



Calgary Safer Mobility Plan 2013-2017

Annual Report 2015

Transportation - Roads - Traffic

The City of Calgary

November 18, 2015

1. Introduction

This Safer Mobility Plan (SMP) Annual Report 2015 provides an update on the most recent collision data for Calgary and comparison to targets, a summary of actions the City and our partners have undertaken in each of the Strategies in the last year, and what we plan to do over the coming year. The *Calgary Safer Mobility Plan 2013-2017*, which provides additional background and information, is available on Calgary.ca. 2015 was a busy year and some highlights of key actions initiated or completed during the year are as follows (numbering references the Safer Mobility Plan strategies discussed in Section 3):

1. Formation of the Safer Mobility Leadership Team and regular meetings to guide the plan
1. Re-structuring of the Safer Mobility Operations Team and regular meetings / member actions
2. Initiated a Collision Data Working Group to improve the data collection process and quality
3. Review of pedestrian safety from 2008-2012, currently under internal review
3. Review of pedestrian safety along MacLeod Trail and implementation of cost effective measures
3. Initiated a pilot program of reflective sleeves on crosswalk sign poles
4. At-Grade LRT Crossing Committee formed and operational, resulting in implementation of cost effective measures to improve safety at identified locations (e.g. Sunnyside station, Chinook Station, various locations along 36 St NE)
6. Development of Road Safety Review Guidelines, currently under internal review
6. Formal Road Safety Audits completed for Flanders Interchange, MacLeod Trail/162 Avenue, and Centre City Cycle Track Network Pilot project, among others.
7. Completion of In-Service Road Safety Reviews at four intersections (Macleod Trail/Southland Drive SE , Heritage Drive/Glendeer Circle SE , 16 Avenue/68 Street NE, Memorial Dr/36 Street SE and one corridor (17 Avenue from Macleod Trail to Crowchild Trail)
7. Implementation of cost effective measures identified through the ISRSR process to improve safety (e.g. Macleod Trail/Southland Drive, 17 Avenue/52 St SE, Anderson Road/14 Street, Crowchild Trail/24 Avenue NW, etc.)
8. Completion of over 40 Collision Reviews and 10 Safety Assessments based on concerns raised by members of the public or Administration, implementation by operating units
9. Awareness campaigns regarding: pedestrian safety, back to school, cycle tracks, impaired driving, 5 avenue lane reversal, etc.
9. SMP Seminars with world renowned traffic safety expert Fred Wegman, who also spoke at the Safe and Smooth Seminar for Safer Calgary
10. Deployment of SLOWS Trailers (mobile) and iSLOWS (pole mounted) signs
11. Continued use of RRFB and approval of device by the Transportation Association of Canada
11. Traffic safety knowledge exchange with the City of Edmonton and Alberta Transportation
11. Traffic safety webinars and internal training sessions

Collision Data

The Transportation Department produces an annual collision data report which summarizes traffic collisions in Calgary. The *Traffic Collision Annual Report 2014* presents some information about collision trends, where and when collisions are happening and the road user groups is involved; key figures from this document are presented in Attachment 2. In 2014, there were 28 fatal collisions, 2,539 injury collisions, and 33,851 Property Damage Only (PDO) collisions on Calgary roads. The societal cost of these collisions is estimated to be \$1.04 Billion. However, Calgary is still performing well compared to other major Canadian cities with an overall collision rate of 215 casualties per 100,000 population compared to a range of 215 to 553 casualties per 100,000 population for major Canadian Cities, based on the most recently available data. Similarly, for pedestrian safety the casualty rate of 31 casualties per 100,000 population in Calgary compares well to an average of 52 pedestrian casualties per 100,000 population for other major Canadian cities.

Despite the relatively good safety record in Calgary, traffic collisions are a leading cause of death and injury for Albertans under the age of 30. Progress made on each of the Focus Areas in the SMP and key actions for 2016 to 'turn the curve' are discussed in Section 2. It is important to note that there is a lag between our activities and the resulting change in collisions; the trends in the most recent collision data are a result of activities completed during 2014 or earlier, current activities will only result in changes in collisions in following years.

Engineering Activities

The Transportation Department has recently published and continues to develop guidelines to create safer roads in the City. These include the development of a Pedestrian Strategy, the Complete Streets Guide, an update to the Calgary Temporary Traffic Control Manual, and a guideline for traffic safety processes in Calgary, including Road Safety Audits and In-Service Road Safety Reviews. Network screening processes are also employed and being refined to identify where there are high concentrations of collisions where we focus In-Service Road Safety Reviews and implementation of measures to mitigate the identified collision issues.

There are several methods to rank intersections, interchanges or corridors based on collisions by considering the number of collisions, severity of collisions, obtaining traffic volume based rates, and looking at persistence of the issues. As an example, the ranking list that was used to determine safety work programs for intersections in 2015 (using most recent 2013 data of the time) is presented in Table 1, with a description of the review type (Collision Review (CR) or In Service Road Safety Review (ISRSR)), what was done at each location, or a description of why works were not undertaken based on planned capital improvements or maintenance activities. The ranking lists are reviewed on an annual basis using the most recent collision data and taking into account recent transportation network changes. A ranking list specifically for locations with vulnerable road user collisions (pedestrians, cyclists and motorcyclists) is being developed and will be published in 2016 along with a program to implement recommendations.

Table 1: Top 10 Intersections based on collision rate in 2013: Safety improvements built or planned

Intersection		Review type*	Proposed Improvements	Status
1	Country Hills Bv & Metis Tr NE	N/A	N/A	Active construction zone
2	36 St & 20 Av NE	CR	<ul style="list-style-type: none"> Reconfigure WB approach to separate left turn from the shared through/left Upgrade to allow simultaneous NBL and SBL 	Planned
3	Glendeer Cir & Heritage Dr SE	ISRSR	<ul style="list-style-type: none"> Rebuild NB right turn Sidewalk connections 	Design completed \$200k
4	68 St & McKnight Bv NE	CR	<ul style="list-style-type: none"> Protected only left turns 	Planned
5	Sarcee Tr & Richmond Rd SW	N/A	<ul style="list-style-type: none"> South project limit of Sarcee paving in 2015 	Work completed 2015 \$5M
6	36 St & 32 Av NE	CR	<ul style="list-style-type: none"> Pavement marking/signage/illumination revisions Review of LRT controls and ROW signage 	Joint Transit and Roads project
7	17 Av & 5 St SW	ISRSR	<ul style="list-style-type: none"> Enhancements for pedestrian safety (crosswalk, reduced roadway width, leading pedestrian interval) 	Design as part of 17 Ave corridor Improvements
8	17 Av & 14 St SW	ISRSR	<ul style="list-style-type: none"> Enhancements for pedestrian safety (No RTOR, leading pedestrian signal, reduced road width) 	Design as part of 17 Ave corridor Improvements
9	52 St & McKnight Bv NE	ISRSR	<ul style="list-style-type: none"> Eastbound right turn channel improvements 	Planned
10	Country Hills Bv & Harvest Hills Bv NW	ISRSR	<ul style="list-style-type: none"> Northbound right turn improvements Southbound right turn improvements Dual protected left turn lanes on Harvest Hills 	Designed for construction in 2016, \$350k
Additional locations/improvements from previous ranking lists:				
Macleod Tr & Southland Dr SE		ISRSR	<ul style="list-style-type: none"> Northbound and westbound right turn geometry improvements Protected left turns on Macleod Tr 	Completed \$350k
17 Av & 52 St SE		ISRSR	<ul style="list-style-type: none"> Offset left turn bays \$20k for pavement marking and signage revisions 	Completed
Memorial Dr & 36 St SE		ISRSR	<ul style="list-style-type: none"> Northbound and eastbound right turn improvements Left turn bay extensions and Transit changes 	Planned
16 Av & 68 St NE		ISRSR	<ul style="list-style-type: none"> Details to be finalized 	Ongoing

Note: * CR = Collision Review, ISRSR = In-Service Road Safety Review

New technology continues to be used to improve traffic safety. The trial for Rectangular Rapid Flashing Beacons (RRFB) has been completed and RRFBs have been accepted as an approved traffic control device by TAC. The City of Calgary was also awarded the TAC Road Safety Engineering Award in 2015 for leadership in the development of the RRFB in Canada. Roads will add these devices where appropriate using a modified 'warrant score' as directed by Council. The conversion of streetlights to LED technology is underway and provides improved visibility while using less power. The use of mobile Speed Limit

Observation and Warning System signs (SLOWS trailers, or iSLOWS when mounted on poles) to target areas identified by citizens have been shown to result in lower vehicle speeds when present. These electronic signs support the Community Traffic Calming Program. Traffic signal operations and signal timing continue to be reviewed where safety issues have been identified. The Transportation Department follows national guidelines set by The Transportation Association of Canada for its traffic control devices.

Education and Awareness

Public education programs focus on improving safety for motorists, pedestrians and cyclists. In 2015, these programs included the extensive outreach program for cycle tracks, educational materials regarding the 5 Avenue Lane Reversal Pilot, 'Look Out for Each Other' pedestrian crossing campaign, 'Move Together' cycle track pilot education campaign, school bus safety, pedestrian safety, signage revisions in school and playground zones, and support for our external partners including the AMA School Patrol program (for which there have been no recorded motor vehicle collisions while patrollers are present during the history of the program) and the MADD Report an Impaired Driver campaign.

Possible Future Directions

An interim review of the SMP has identified that the establishment of a dedicated office of traffic safety, similar to the organization in Edmonton, may be an improvement over the current decentralized model of the SMP to maintain strategic focus and strengthen proactive efforts. The SMP established a decentralized group of City staff to contribute to the plan. As a result of not having a dedicated office of traffic safety, as is done in Edmonton, many of the strategic objectives of the SMP suffer delays when urgent tactical items arise. The Edmonton Office of Traffic Safety has 17 dedicated staff and an additional 22 staff for the management and operation of Edmonton's automated enforcement program. Calgary has been experiencing increases in casualty collisions in recent years while casualty decreases have been observed in Edmonton since the establishment of the Office of Traffic Safety. Funding for new activities is another area for exploration in the coming year since the SMP was based on utilizing existing resourcing; the Edmonton Office of Traffic Safety's examples of a 'traffic safety fund' with supporting fundraising and donations, among other funding sources will be reviewed for possible future direction of the SMP.

There is also significant discussion about vision zero in Calgary, consistent with the SMP mission of "Striving for zero... pursuing transportation completely free of fatalities and injuries". Establishing more aggressive casualty reduction targets than those set out in the SMP would likely require additional resources beyond what is (and historically has been) dedicated specifically to the improvement of traffic safety. Communications are a very critical part of the SMP and to date the Safer Mobility Leadership Team has not had capacity to establish those communications either through dedicated communications staff or through the Engage! Unit; this will be an area of focus for 2016.

Summary

With our efforts and new activities, two of the targets set out in the SMP were achieved in 2014. Fewer casualties were recorded for vulnerable road users (pedestrians, cyclists and motorcyclists) and non-intersection collisions. Discussion of each target and the related actions for 2016 to ‘turn the curve’ are outlined in Section 2. The 11 Safer Mobility Strategies of the SMP are discussed in Section 3, with a summary of actions initiated or completed in 2015 and the planned actions for 2016.

Overall, the City of Calgary has a sound safety record and compares well with other jurisdictions across Canada. The actions we are taking to implement the Safer Mobility Plan 2013-2017 will continue to improve traffic safety in our city. However, additional resources could enhance our progress toward the established targets, and further investigation will be put forward in the next iteration of the SMP to look at accelerating our efforts and establishing more aggressive targets.



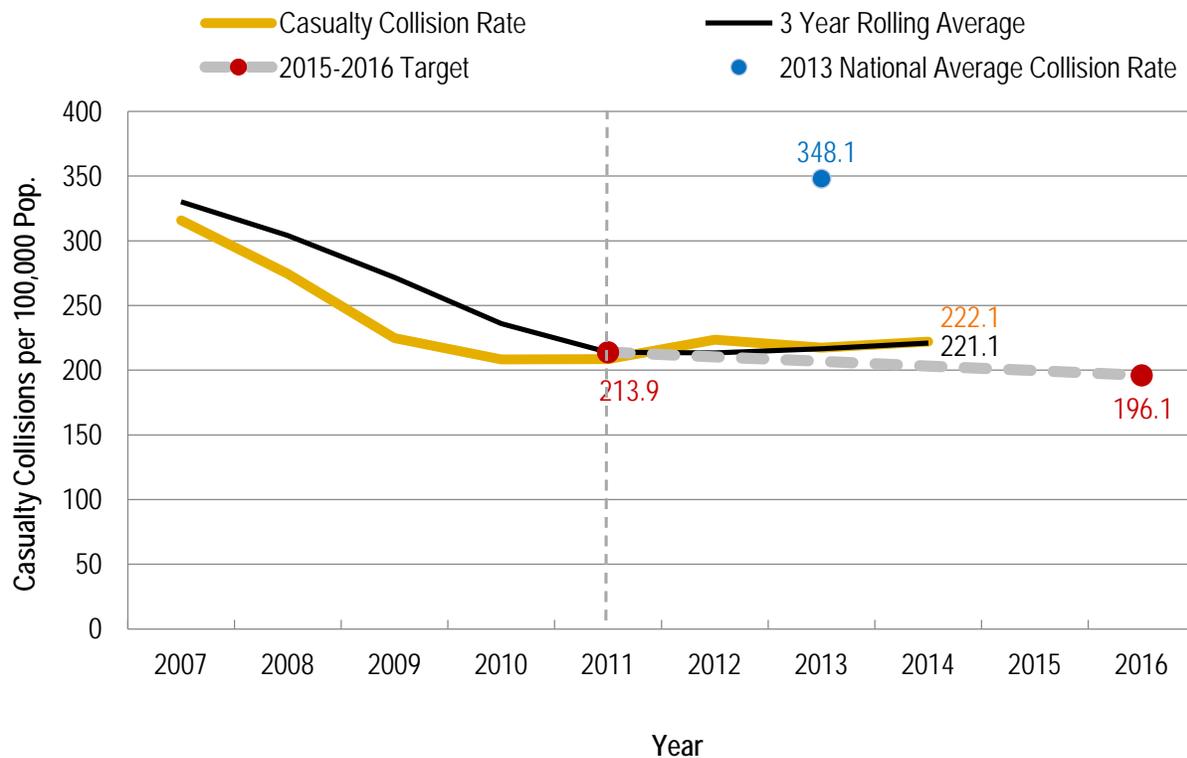
2. Progress on Focus Area Targets and Key Actions for 2016

Despite ongoing efforts and new activities to improve traffic safety, the interim targets set out in the SMP were not achieved in 2014 with the exception of the Non-Intersection Collision Target and the Vulnerable Road User Collision Target where significant progress was realized and the observed casualties were below the target. Discussion of each focus area and actions for 2016 to ‘turn the curve’ for each of these areas are discussed in this section.

2.1 Overall Casualty Collision Target

Target: 10 percent reduction in casualty collision rate (fatality and injury combined) per 100,000 population, based on a 3 year rolling average (2015-2017)

Baseline: Casualty (fatality and injury combined) collision rate of 213.9 per 100,000 population, based on a 3 year rolling average (2009-2011)



Progress summary: The overall casualty collision rate for 2014 remained relatively static compared to 2013, and the observed rate for the most recent year and the most recent 3 year rolling average are not meeting the projected target values. The National Average for 2013, the most recently available data, was 348.1 casualty collisions per 100,000 population. Intensified effort is required to achieve this target.

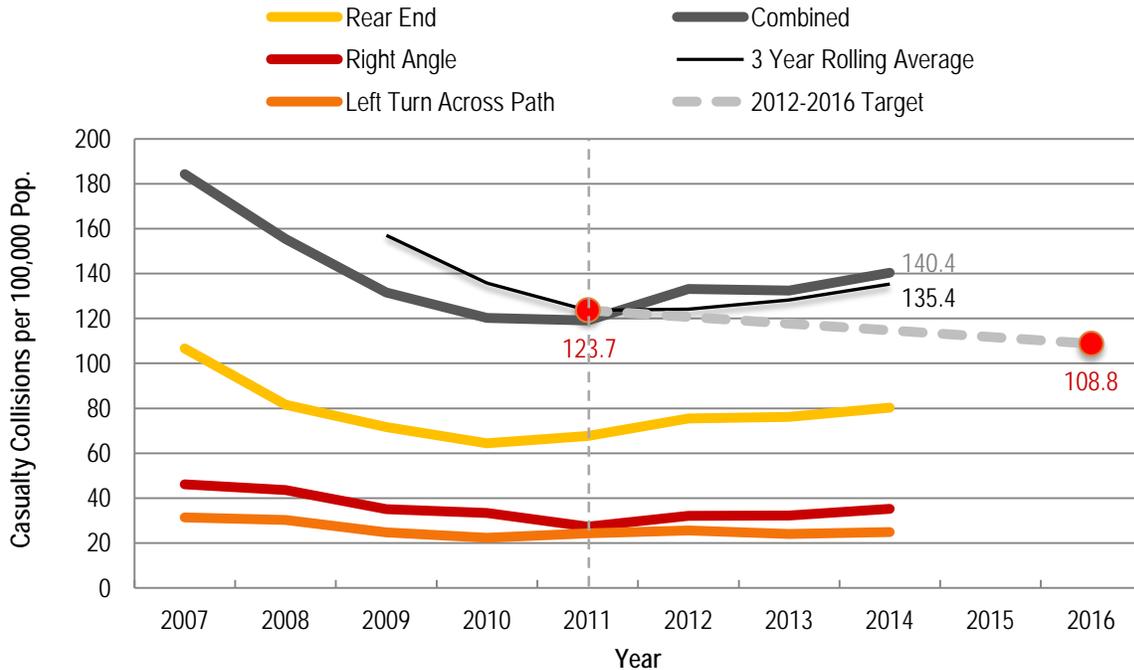
Key Actions to ‘turn the curve’:

- In-Service Road Safety Reviews/Road Safety Audits/focused infrastructure improvements
- Engagement and awareness activities related to speed
- Support of Calgary Police Service (CPS) targeted enforcement activities

2.2 Intersection Collision Target

Target: 12 percent reduction in combined rear end, right angle, and left turn across path casualty collision rate per 100,000 population, based on a 3 year rolling average (2015-2017)

Baseline: Combined rear end, right angle, and left turn across path casualty collision rate of 123.7 per 100,000 population, based on a 3 year rolling average (2009-2011)



Progress summary: The intersection casualty collision rate for 2014 increased compared to 2013, and the observed rate and three year rolling averages are not meeting the projected target values. Casualty rates for Left turn collisions have remained relatively static but increases were observed in rear end and right angle collisions. Intensified effort is required to achieve this target. National averages are not available for intersection collisions.

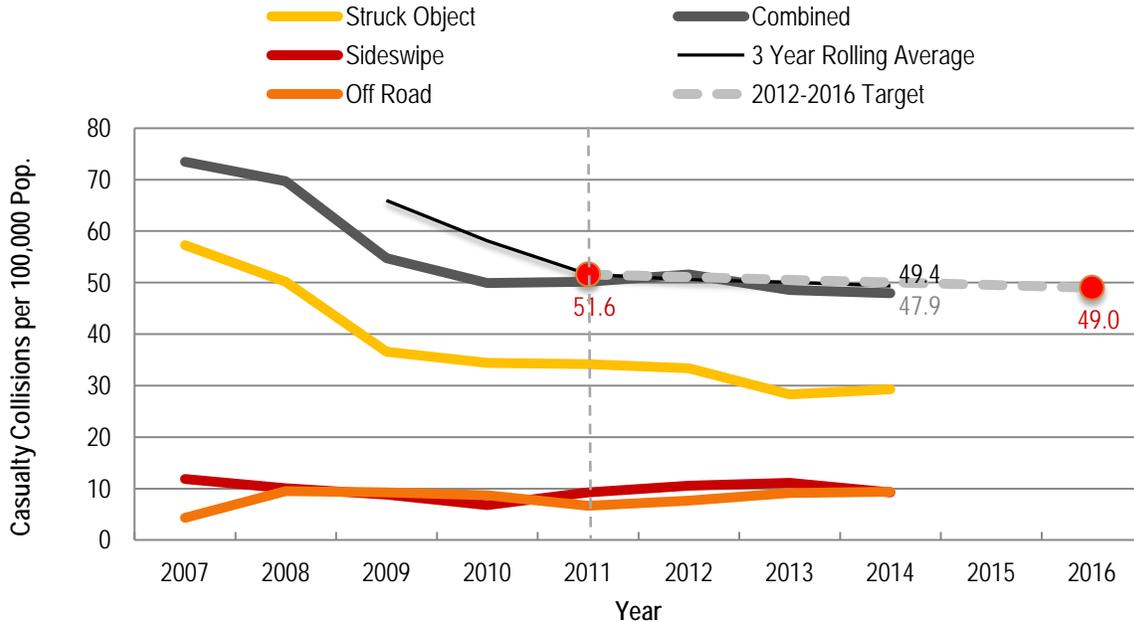
Key Actions to 'turn the curve':

- In-Service Road Safety Reviews/Road Safety Audits/Focused infrastructure improvements
- Network screening and focused application of mitigation measures for rear end collisions
- Network screening and focused application of mitigation measures for right angle collisions
- Engagement and awareness activities related to speed
- Engagement and awareness activities related to distracted driving
- Support of CPS targeted enforcement activities

2.3 Non-Intersection Collision Target

Target: 5 percent reduction in combined struck object, sideswipe, and off road casualty collision rate per 100,000 population, based on a 3 year rolling average (2015-2017)

Baseline: Combined struck object, sideswipe, and off road casualty collision rate of 51.6 per 100,000 population, based on a 3 year rolling average (2009-2011)



Progress summary: The non-intersection casualty collision rate for 2014 remained static compared to 2013, and the observed rate for 2014 and the three year rolling average are still meeting the projected target values. Casualty rates for sideswipe collisions decreased but there was a similar increase in struck object collisions. Continued effort is required to maintain achievement for this target. National averages are not available for non-intersection collisions.

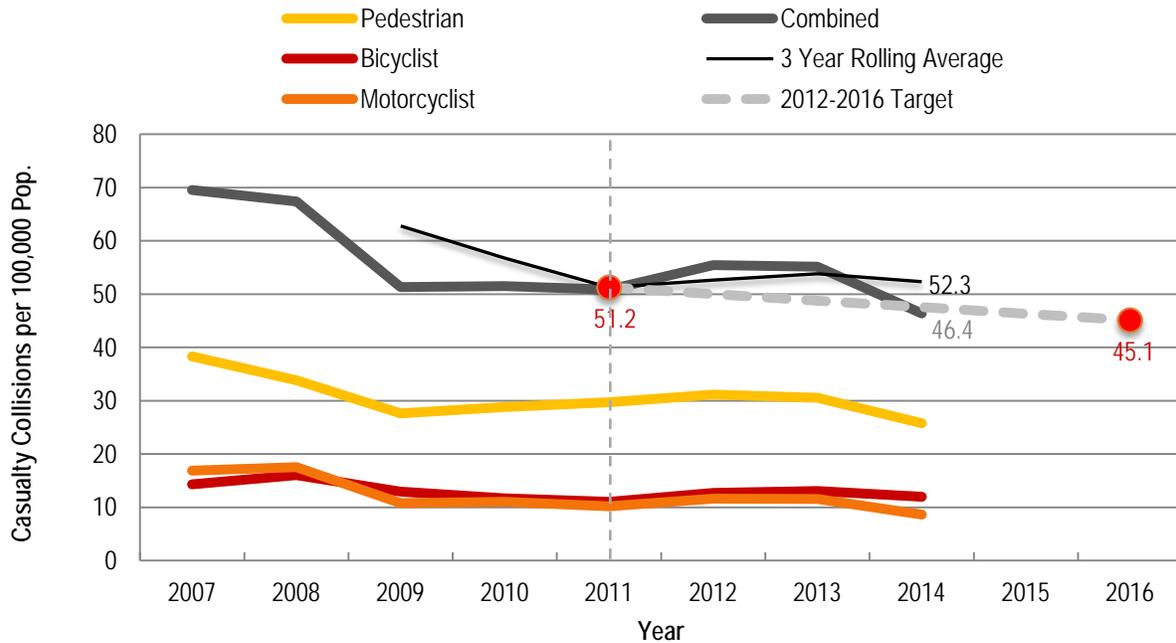
Key Actions to ‘turn the curve’:

- In-Service Road Safety Reviews/Road Safety Audits/Focused infrastructure improvements
- Network screening and application of mitigation measures for struck object collisions
- Network screening of median and roadside barriers
- Engagement and awareness activities related to speed
- Support of CPS enforcement activities

2.4 Vulnerable Road Users Collision Target

Target: 12 percent reduction in vulnerable road user casualty collision rate per 100,000 population, based on a 3 year rolling average (2015-2017)

Baseline: Vulnerable road user casualty collision rate of 51.2 per 100,000 population, based on a 3 year rolling average (2009-2011)



Progress summary: The vulnerable road user casualty collision rate for 2014 decrease significantly compared to 2013, and the observed rate for 2014 is meeting the projected target values but the three year rolling average is not. Casualty rates for all three sub-groups decreased. Continued effort is required to maintain achievement for this target and to bring the three year rolling average below the target value. National averages are not available for vulnerable road user collisions.

Key Actions to 'turn the curve':

- Continued application of enhancements for pedestrian crossings
- Road Safety Audit of cycle track pilot project and implementation of mitigation measures
- Completion of pedestrian safety study and application of mitigation measures for pedestrian collisions
- Engagement and awareness activities related to vulnerable road user safety
- Support of CPS enforcement activities related to vulnerable road users

2.5 Impaired and Distracted Driving (Mobility) Support Target

- Targets:
- Share data analysis and mapping related to impaired driving with CPS to aid with targeted enforcement efforts.
 - Form/maintain partnerships with CPS and other stakeholders and provide support in educating and engaging the public.

Progress summary: The impaired and distracted driving targets are currently qualitative. Discussions are underway to establish quantitative baseline values and targets despite the lack of direct control. Continued effort is required to maintain achievement for this target.

Key Actions to 'turn the curve':

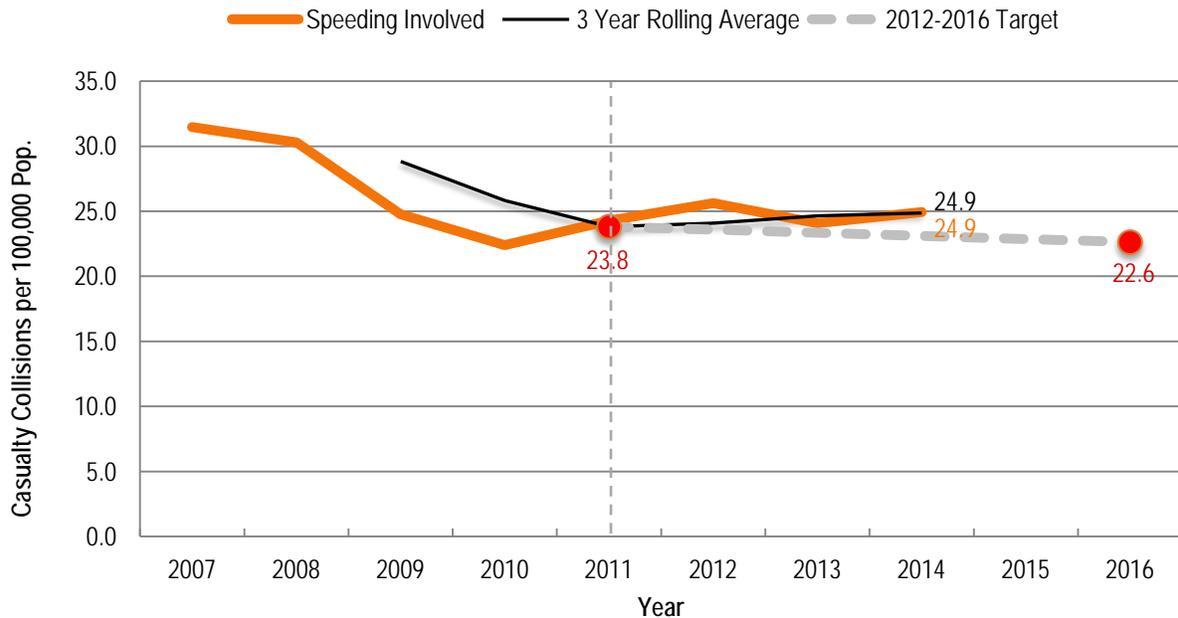
- Establishment of quantified baseline and target values in collaboration with CPS
- Engagement and awareness activities related to distracted and impaired mobility
- Support of CPS enforcement activities related to impaired and distracted mobility



2.6 Speeding Involved Collision Target

Target: 5 percent reduction in speeding involved casualty collision rate (fatality and injury combined) per 100,000 population, based on a 3 year rolling average (2015-2017)

Baseline: Speeding involved casualty collision rate of 23.8 per 100,000 population, based on a 3 year rolling average (2009-2011)



Progress summary: The speeding involved casualty collision rate for 2014 increased compared to 2013, and the observed rate and three year rolling average are not meeting the projected target values. Intensified effort is required to achieve this target. National averages are not available for speeding involved collisions.

Key Actions to 'turn the curve':

- In-Service Road Safety Reviews/Road Safety Audits/Focused infrastructure improvements
- Application of design guidelines such as Complete Streets to encourage lower speeds
- Network screening and application of mitigation measures for speeding involved collisions
- Engagement and awareness activities related to speed, including SLOWS and Community Traffic Calming
- Support of CPS speed enforcement activities

3. Progress on SMP Strategies in 2015 and Planned Actions for 2016

This section highlights actions that have been undertaken in 2015, some of these have been completed while others are ongoing. The planned actions for 2016 are also identified for each strategy. A description of each of the strategies is provided in the Safer Mobility Plan 2013-2017.

Strategy 1: Safer Mobility Plan Management Strategy

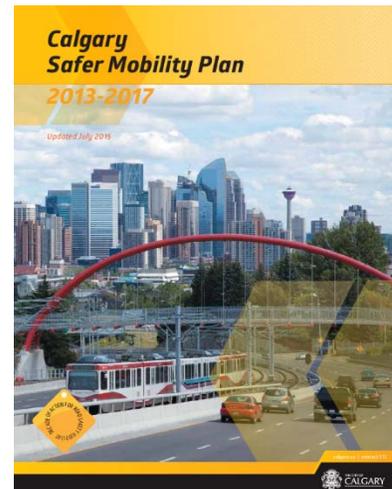
The management of the SMP is primarily done through the collaborative teams of the SMP. One of the main actions in this strategy is to report on the progress of the plan annually and to re-assess the SMP at the end of 2017.

Actions initiated /completed in 2015

- Formation of the Safer Mobility Leadership Team and regular meetings to guide the plan
- Re-structuring of the Safer Mobility Operations Team and regular meetings / member actions
- Production of this 2015 Safer Mobility Plan Annual Report

Planned actions for 2016

- Ongoing meetings of the Safer Mobility Leadership Team
- Investigate possible organizational changes and funding needs/opportunities
- Production of the 2016 Safer Mobility Plan Annual report



Strategy 2: Transportation Safety Data Management Strategy

Actions initiated /completed in 2015

- Initiated a Collision Data Working Group to improve the data collection process and quality

Planned actions for 2016

- Continued evaluation of existing data and opportunities for enhancement of data quality

Strategy 3: Vulnerable Road User Safety Strategy

Actions initiated /completed in 2015

- Review of pedestrian safety from 2008-2012, currently under internal review
- Review of pedestrian safety along MacLeod Trail and implementation of cost effective measures
- Monitoring of cyclist safety at cycle tracks
- Initiated a pilot program of reflective sleeves on crosswalk sign poles
- Completion of RRFB pilot and continued application of device (recipient of the Transportation Association of Canada Road Safety Engineering award 2015). Continuing to develop the device for national use.



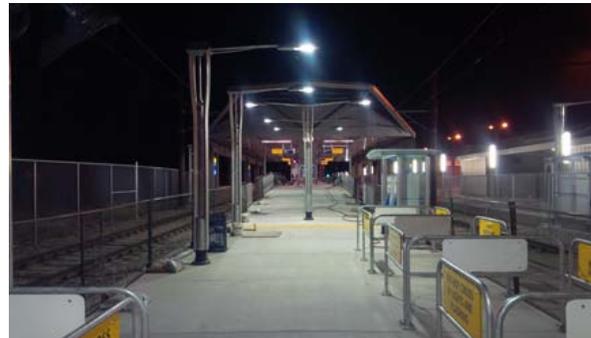
Planned actions for 2016

- Initiation of traffic safety related actions identified in the Step *FORWARD* pedestrian strategy.
- Complete review of pedestrian safety and implement identified mitigation measures.

Strategy 4: Safer Transit Strategy

Actions initiated /completed in 2015

- At-Grade LRT Crossing Committee formed and operational, resulting in implementation of cost effective measures to improve safety at identified locations (e.g. Sunnyside station, Chinook Station, various locations along 36 St NE)
- Development of training programs for transit operators



Planned actions for 2016

- Launch of safety and suicide awareness programs (operator training, education/awareness campaign for public)
- Formal review of all pedestrian crossings of LRT system
- Continued enforcement of safe pedestrian crossings of LRT system

Strategy 5: Transportation Network Screening Strategy

Actions initiated /completed in 2015

- Completion of 2014 Annual Collision Report and internal distribution
- Update to network screening process to include collision frequency, collision rate, and consistency

Planned actions for 2016

- Develop Safety Performance Functions (predictive models) to support network screening using latest methods
- Network review of identified safety issues or design elements (e.g. left turn, right turn channelization/rear end collisions, review of roadside barriers and run off road collisions)



Strategy 6: Road Safety Audit Strategy

Actions initiated /completed in 2015

- Development of Road Safety Review Guidelines, including Road Safety Audits (RSA) for City Projects
- Formal RSAs completed for Flanders Interchange, MacLeod Trail/162 Avenue, and Centre City Cycle Track Network Pilot project, among others.

Planned actions for 2016

- Implementation of Safety Review Guidelines and increased use of Road Safety Audits
- Training of City Staff in Road Safety Audits



Strategy 7: In-Service Road Safety Review Strategy

Actions initiated /completed in 2015

- Development of Road Safety Review Guidelines, including In-Service Road Safety Reviews (ISRSR) for City Projects
- Completion of In-Service Road Safety Reviews at four intersections (Macleod Trail/Southland Drive SE , Heritage Drive/Glendeer Circle SE , 16 Avenue/68 Street NE, Memorial Dr/36 Street SE and one corridor (17 Avenue from Macleod Trail to Crowchild Trail)
- Implementation of cost effective measures identified through the ISRSR process to improve safety (e.g. Macleod Trail/Southland Drive, 17 Avenue/52 St SE, Anderson Road/14 Street, Crowchild Trail/24 Avenue NW, etc.)
 - These projects are paid from the Safety Improvements Capital Program, \$1 million, which was started in 2015, or other related capital programs and there is currently a backlog of unfunded measures that have been identified through the ISRSR program

Planned actions for 2016

- Completion of In-Service Road Safety Reviews at four intersections and one corridor identified through the network screening process
- Implementation of recommendations from previous In-Service Road Safety Reviews
- Evaluate the effects of previous mitigation measures that have been applied

Strategy 8: Public Response Strategy

Actions initiated /completed in 2015

- Development of Safety Review Guidelines, including Collision Reviews and Safety Assessments to investigate public feedback
- Completion of over 40 Collision Reviews and 10 Safety Assessments based on concerns raised by members of the public or Administration
- Identification of subject matter experts for transportation safety issues

Planned actions for 2016

- Coordinate public response strategy with Calgary Police Service
- Consult with Engage! Unit

Strategy 9: Public Education and Communication Strategy

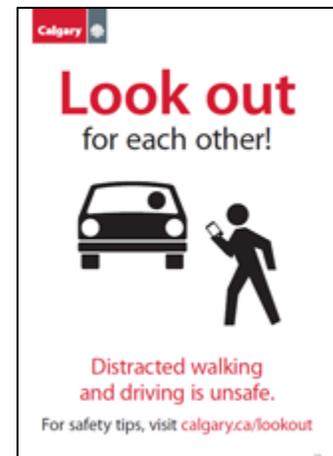
Actions initiated /completed in 2015

- Development and implementation of Cycle Track educational materials (for cyclists, motorists, and pedestrians)
- Use of bike ambassadors to improve awareness and understanding of the cycle track network (more than 20,000 interactions)
- Awareness campaigns regarding: pedestrian safety, back to school, 5 avenue lane reversal, Don't RIP etc.
- SMP Seminars with world renowned traffic safety expert Fred Wegman, and speaker at Safe and Smooth Seminar for Safer Calgary



Planned actions for 2016

- Establishment of Safer Mobility Community Team (pending re-allocation of resources)
- Development of traffic safety factsheets, awareness of traffic safety initiatives to the public (pending support from Engage! or re-allocation of resources)
- Educational materials about Diverging Diamond Interchange at Macleod Trail/162 Avenue
- Work with Community and Neighborhood Services and Engage! Unit.
- Development and implementation of Share the Road Tips Guide (for cyclists and motorists)
- Development and implementation of additional education materials for new bikeways (for motorists, cyclists and pedestrians)
- Use of bike ambassadors to improve awareness and understanding of new bikeways



Strategy 10: Targeted Enforcement Support Strategy

Actions initiated /completed in 2015

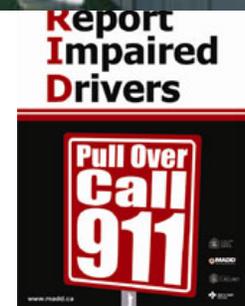
- Deployment of SLOWS Trailers (mobile) and iSLOWS (pole mounted) signs
- Deployment of “Report Impaired Driving” signage
- Update of speed compliance map based on collected traffic data
- Participation in CPS Collision Reconstruction review meetings and sharing of data/analysis of collisions



- “Limit Your Speed” campaign signage

Planned actions for 2016

- Deployment of traffic speed data collection devices to assist CPS in targeted speed enforcement
- Implementation of Community Speed Watch, volunteer lead speed awareness program
- Review of traffic collision/incident management practices and reduction of secondary collisions, renewal of ‘take it off the road’ campaign.



Strategy 11: Safety Research and Innovation Strategy

Actions initiated /completed in 2015

- Approval of RRFB as a traffic control device by the Transportation Association of Canada
- Initiation of the Safer Mobility Research Team
- Primary research comparing efficacy of RRFB devices and overhead flasher devices
- Traffic safety knowledge exchange with the City of Edmonton and Alberta Transportation
- Identification of lead individuals within the City for traffic safety related technical organizations
- Initiation of a TAC project to develop warrants for the use of RRFB



Planned actions for 2016

- Formalize traffic safety knowledge exchange within the Safer Mobility Teams
- Apply video based conflict analysis for proactive evaluation of safety measures
- Pedestrian signal changes at intersections (leading or lagging interval, phasing & timing changes)