety performance of ISDs within the city of Edmonton showed significant crash reductions that ranged from 12% to 25% for total collisions, and from 33% to 43% for angle collisions (Contini and El-Basyouny, 2016).

Managing impact speeds is the fastest and most cost efficient way to affect improvements at our intersections. A program has been developed for the installation of ISDs that improves transparency and accountability of their application that will facilitate the expansion of the ISD program.

Action #10: Increase capacity for data analytics to mine automated enforcement data

Automated enforcement (AE) data has been proven to be effective to identify high risk drivers (Topinka, 2012). This study showed drivers with more AE violations are more likely to be involved in injury collisions as well as other criminal activity. Once identified, these drivers can be monitored through manned enforcement for criminal and traffic violations.

III. Education

Education can be used to raise road user awareness of intersection safety. Education is most effective when paired with other engineering, enforcement and/or engagement initiatives. Education of traffic safety professionals in our municipality is important to build our capacity to implement up to date best practices in intersection safety.

Current Education Initiatives for Intersection Safety

Table 3: Current Education Initiatives to Improve Intersection Safety

Initiative	Details
Traffic Safety Communication Plan	Intersection Safety is our focus for two months of the year. Many messages related to Speed and Pedestrian Safety are also related to intersections. Strathcona County's messages are supported by Provincial campaigns throughout the year.
Edmonton's Urban Traffic Safety Conference	Several members of the Integrated Traffic Unit, Transportation and Agriculture Services, Transportation Planning and Engineering as well as Council attend this annual conference to learn more about how we can improve safety in our community.
Safe Travels Advertorial Campaign	This campaign was run from May 2014-April 2015 and concentrated on the Safe System message, many of them intersection related. Many advertisements have been created and can be reused in the community.

Recommended Education Actions for Intersection Safety

Action #11: Update Traffic Safety Communications Plan

Current intersection safety related messaging in Strathcona County is done using general safety messages in line with the province Traffic Safety Plan 2015. Intersection safety messages that educate about Safe System principles and Strathcona County collision statistics are likely to be more interesting and relatable for our residents than generic, traditional traffic safety messaging, and thus may be more likely to effect the behaviour changes we want.

Include messages about emergency vehicles/construction/meaning of pedestrian signal phases in response to identified gaps in driver understanding.

Explore innovative ways to educate residents that are more impactful and engaging.

IV. Engagement

Strathcona County lies within the Capital Region. Drivers in the region frequently cross municipal boundaries. Thus, working with local partners is imperative to forward best practice and encourage the implementation of consistent practices in intersection management and safety across the region.

Current Engagement Initiatives for Intersection Safety

Table 4: Current Engagement Initiatives to Improve Intersection Safety

Initiative	Details
Capital Region Intersection Safety Partnership (CRISP)	Strathcona County is an active member of this regional partnership with the mission, "enhancing traffic safety in municipalities located within Alberta's Capital Region, through sustained, collaborative and integrated evidence-based intersection safety initiatives."

Recommended Engagement Actions for Intersection Safety

Action #12: Expand our Traffic Safety Advisory Team (TSAT)

The development of this plan involved the participation of all internal stakeholders in Strathcona County. Continue to regularly engage them on initiatives to improve road safety, including intersection safety.

Staff in RCMP and Enforcement Services, Transportation and Agriculture Services, and Transportation Planning and Engineering regularly meets to coordinate road safety in our community. Extend membership in this group to other County staff involved in Planning and Development Services, Emergency Services, and Transit to explore better ways to implement the Safe System approach at intersections in Strathcona County.

Action #13: Improve data sharing regarding high collision intersections with internal stakeholders

Effective actions taken to improve traffic safety are data driven. Making network screening and other traffic data available to internal stakeholders will help them to prioritize and target their initiatives to improve intersection safety. Leverage new data sharing capacity created by Strathcona County's Open Data system.

Action #14: Engage with Alberta Transportation to find solutions to the safety concerns on the Highway 21 corridor.

Three of the top 12 intersections for fatal/major injury collision are located on Highway 21. Highway 21 generally has an ongoing history of serious collisions.

V. Evaluation

Evaluation of individual initiatives as well as our overall progress towards our collision reduction goals is crucial to our intersection safety Action Plan.

Current Evaluation Initiatives for Intersection Safety

Table 5: Current Evaluation Initiatives to Improve Intersection Safety

Initiative	Details
Network Screening	Each year, collision data is mined to determine high collision locations and areas of concern.
Traffic Monitoring	Traffic is currently monitored through pan-tilt-zoom cameras and in-person observation. These traffic studies are used to evaluate and adjust signal operations, and to investigate safety concerns.

Recommended Evaluation Actions for Intersection Safety

Action #15: Improve intersection monitoring capacity

Collision data is used for identifying intersections of concern, but more options are available to address collisions proactively through conflict analysis. Improving our ability to capture video data at intersections will allow us to move towards addressing conflict points before collisions occur. It will also increase the safety efficiency of our staff by minimizing extended site visits to collect data.

E. Deliverables

This Action Plan will result in the following deliverables:

Action	Deliverable	Expected Completion Date	Responsible*
Action #1: Roundabout Policy	Review provincial and other municipal best Practices	December 2018	TPE/PDS
Action #2: Continue to implement Safe System based left turn signal assessment warrant guidelines	Implement one to two locations annually	Ongoing	TPE
Action #3: Assess the speed limits on high collision corridors	Assessments completed and if needed, Speed Bylaw changes presented to Council	December 2018	TPE
Action #4: Update Transportation Design and Construction Standards	Finalize new intersection related Design and Construction Standards	September 2018	TPE/PDS
Action #5: Develop County specific roadway markings guidelines	Guideline Document Developed with plan for implementation	June 2018	TPE/TAS
Action #6: Develop a stop sign strategy	Strategy developed with implementation plan	June 2019	TPE/TAS/RCMP and ES/Communications
Action #7: Remove advance warning signals that are no longer warranted	Warning signals removed as locations are rehabilitated	Ongoing	TPE/TAS
Action #8: Surface Treatment Pilot/Expansion	HFST is applied at one to three locations	October 2018	TPE/TAS
Action #9: Expand Intersection Safety Devices (ISD) program	Identify three to six appropriate locations and arrange for installation	December 2018	RCMP and ES TAS/TPE/
Action #10: Increase capacity to mine AE data	Digitize data that can be reviewed by an analyst to identify useable information to improve traffic safety	August 2018	RCMP and ES
Action #11: Update Traffic Safety Communications Plan	Plan completed and implementation is started	September 2018	TPE/TAS/RCMP and ES/Communications
Action #12: Expand Traffic Safety Advisory Team (TSAT)	Expand membership on team, establish terms of reference and meeting schedule	June 2018	TPE
Action #13: Improve data sharing regarding high collision intersections with internal stakeholders	Establish process guidelines for sharing information related to intersections collisions and other evaluation indicators	October 2018	TPE/TAS/ RCMP and ES/Transit/ES
Action #14: Engage with AT on Hwy 21 corridor	Share collision data summary with AT and collaborate on solutions.	Ongoing	TPE
Action #15: Improve intersection monitoring capacity	Investigate options for monitoring and develop guidelines for their installation.	February 2018	TPE/TAS

*TPE=Transportation Planning and Engineering; TAS=Transportation and Agriculture Services; RCMP and ES=RCMP and Enforcement Services; ES=Emergency Services

F. Resource Requirements

Strathcona County's Traffic Safety Strategic Plan 2020 establishes our vision for traffic safety: *"no one will be killed or seriously injured while travelling on Strathcona County's road network".*

To that end, resources must be allocated where serious injuries and fatalities are most likely to occur. The vast majority of our serious collisions take place at intersections, mainly on the arterial network. For that reason, our traffic safety resources are well spent on intersection safety.

The following actions will be resourced through TPE - Annual Traffic Signal / Intersection Replacements Program:

Action #14: Improve intersection monitoring capacity

Action #7: Remove advance warning signals that are no longer warranted

The following action will be resourced through TPE- Traffic and Pedestrian Safety (with application by TAS staff)

Action #8: Pilot the introduction of high friction surface treatment (HFST) on intersection approaches

The following Actions require staff time only and will be integrated into annual internal workplans:

Action #1: Consider developing a Roundabout Policy to encourage greater use of this design

Action #2: Implement Safe System based left turn signal assessment warrant guidelines

Action #3: Assess the speed limits on high collision corridors

Action #4: Update Transportation Design and Construction Standards

Action #5: Develop Strathcona County specific roadway markings guidelines

Action #6: Develop a stop sign strategy

Action #9: Expand Intersection Safety Devices (ISD) program

Action #11: Update Traffic Safety Communications Plan

Action #12: Expand our Traffic Safety Advisory Team (TSAT)

Action #13: Improve data sharing regarding high collision intersections with internal stakeholders

To achieve the following action, the RCMP and Enforcement Services will leverage hourly labourers:

Action #10: Increase capacity for data analytics to mine Automated Enforcement data

G. Conclusion

The majority of serious and fatal collisions happen each year at Strathcona County intersections. Strathcona County cannot meet traffic safety goals without significant safety improvements at our intersections. The ISAP has identified 14 actions based on best practice which have been chosen to be realistic, sustainable and actionable by June 2019 in support of reaching our overarching Traffic Safety Strategic Plan collision reduction targets by 2020.

H. References

Opus International Consultants (Canada) Limited for Government of Alberta Transportation. 2010. *Methods of Reducing Collisions on Alberta Roads: Phase 2 Final Report.*

City of Edmonton. 2015. *Vision Zero: Edmonton road safety strategy 2016 – 2020*. (accessible at

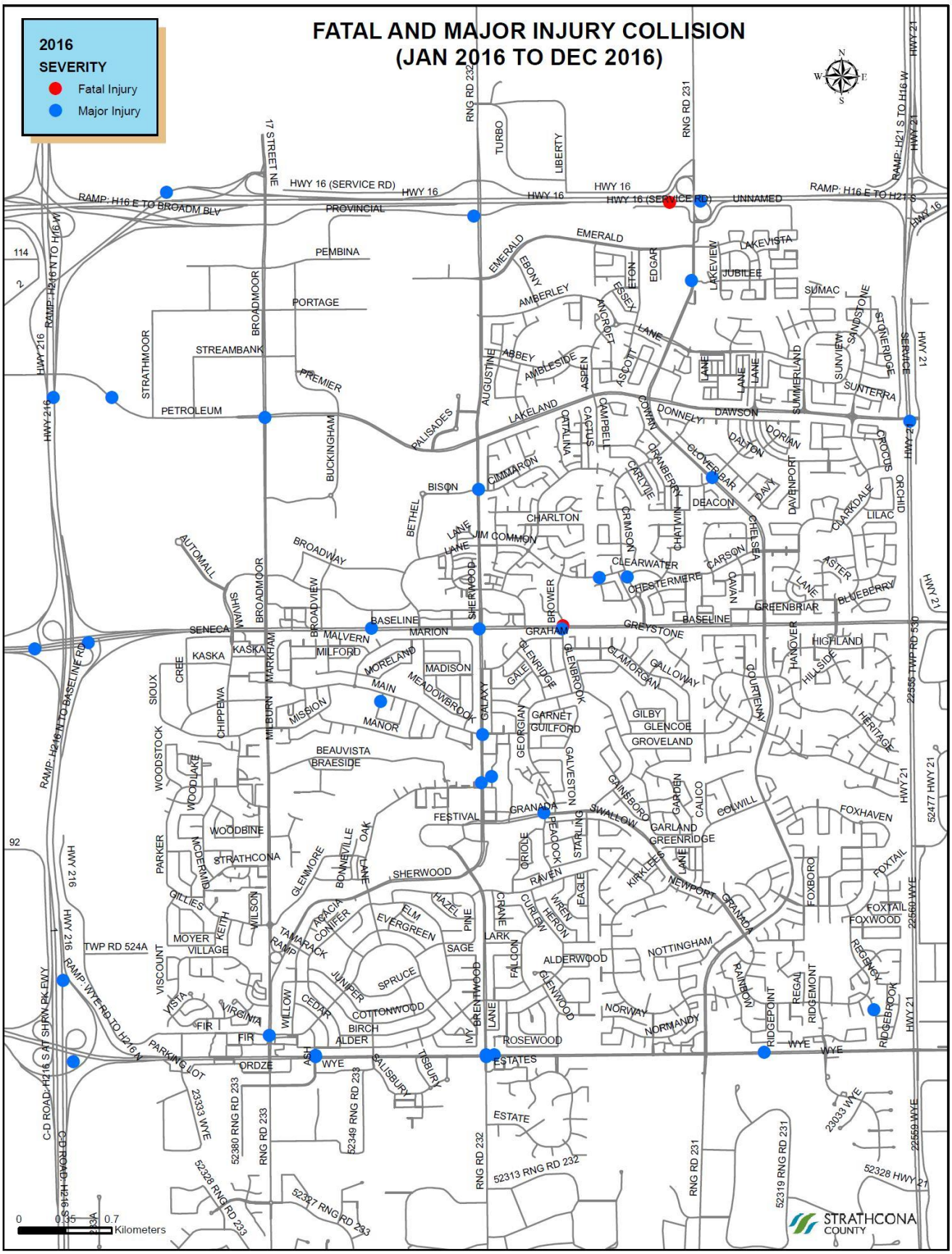
Contini, L., and El-Basyouny, K. 2016. *Lesson learned from the application of intersection safety devices in Edmonton.* Accident, Analysis and Prevention, 94:127-134.

Corben, B., Peiris, S., Logan, D., and Candappa, N., 2012. *Intersection Study: An Application of Safe System Approach to Intersections in the Capital Region- Pilot Project. Phase I Progress Report.*

Sun, D., and El-Basyouny, K., 2015. Evaluating the Safety Effects of Stop-Sign Enforcement at Unsignalized Intersections in Strathcona County.

Topinka, N. 2012. *Automated Enforcement and Detection of Driver Risk*. (accessible at
World Health Organization (WHO), 2013. *Pedestrian safety: a road safety manual for decision-makers and practitioners.*

Appendix: 2016 Fatal and Major Injury Collision Maps


FATAL AND MAJOR INJURY COLLISION
(JAN 2016 TO DEC 2016)
2016
SEVERITY
Fatal Injury
Major Injury
HWY 16 (SERVICE RD)
HWY 16
PROVINCIAL
PEMBINA
PORTAGE
STREAMBANK
PREMIER
PETROLEUM
BISON
CHARLTON
JIM COMMON
CLEARWATER
CHESTERMERE
DEACON
DAWSON
DONNELY
LAKELAND
PALISADES
CIMMARON
BROADWAY
BASELINE
GREYSTONE
GREENBRIAR
SENECA
KASKA
MALVERN
MILFORD
MARION
GRAHAM
MORELAND
MADISON
MAIN
MEADOWBROOK
MANOR
BEAUVISTA
BRAESIDE
FESTIVAL
GRANADA
GARNET
GUILFORD
GILBY
GLENCOE
GROVELAND
GARLAND
GREENRIDGE
NEWPORT
SHERWOOD
WOODBINE
STRATHCONA
MOYER
VILLAGE
TWP RD 524A
ALDERWOOD
NOTTINGHAM
NORWAY
NORMANDY
ROSEWOOD
ESTATES
ESTATE
WYE
ORDZE
PARKING LOT
RAMP: H16 E TO BROADM BLV
RAMP: H216 N TO H16 W
RAMP: H16 E TO H21 S
RAMP: H21 S TO H16 W
RAMP: WYE RD TO H216 N
C-D ROAD: H216 S AT SHRW PK EWY
C-D ROAD: H216 S AT H16 W
RNG RD 232
RNG RD 231
RNG RD 233
17 STREET NE
HWY 216
HWY 21
HWY 2
SERVICE
52313 RNG RD 232
52319 RNG RD 231
52328 HWY 21
52327 RNG RD 233
52228 RNG RD 233
52380 RNG RD 233
52349 RNG RD 233
23333 WYE
23033 WYE
22555 TWP RD 530
52477 HWY 21
22560 WYE
22559 WYE
0 0.35 0.7
Kilometers
STRATHCONA COUNTY

FATAL AND MAJOR INJURY COLLISIONS (JAN 2016 TO DEC 2016)

COLLISON SEVERITY	FATAL	MAJOR	TOTAL
PERSONS	5	65	70
COLLISIONS	5	59	64

UNIT TYPE	COUNT
PASSENGER CAR	31
MINI-VAN/MPV/SUV	31
PICK-UP/VAN < 4500 KG	22
MOTORCYCLE/SCOOTER	8
TRUCK > 4500 KG	6
PEDESTRIAN	6
BICYCLE	4
TRANSIT BUS	3
FIXED OBJECT	2
ANIMAL - DEER	2
TRUCK TRACTOR	2
ANIMAL - MOOSE	1

LIGHT CONDITIONS	COLLISIONS
DAYLIGHT	39
DARKNESS	23
SUNGLARE	1
UNKNOWN	1

WEATHER CONDITION	COLLISIONS
CLEAR	53
RAINING	2
SNOW	8
UNKNOWN	1

COLLISION TYPE	COLLISIONS
STRUCK OBJECT	13
RIGHT ANGLE	13
REAR END	10
LEFT TURN ACROSS PATH	9
OFF ROAD RIGHT	6
OFF ROAD LEFT	4
OTHER	3
HEAD ON	2
PASSING - RIGHT TURN	2
PASSING - LEFT TURN	1
SIDESWIPE SAME DIRECTION	1

MONTH	COLLISIONS
JANUARY	5
FEBRUARY	6
MARCH	2
APRIL	4
MAY	5
JUNE	8
JULY	10
AUGUST	4
SEPTEMBER	2
OCTOBER	6
NOVEMBER	5
DECEMBER	7