City of Edmonton Traffic Safety Strategy (2006-2010)

"It may be the journey, not the destination"

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Abstract

In 2004, the City of Edmonton Mayor established a Mayor's Task Force on Traffic Safety to reduce the high prevalence of collisions on Edmonton roadways. A traffic safety symposium led by the Edmonton Police Service in 2004 engaged over seventy stakeholders to address the problem. A key recommendation of the Task Force was to create a municipal Office of Traffic Safety (OTS). This "political will" is a critical element in any effort to improve traffic safety, and to date is the foundational or cornerstone of Edmonton's Traffic Safety Strategy.

The City of Edmonton OTS had the immediate benefit of working as a multi-disciplinary initiative based on strong support from the Edmonton Police Service and the Transportation Department. Both organizations, working collaboratively established a hybrid office that was formally created and staffed in late October 2006 with an Executive Director, with both organizations contributing financial support.

The initial vision for OTS was an independent entity that works collaboratively and integratively to optimize traffic safety in Edmonton. In the short term, the support of a senior municipal department like transportation has been instrumental in accelerating the abilities of OTS. Having the infrastructure in place to deal with administration and financial process provided the critical time to establish the Edmonton Traffic Safety Strategy.

This paper will focus on efforts by the OTS towards implementation of the Edmonton Traffic Safety Strategy and progress on initiatives based on priorities set within the Strategy. An old adage suggests, when much is given much is expected. This was also the case of OTS with the need to define expectations and set direction for traffic safety in Edmonton. Two important decisions were made which have and continue to serve OTS well. An evidence based approach was adopted to ensure that OTS could optimize best and leading practices in Traffic Safety. This also underscored the advantages of working with a senior department since the City of Edmonton Strategic management office became involved and provided resources to develop the Edmonton Traffic Safety Strategy (2006-2010), through a leading strategic planning process.

OTS had the advantage to work with a traffic safety consultant in developing the first strategy. Through this process the best and leading global traffic safety plans and strategies were reviewed and thirty two potential initiatives were identified for inclusion in the Edmonton strategy. These were also considered in relation to the Road Safety Vision 2010 and the Alberta Traffic Safety Plan. Several early decision points in the strategy development facilitated a better fit for Edmonton's Traffic Safety needs without losing the intent and direction of the national and provincial plans.

By using an evidence based approach, many of the targets and sub targets in both the Road Safety Vision 2010, and the Alberta Traffic Safety Plan could not be validated for Edmonton's Strategy or there was insufficient data to confirm their applicability. Both research and local data supported three high potential targets and the fourth was adopted directly from the national and provincial plans. The issues of speed, impaired driving, and intersection collisions were notable in local data, however the collection and usefulness of data remains a roadblock in establishing the exact nature and prevalence of speed and impaired driving collisions.

Targets

Target #1, a 20% reduction in intersection related collisions was adopted from Road Safety Vision 2010. Target #2, support the increase of seatbelt use to 95% was also directly adopted from Road Safety Vision 2010. Both Targets #3 and #4 relating to Impaired Driving and Speed, as noted earlier were included, however with the proviso that specific baselines and targets needed to be established. See the Edmonton Traffic Safety Strategy (2006-2010) [1]

In retrospect, the selection of these targets based on research and evidence proved to be the best direction, and work is ongoing to determine the best interventions. One caveat to the targets is the seatbelt compliance rate which is not easily facilitated at the municipal level, and is probably best suited for national and provincial plans. This does not suggest that local law enforcement shouldn't enforce seatbelt laws in support of national and provincial efforts. Part of the benefit in working in a multi-disciplinary and orders of government system is optimizing roles and responsibilities, and in this case the best fit is probably provincial and national.

Strategies

The selection of the eighteen strategies in the Edmonton Traffic Safety Strategy reflects the review of the initial thirty plus initiatives and their applicability to Edmonton. The

[1] Edmonton Traffic Safety Strategy (2006-2010) can be located at http://www.google.ca/search?hl=en&source=hp&q=edmonton+traffic+safety+strategy&aq=f&aqi=&aql=&oq=&gs_rfai=

stakeholder input was critical in identifying which were important to Edmonton as well as establishing local support. As in the case of both the targets and strategies, it was felt less was more, and too many targets and strategies only reduce the potential to focus on evidence based directions. The second important decision, in essence, was to use an Edmonton based mix and match approach, as opposed to a one size fits all approach.

Several strategies were identified as high value opportunities however the following three were deemed to be the most important.

1. Strategy #1-The OTS will co-ordinate and where possible, support integration of activities between various departments involved and be the focal point for traffic safety for the city.
2. Strategy #5- Identify and improve systems for data collection and data management.
3. Strategy #14- Continue traffic engineering analysis and techniques to assess and prioritize safety initiatives

Each of these strategies has now contributed to initiatives that are active in supporting the reduction of collisions in Edmonton and will be identified or discussed later in the paper.

Through the strategic management process, the targets were weighted, and the strategies were prioritized. These results were based on evidence, stakeholder input and validation. The Edmonton Strategy aligns with the national and provincial plans and reflects the priority of local traffic safety issues. This process was critical when the Edmonton Strategy was introduced to the community through the media. More specifically, the rigor of the process answered the basic 5 why's (who, what, where, when, why).

Strategy Implementation

In developing the Edmonton Strategy, it should be noted that strong support is needed to create the time and space to do the proper strategic planning. This is especially true with the first one, to ensure all stakeholders get an opportunity to provide input and feedback. By using subject matter experts and an approved strategic planning process, the time it took to finish the Edmonton Strategy, albeit longer than normal, was time well spent and not subject to criticism.

With the Edmonton Strategy completed by mid-2007, the operationalization of the strategy began with the hiring of staff and a re-organization in the Transportation Department. A collision data entry unit which was responsible for data entry of Edmonton collisions and production of monthly and annual collision reports was transferred to OTS. This unit continues to provide timely collision data for analysis, as well as prepares various reports, including the annual Motor Vehicle Collision Report for Edmonton.

The collision data is extracted from the provincial collision reports prepared by the EPS and entered into the OTS Motor Vehicle Collision Information System (MVCIS)

database. To improve decision making, data input was moved from a passive activity to proactive input, with collision data being targeted for entry within 30 days of occurrence. Limitations in the collision report processing system may not always meet this target but the data available does provide quicker trend analysis. This system is now being slowly replaced by the provincial rollout of electronic reporting which will substantially improve the timeliness and availability of collision data.

It was and is still evident that there are systemic gaps in the integration of traffic safety data. The following traffic safety data initiatives were undertaken but are not discussed further in the paper. With limited resources, efforts were undertaken to integrate data sets from different internal systems through a business intelligence process (originally Cognos 8). This has now led to the use of Business Objects software to integrate data from various departments. These business intelligence applications provided the initial impetus to leverage data however has greater potential. This has since necessitated the creation of a co-chaired multi-department traffic coordination data committee to optimize data collection, storage, analysis, and multi-stakeholder use.

In order to determine the prevalence of impaired driving in Edmonton, a research project is being conducted by the Office of Traffic Safety, the Edmonton Police Service, and the University of Alberta Sociology department into the Curb the Danger Program. This program was initiated in late 2006 to increase the detection and reporting of impaired drivers by community members through 9-1-1. This second generation program, partially based on Operation Lookout provides greater interaction between the police and public in the detection and apprehension of impaired drivers. This initiative has also resulted in the development of Curb the Danger Signs by the Transportation Department that are Trade named and displayed in three different sizes in strategic locations in Edmonton. Significant increases in impaired drivers are now being detected through this program.

Other programs that were initiated as a result of the three previously identified strategies will be discussed later in this document. These programs include the Top 20 high Collision Locations, Speed Management Continuum, and the Integrated Corridor Safety Program. Where possible evidence based results will be discussed, as well as policy implications. The reported results will be reflective of the best information available as of June 2010. These results maybe subject to change based on new data or statistical validation.

Top 20 High Collision Locations

A review of the 2006 collision data noted that 51 % (13,286/26,066) of collisions were intersection related. As a starting point, OTS established the Top 20 High Collision Locations (HCL's) report which was completed in 2007. The selection of the Top 20 HCL's is based on the following OTS criteria;

Given the limitations of the individual methods (i.e frequency, rate and severity), the crash score method was selected to identify Top 20 High Collision Locations (HCL). A

combination of frequency, rate and severity of collisions was used in calculations with greater emphasis on frequency and rate of collisions (combined weight of 80%) than severity of collisions (weight of 20%)[2]

Regardless of the process, the analysis and selection of these locations provided a focal point to begin the integration and collaboration of engineering and law enforcement efforts.

The Traffic Engineering Group also prepares annual recommendation reports for various engineering changes also utilizing the crash score method for identifying the Top 20 locations to review. The majority of locations in the list were at signalized intersection locations. The process completed included detailed collision analysis and targeted field observations based on this analysis. The key findings from a more detailed collision review and field observations of these locations were high crashes associated with following to closely occurring at right turning points in the intersections with right turn island separations. The next most common crash type was crashes connected with left turning across the path of opposing traffic. Typical recommendations from these findings were to modify the right turn geometry and left turn operations respectively.

In addition to recommendations for altering these collision patterns general observations of traffic control/guide signing, roadway markings and traffic signal fixture condition and location were also reviewed. Recommendations from these reviews were primarily ensuring proper maintenance and condition of existing signing and markings as well as recommendations for location changes or additions where required for more positive guidance.

As noted in research and practice, law enforcement can be quickly mobilized for targeted enforcement, but should be considered a short term intervention. In this case, Table 1 notes the prioritization of the Top 20 HCL's for 2006 in Edmonton and where available, the assignment of direct police enforcement. The resources were drawn from operation response to call police divisions, as well as EPS Traffic Section which has a city wide mandate.

The comparison in Table 1. with before and after enforcement intervention would suggest after one year worth of data that intersections with active law enforcement generally experienced a decline in collisions and those without enforcement experienced an increase. The intersection ranked #23 was added to the list to provide a minimum of two locations for enforcement in the downtown police division.

Collision analysis of the Top 20 HCL's noted a trend that was isolated to the right turn cut-off design of the standard signalized intersection. Based on the analysis, 30% of the collisions at these intersections were occurring in the right turn cut-offs. An engineering review utilizing consultant based subject matter expertise and a cross functional engineering review team has developed and implemented a new matrix based right turn

[2] Thue, L. and Neuman, C. (September 2007). Top 20 High Collision Intersections in Edmonton, Office of Traffic Safety

cut-off design selection model. The new right turn selection matrix takes into consideration traffic characteristics (such as traffic capacity, turning traffic compositions etc.) road characteristics (such as property constraints, upstream/downstream conditions and receiving roadway standard pedestrian/vulnerable road user characteristics (such as pedestrian activity, pedestrian comfort/security and land use near intersection

Table 1. Enforcement Intervention Effects

2006 Rank	Intersection	Assigned To	Jan - Jun 2007	Jan - Jun 2008	Change	
1	23 Av & Gateway Bv	Southwest	44	32	-27.3%	
2	107 Av & 142 St	West	47	47	0.0%	
3	23 Av & 91 St	Traffic 1	32	37	15.6%	
4	Mill Woods Rd & 91 St	Southeast	22	24	9.1%	
5	137 Av & 113A St	North	25	28	12.0%	
6	87 Av & 170 St	Not Assigned	22	40	81.8%	**
7	118 Av & Groat Rd	Traffic 3	49	26	-46.9%	**
8	34 Av & 91 St	Traffic 1	30	31	3.3%	
9	95 Av & 170 St	West	39	21	-46.2%	**
10	137 Av & 127 St	Traffic 3	29	24	-17.2%	
11	23 Av & 111 St	Southwest	26	17	-34.6%	
12	118 Av & 101 St	Downtown	20	21	5.0%	
13	Yellowhead Tr WB & Victoria Tr	North	26	25	-3.8%	
14	137 Av & 97 St	Traffic 2	37	33	-10.8%	
15	Whitemud Dr EB & Calgary Tr	Not Assigned	12	11	-8.3%	
16	100 Av & Anthony Henday Dr S	Not Assigned	13	18	38.5%	
17	Yellowhead Tr & 149 St	Not Assigned	29	34	17.2%	
18	87 Av & 178 St	Not Assigned	22	31	40.9%	
19	23 Av & Parsons Rd	Southeast	27	30	11.1%	
20	153 Av & 127 St	Traffic 2	22	28	27.3%	
23	Gretzky Dr, Yellowhead Tr, Fort Rd	Downtown	32	24	-25.0%	
	TOTAL - Top 20		**605**	**582**	**-3.8%**	
	TOTAL - Targeted for Enforcement		**507**	**448**	**-11.6%**	**

** Denotes statistical significance at 95% confidence level

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The most problematic right turn cut-off (RTC) at Yellowhead Trail westbound off ramp and the RTC onto Victoria Trail northbound was fast tracked for change and the construction was completed in November, 2009 as shown in Figures 1 and 2.

Figure 1. Yellowhead Trail and Victoria Trail Original Design

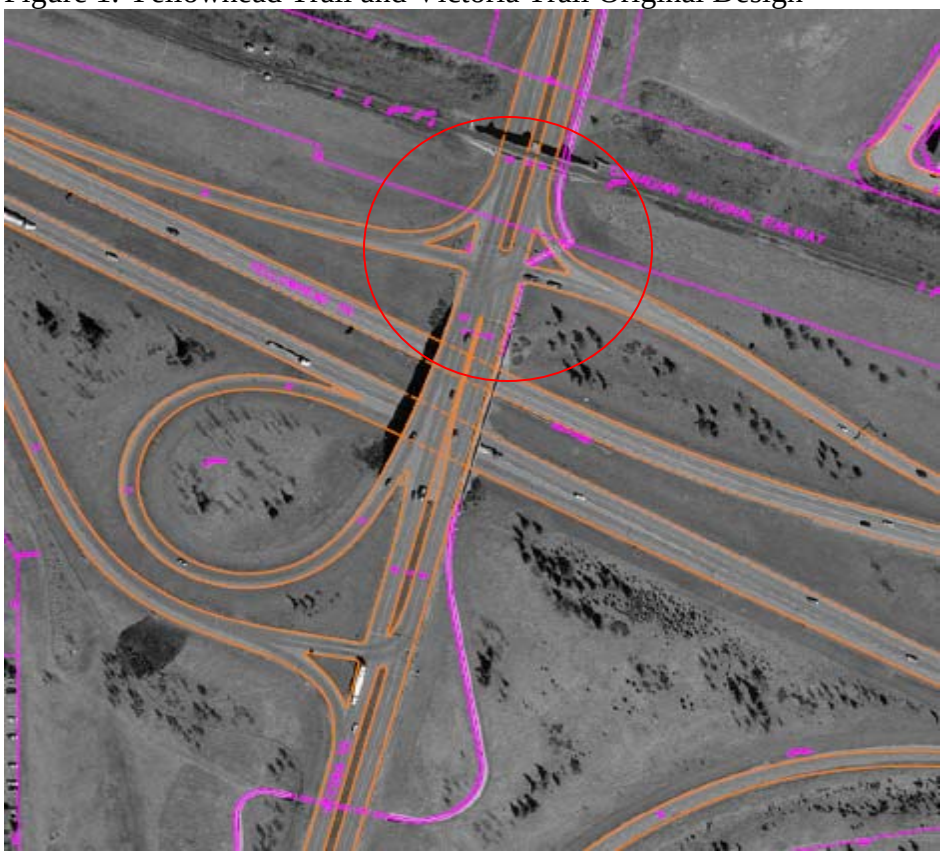
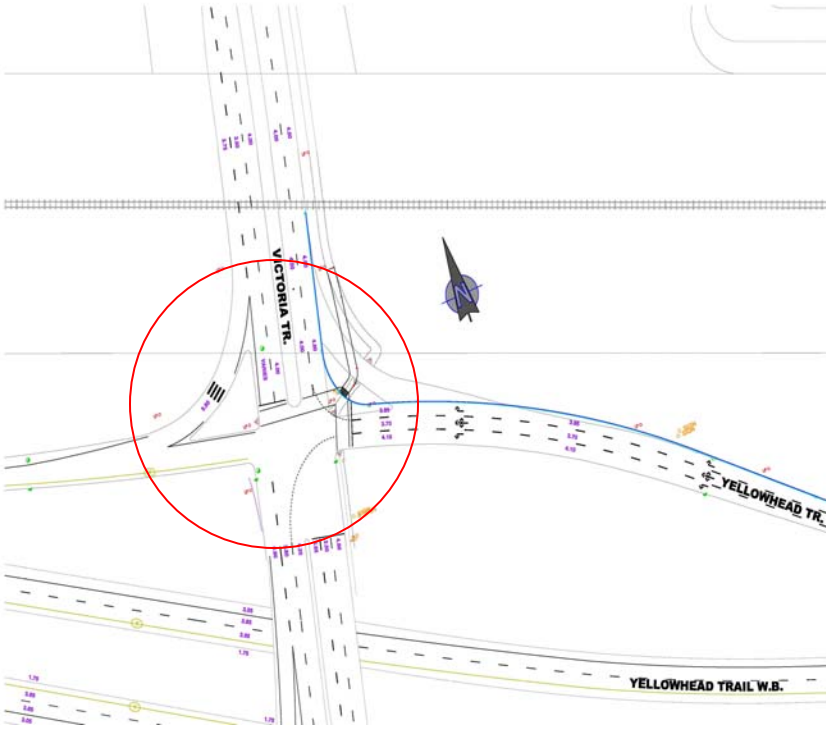


Figure 2. Yellowhead Trail and Victoria Trail Design Change November, 2009



The change to date has eliminated the RTC collision problem, removed the traffic queue at peak evening times on the ramp which was causing traffic to backup onto the Yellowhead Trail, a major arterial road with a 100 km/h speed limit.

Yellowhead Trail and Victoria Trail Capacity Analysis

The summary of the capacity analyses of the existing conditions and the future alternatives is presented below.

Under ***Existing Conditions*** the intersection of Yellowhead WB Off-Ramp and Victoria Trail is operating at an unacceptable level of service (LOS) "F" with westbound right turn movement also operating at an unacceptable LOS "F" with very high delays (300 sec) and queues extending beyond 300 meters. All other movements are operating at an acceptable LOS and v/c ratios.

Under ***Option 1 Scenario (free flow WB right turn movement with single NB through lane at WB off-ramp and single eastbound left turn lane at EB off-ramp)*** the intersection of Yellowhead WB Off-Ramp and Victoria Trail is projected to operate at an acceptable LOS "B" with significant reductions in delay. The overall v/c ratio would improve to 0.78 (vs 1.0 for the existing conditions). However, the northbound through movement would degrade from LOS "B" to "C" with v/c deteriorating from 0.48 to 0.84. Also the queue for the northbound through movement would extend beyond 200 m. Also the eastbound left turn movement at the Yellowhead EB Off-Ramp and Victoria Trail would degrade from LOS "C" to "D" with v/c deteriorating from 0.29 to 0.72.

Under ***Option 2 Scenario (Dual WB channelized right turn lanes with Yield control and two NB through lanes at WB off-ramp),*** the intersection of Yellowhead WB Off-Ramp and Victoria Trail is projected to operate at an acceptable LOS "B" with significant reductions in delay with all the three critical movements also operating at acceptable LOS "B". The v/c ratios for the westbound right turn and eastbound left turn movements would also improve compared with the existing conditions. The v/c ratio for the northbound through movement would degrade to 0.68 (vs 0.48 for existing conditions), however the overall v/c ratio for the westbound off-ramp would improve to 0.69 compared with the existing conditions (1.0) and option 1 scenario (0.78).

Under ***Option 3 Scenario (Dual WB Non-channelized right turn lanes with signalized control and "No Right Turn on Red" restriction and two NB through lanes at WB off-ramp),*** the intersection and all the three critical movements are projected to operate with similar LOS and v/c ratios as they would operate under Option 2. This was the option recommended and implemented.

A pre and post video based time to collision software program was utilized to determine post traffic safety benefits of the new design change. Preliminary indications from this review suggest a significant traffic safety benefit was realized however the final report has not been completed.

Based on the RTC engineers review, the known traffic safety benefits of the new RTC matrix on collision reduction has resulted in a policy review and change for this design application. New intersections are now built using the new design standards, intersections undergoing upgrades or reconstruction are subject to the same review, and a

cost benefit review of problematic t RTC collision locations has identified a priority list for capital program improvements.

The Top 20 HCL's that involved traffic circles were reviewed separately by subject matter consulting experts. Recommendations ranged from full conversion of some circles to signalized intersections, modified engineering changes to other locations circle design, or no recommended changes. Locations identified for changes will be included in the capital budget for funding prioritization.

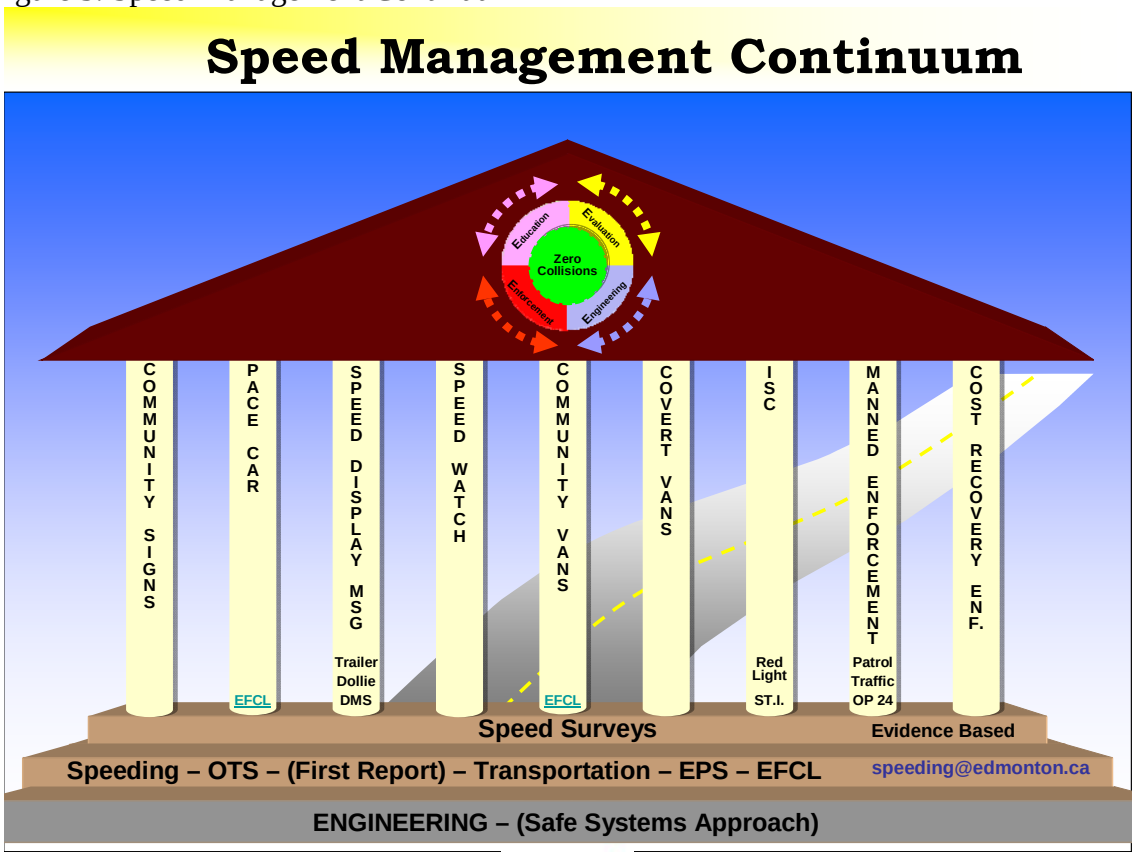
The deterrence theory is generally applied to law enforcement efforts in reducing traffic or criminal related activities. In this case, general deterrence a subset of the deterrence theory was effective in reducing HCL collisions in a relatively short time. The greater time spent by the police at these locations seemed to produced greater collision reductions. As noted earlier, police enforcement is and should be a short term application for two main reasons. Initial efforts will detect high numbers of violators but as time passes, driver behaviour changes to reflect the presence of police. Secondly, police resources tend to be action orientated and with a decrease in potential violators, they generally prefer to be deployed to more active locations. This resulted in the expansion of traffic safety efforts to include the Integrated Corridor Safety Program which will be discussed later in this paper.

Speed Management Continuum

The 2004, 2007, and 2010 City of Edmonton Citizen Surveys and Edmonton Police Service Citizen Surveys report speeding and traffic as equal as or greater than the issues of homicides, and gang and drugs, in Edmonton. This ongoing citizen concern has necessitated a change in the way speeding is handled in Edmonton. The Speed management continuum was created to meet the needs of integrating education, engineering, enforcement, and evaluation (the 4 traffic safety E's). To make it easier to understand, the continuum is depicted in Figure 3.

This is the third iteration of the continuum and reflects the desire for continuous improvement based on new speed management research, community involvement, and experience. A general narrative follows with regard to the continuum, however will not address the specifics of the traffic safety benefits, program research, or evaluation components. The continuum provides an opportunity for one entry point in reporting speed related complaints that meets the needs of the police, transportation department, and other related stakeholders. The ultimate goal of the speed management continuum is to ensure that the efforts of all traffic safety stakeholders dealing with speed related complaints are done in the most efficient and effective way, through the integration of resources and seamless collaboration. This will then provide the most appropriate level of service, in dealing with speed related complaints, to the citizens of Edmonton' in the most cost beneficial fashion.

Figure 3. Speed Management Continuum



The foundational base for the speed management continuum is the engineering aspect which was recently added to begin to address a Safe Systems Approach, as well as integrate engineering changes identified from dealing with speed related complaints, and collisions. The first opportunity came from the identification of the RTC problem (discussed previously) which related to earlier road designs standards that permitted higher turning speed at a time there was substantially less traffic. The second opportunity came in the form of a review of speeding complaints reported to police and OTS. Oversize collector roads, 14.5 m's wide, were identified through analysis as contributing to an over representation of all speed related complaints. This design standard has been reduced to 11.5 m's for new roadways, and countermeasures are being developed to deal with the present infrastructure inventory. Engineering will continue to be at the forefront of any speed management efforts, and is now positioned to include a Safe Systems Approach.

The Edmonton Police Service and OTS have agreed to allow speeding complaints to be directly reported to the Speed Management Coordinator at the Office of Traffic Safety. This position is specifically designated to deal with all speed related complaints through a first report process. Complaints are then considered in relation to the speed management continuum. All speed related complaints are immediately forwarded to EPS for information, as well, the coordinator receives EPS complaints for inclusion into a OTS database. These complaints can also come through a designated email address of

speeding@edmonton.ca or through one of our stakeholders like the Edmonton Federation of Community Leagues (EFCL)[2].

In support of an evidence based process, speeding complaints generally result in a speed survey being conducted at the identified location through the use of NC-200 portable traffic analyzers which provide speed related data, vehicle classification and count. This process provides a speed profile or baseline which can then be used for a variety of enforcement, engineering, and other related decisions. In 2008, over 800 surveys were done, and each survey used from one to forty-four units, depending on location and required sample size.

The first pillar from the left signifies the ability to install community information signs based on speed complaints in low traffic volume areas, restricted access, or simple a desire by the complaints to use education as a tool to slow down drivers. These signs generally have a yellow background and display wording like, "Give our kids a brake, slow down," and "Slow down, this is your neighbourhood." The speed management coordinator can initiate these requests directly through the Transportation Department.

The Pace Car program is well recognized internationally and is included as part of the community initiatives available to reduce speeding. A window cling or bumper sticker (non-adhesive) can be affixed to vehicles which indicate that the driver is an official "Pace Car" and "I drive the limit." These stickers are generally distributed through the Edmonton Federation of Community Leagues, one of our traffic safety stakeholders, and seem to be popular in areas with more seniors based demographic. The program is presently being extended to some of the City of Edmonton's road maintenance fleet.

A transportation technician, assigned to OTS has an inventory of Speed Display Trailers, and portable speed display dollies. The larger towed speed display trailers are usually deployed on higher volume roadways but can also be used in neighbourhoods, or for speed related projects. The speed display dollies, which can easily be handled by one individual, typically are assigned to school staff or community representatives who agreed to deploy, retrieve, and charge the units on a daily basis. In 2010, a small inventory of digital message signs are now being used as well to determine there applicability for speed management.

A third community based program with an international history is the Speedwatch initiative. This program is run collaboratively with EPS and OTS. OTS supplies fourth generation, radar based, tripod mounted, display boards for use by trained EPS community volunteers. A fourth generation speed display board can display vehicle speeds visible on the backside of the board for enhanced safety, adjust the speed display for viewing through a rearview mirror, and hold and flash the top end speed for seconds, to provide time to capture the license plate number. This program employs a three strike process for speed management compliance. The first strike is the speed limit, whether posted or un-posted. The second strike is the deployed speed display board which is

manned by community volunteers, dressed in appropriate safety equipment. The third strike is manned police enforcement.

Speedwatch teams trained by the EPS are assigned locations where speeding has been identified as a problem. These locations are generally local roadways, with some collector roads, but not arterials. The equipment is set up and volunteers monitor traffic and take basic statistics that show vehicle counts and speeds. Vehicles exceeding 15 km/h over the speed limit where a license plate is obtained by a volunteer are provided to the EPS, who then send the registered owner an information letter outlining the circumstances of the violation. In situations where speeding is identified by Speedwatch teams as excessive, police resources can be deployed separately or in tandem with the Speedwatch efforts. The EFCL endorses and supports Speedwatch as a community based speed management program.

The community vans are fully functional photo radar vans that are fully marked with wrap around visuals that depict themes of "We work here," We play here," and "We live here." These overtly visible education based enforcement tools are specifically designed to educate drivers of speeding concerns but have the capability of enforcing violators who fail to slow down through photo radar technology. These units are generally deployed in communities, by playgrounds and schools where speeding complaints are noted or can be requested through the EFCL for consideration of deployment by EPS. This educational/enforcement tool has strong media and community support and negates any comments by the public of unfairly penalizing speeding drivers.

The OTS is responsible for all equipment relating to intersection safety cameras (devices) (ISC's) and automated mobile photo radar enforcement. Second generation red light and speed through intersection ISC's support the speed management continuum. Twenty-five ISC's were installed in high crash intersections in 2009, and another 25 ISC's will be installed in 2010. The first series of 25 sites were selected from previous sites used in the first generation red light only program. The second series of 25 sites were selected through a safety performance function review and recommended to the EPS for enforcement. The EPS reviewed and affirmed the site selections as suitable for enforcement.

Mobile automated photo radar enforcement equipment is managed by OTS, and includes ten covert vehicles, and the four community safety vans (noted above). The EPS is responsible for staffing and deployment of these units in compliance with the guidelines established by the Government of Alberta for automated enforcement. Scientific methodology is being developed to assist EPS in deployment recommendations by OTS however EPS retains sole responsibility for site selection and enforcement. Recommendations for the deployment of the community safety vans can come from several sources like the speed management coordinator, EFCL, schools, and communities, and are vetted by the EPS for guideline compliance before deployment. As indicated earlier, the primary purpose of these units are educational, unfortunately many drivers are oblivious to the presence of these units or are driving distracted, which then engages their enforcement capability.

Manned enforcement is carried out by various police general duty divisions, or through support services like EPS traffic section. In addition to regular proactive speed enforcement, the EPS has adopted the Operation 24 Hours program which is now a collaborative effort between EPS and OTS. Digital Messaging Signs (DMS's), both permanent and portable are used for advising motorists of forthcoming speed enforcement. DMS's are activated as early as five days prior to supplemented manned speed enforcement, with a message of "Big Ticket Event" "Don't Speed." On the fifth day, with the messaging active, a large and coordinated manned enforcement action is under taken which continues to detect large numbers of speeders (See table #1). The smaller numbers of violators noted in some of the winter months, generally reflects poor road and or very cold weather conditions.

Table 2. Operation 24 Results (Courtesy of the EPS Traffic Section)

Summary of Operation 24 Hrs Results Since Inception				
Operation		Offender Type		
		Speed	Other	Total
2008	Sep	1,887	323	2,210
	Oct	1,703	497	2,200
	Dec	552	235	787
2009	Jan	1,099	268	1,367
	Mar	918	814	1,732
	Apr	2,289	360	2,649
	May	1,294	300	1,594
	Jun #1	1,453	461	1,914
	Jun #2	1,619	179	1,798
	Sep	1,171	317	1,488
	Oct	1,081	424	1,505
	Dec	254	266	520
2010	Jan	869	238	1,107
	Feb	1,123	304	1,427
	Mar	2,446	397	2,843
	Apr	2,047	390	2,437
	Jun	1,904	414	2,318
Total		**23,709**	**6,187**	**29,896**

Research supports the combination of media campaigns coordinated with enforcement campaigns for best results in speed enforcement. Preliminary data reviews of Operation 24 Hour DMS messaging and speed enforcement appears to suggest a reduction in collisions for 2 or more days after the enforcement. Due to data and equipment limitations, these findings cannot be statistically validated at this time.

When all available police resources have been expended for speeding enforcement and circumstances dictate the need for additional speed enforcement, the OTS can provide overtime funding to the police to conduct additional or necessary speeding enforcement. This program is basically a cost recovery process and the fines generated from

enforcement offset the extra policing costs. A similar program in Fresno California, which this initiative is based on, uses funds from police enforcement to support additional police resources. Coined "violator pay" this fine revenue funded police traffic enforcement has produced excellent results in the reduction of collisions in Fresno, California.

The continuum is designed for continuous improvement in speed management by focusing on the 4 E's of Traffic Safety. Whether through ongoing research, pilot projects, or new information from traffic safety conferences, the continuum will continue to be up dated with a goal of creating a macro speed management statistical model that will incorporate leading or best practice methodology. This systemic approach will move the process of speed management in Edmonton towards the optimization of resources, and the ability to determine the most efficient and effective way to collaborate and integrate traffic safety stakeholders.

A residential speed reduction pilot project (May to October 2010) in six neighbourhoods dropped the speed limit from 50 km/h to 40 km/h. This project will determine the effectiveness of the reduced speed limit in relation to collisions; determine which elements in the speed management continuum (discussed later) support speed reduction, and other related opportunities. Control and displacement neighbourhoods will be considered in the project, as well as pre and post neighbourhood surveys.

In order to determine the prevalence of impaired driving in Edmonton, a research project is being conducted by the Office of Traffic Safety, the Edmonton Police Service, and the University of Alberta Sociology department into the Curb the Danger Program. This program was initiated in late 2006 to increase the detection and reporting of impaired drivers by community members through 9-1-1. This second generation program, partially based on Operation Lookout provides greater interaction between the police and public in the detection and apprehension of impaired drivers. This initiative has also resulted in the development of Curb the Danger Signs by the Transportation Department that are Trade named and displayed in three different sizes in strategic locations in Edmonton. Significant increases in impaired drivers are now being detected through this program.

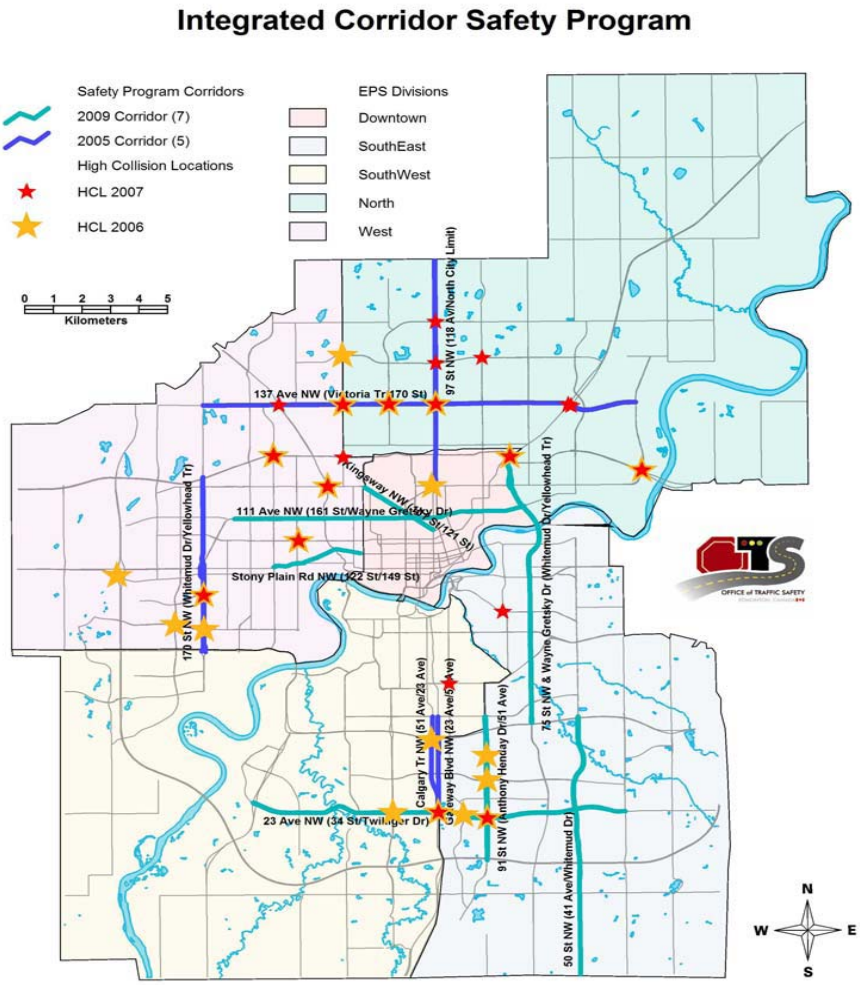
Integrated Corridor Safety Program

The Integrated Corridor Safety Program (ICSP) was initiated to look at larger portions of Edmonton roadways for potential traffic safety opportunities. Twelve corridors (roadways) were identified that had high rates of collisions, usually contained one or more high collision locations, or were high volume arterial roads that moved traffic into and out of the city (see Figure 4). The selection of the present ICSP corridors was based on some previous recommendations by engineers and safety experts, a review by the EPS, and high numbers of collisions. Future corridor selection for this program would benefit from a more robust methodology.

The immediate benefits of this approach was the greater latitude of police to conduct law enforcement activities that did not restrict them to one specific site like previously experienced with the HCL's. With the corridor program, the engineers can now conduct traffic safety reviews along problematic roadways, and have created a template for use in reviewing these corridors. To date, four corridors have been or will be reviewed by the end of 2010. The traffic safety engineering reviews and template development will be briefly discussed later in the paper. The template will be used to review all the corridors to ensure consistent factors are compared to the same standard.

Initial analysis of the corridors are done for collisions, and a series of reports are prepared that integrate information that is critical for law enforcement and engineering. These reports are prepared on a quarterly or annual basis, and provide an update to activities from the police and engineering elements. As the process and reporting develops, additional information is being added to the reports and includes photo radar statistics, ISC statistics, deployment hours of speed display equipment, and any engineering changes.

Figure 4. Edmonton Integrated Safety Corridors



The following elements are contained in the traffic safety reviews being conducted by engineers from OTS and Traffic Engineers Sections.

In the office, collision data was analyzed to find out potential causes of the collisions at intersections and mid-blocks along the corridors. The safety review team met to list potential causes at the end of office analysis.
The review team conducted field observations at each study site and reviewed the physical characteristics and traffic operations of the corridors as an integral part of this process. Based on the information gathered from these reviews, the road safety issues that contributed to increased risk of collisions at each site and potential mitigating improvements issues were identified. These countermeasures ranged from modification to roadway geometry, review of existing policies to maintenance countermeasures such re-paint faded pavement markings etc., signage, street blade locations, visibility and legibility etc.

All the potential improvements were then prioritized by conducting economic analysis utilizing collision costs[3] discount rates and service life etc. applicable to City of Edmonton.

After implementation, these improvements will be evaluated to determine effectiveness of these measures and to improve process for future corridor reviews.

The following tables depict some of the initial results achieved from the integration of enforcement and engineering in the Integrated Corridor Safety Program.

Table 3. City-Wide Collisions (Including ICSP Corridors – 2009 Results)

Year	Collision Frequency by Cause										Injury Collisions		Fatal Collisions		Total Collisions	
	FTC		ROR		ILC		LTXP		FOTS							
2009	10,996	2%	2,729	-9%	2,716	-5%	2,002	-5%	1,377	2%	3,962	-16%	29	4%	28,832	-1%
2008	10,797	-3%	2,988	21%	2,857	15%	2,110	-11%	1,346	-8%	4,730	-14%	28	-10%	29,072	2%
2007	11,095	-	2,474	-	2,476	-	2,359	-	1,462	-	5,482	-	31	-	28,520	-
Total	**32,888**		**8,191**		**8,049**		**6,471**		**4,185**		**14,174**		**88**		**86,424**	

FTC – Follow too close, ROR – Run off Road, ILC – Improper Lane Change, LTXP- Left Turn Across Path, FOTS – Failed to observe traffic signal

[3] De Leur, P (March, 2010), Collision Cost Study, de Leur Consulting Ltd.

Table 4. ICSP Corridors collisions only

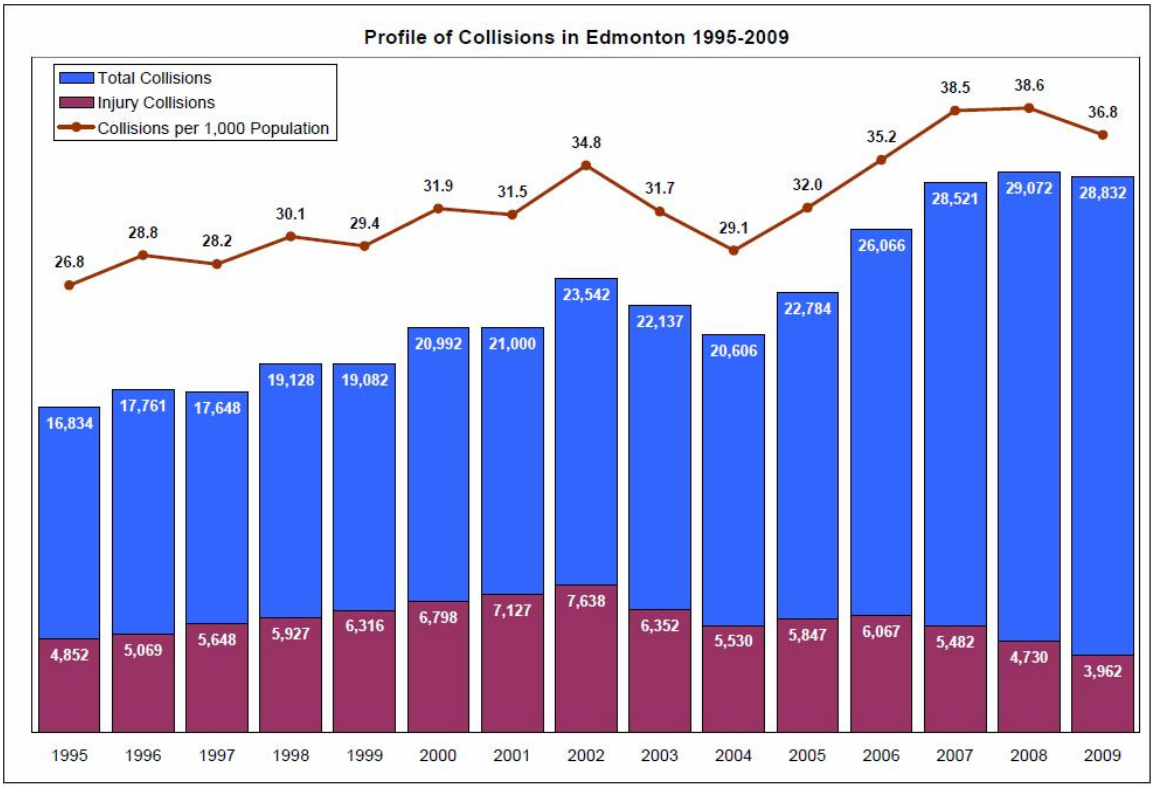
Year	Collision Frequency by Cause										Injury Collisions		Fatal Collisions		Total Collisions	
	FTC		ROR		ILC		LTXP		FOTS							
2009	2,916	-2%	218	-19%	490	-14%	582	-7%	402	-3%	843	-21%	4	-20%	5,136	-6%
2008	2,961	-5%	269	22%	568	18%	629	-10%	413	-10%	1,062	-22%	5	0%	5,437	-1%
2007	3,131	-	220	-	480	-	701	-	459	-	1,353	-	5	-	5,502	-
Total	9,008		707		1,538		1,912		1,274		3,258		14		16,075	

Overall, the 2009 trends suggest that there is a decline in collisions citywide and an additional 5% reduction in the ICSP corridors. This decline appears to continue in the 1st Qtr of 2010 with an additional beneficial decline in the targeted corridors.

Profile of Collision in Edmonton 1995-2009

The collision profile for Edmonton is identified below in Table 5.

Table 5. Edmonton Collision Profiles



It is no doubt to early to determine what impact all the previously mentioned programs have had on reducing collisions in Edmonton. It is apparent that the number of injury collisions continues to decline over the past four years. In reviewing the total number of collisions, there has been a slight decline of 1%, however it should be noted that the

reported collision property damage estimates continues to decline from 2007 to 2009 (see Table 6.). This may be indicative of a reduction in the severity of collisions, or some other factors.

Table 6. Edmonton Estimated Collision Property Damage Costs

	Estimated Collision Property Damage per year	
2007	2008	2009
$106,067,596	$97,366,905	$88,264,858

Preliminary collision data from 2010 that has not been validated suggests the trend is continuing with a reported 16.5% reduction in overall collisions when comparing January-May 2009 and January-May 2010. Similarly, injury and fatality collisions are tracking at a 15.3% reduction when comparing the first five months of 2009 to 2010.

Building Expertise and Capacity

In 2009, the Edmonton Police Commission and the City of Edmonton Office of Traffic Safety hosted the first Edmonton International Urban Traffic Safety Conference. The conference emphasized the benefits of leading and best global traffic safety practices with presentations from Eric Howard on the Australian Safe Systems Approach, and Sustainable Safety by Fred Wegman from SWOV. Other leading traffic safety researchers and practitioners provided insight into opportunities for traffic safety improvement.

In 2010, the Second Annual Edmonton International Urban Traffic Safety Conference was hosted by the Edmonton Police Commission, the City of Edmonton Office of Traffic Safety, and the Capital Region Intersection Safety Partnership (CRISP). A major study commissioned by CRISP and available on their website, was released at the conference and identified the Cost of Collisions in the Edmonton Capital Region for 2007. Direct collision costs in the Edmonton Capital Region in 2007 were estimated at slightly less than 1 Billion dollars.

Two outcomes of the conferences to date will continue to support building traffic safety expertise and capacity. During the first conference, the City of Edmonton in an unprecedented move approved the creation of a permanent endowed Urban Traffic Safety Research Chair at the University of Alberta, Faculty of Engineering. After reviewing the benefits of the first two conferences, Edmonton will continue to host an annual International Urban Traffic Safety conference.

The next generation of the Edmonton Traffic Safety Strategy (2011-2015) is a work in progress. The same strategic management process team is leading this initiative. The value of having a strategic plan or strategy cannot be over stated. As with the first strategy, resources will be targeted at improving data collection, analysis, and integration of efforts based on the 4 E's and the safe systems approach.

Conclusion

The City of Edmonton Office of Traffic Safety established the Edmonton Traffic Safety Strategy (2006-2010) based on alignment with the Road Safety Vision 2010, the Alberta Traffic Safety Plan, and examination of Edmonton collision data. A final evaluation will be completed when the Edmonton Traffic Safety Strategy (2006-2010) is completed at the end of this year. After three years of program development and implementation, the 2010 mid-year results suggest a declining trend in collisions for Edmonton.

Efforts continue to focus on ensuring that an evidence based approach is a key element of OTS traffic safety initiatives. Much work remains to be done in this regard, and will require ongoing improvements in collision data collection, analysis, evaluation (statistics and methodologies), and efficient and effective integration of all traffic safety stakeholders through a systemic approach.