Selecting Communities for Piloting the New Reduced Speed Limit on Residential Roads in the City of Edmonton

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Abstract

In October 2009, Edmonton City Council, with support from the Edmonton Federation of Community Leagues, initiated the residential speed reduction pilot project. The Office of Traffic Safety (OTS) was tasked to develop and initiate the pilot project, identify six residential communities for proposed speed limit reduction, and reduce the speed limit from 50 km/h to 40 km/h. This paper reports the selection criteria and the use of the Analytic Hierarchy Process (AHP), a multi-criteria decision analysis tool to create a ranked list of neighbourhoods. Additional criteria such as incoming and ongoing neighbourhood road rehabilitation plans, neighbourhood development and roadway network types were used to further scrutinize the ranked list and select six communities for the pilot project. The project commenced on May 1, 2010 and concluded October 31, 2010.

Introduction

Speed has been identified as a key risk factor in road traffic injuries, influencing both the risk of road traffic collisions and the severity of the injuries that result from them. Vanlaar et al. (2008) reported that over 20% of collisions in Canada involve excessive speeding or driving too fast for conditions. In 2006, such collisions have resulted in about 800 fatalities and approximately 3,000 serious injuries in Canada. In the province of Alberta, 17% of drivers who were killed were traveling at an excessive speed (Alberta Traffic Safety Plan, 2006). Elvik (2005) reported that speeding is a major factor in motor vehicle collisions, especially those resulting in serious injuries.

The association between driving speed and the risk of being involved in a collision and being injured or killed in a collision, is well established within the traffic safety literature. Figure 1 below illustrates the risk of a pedestrians fatality at a given impact speed. Higher speeds are associated with a greater risk of a collision and a greater probability of fatal injury. This is due to the fact that as speed increases, so does the distance travelled during the driver’s reaction time and the distance needed to stop. Also, at greater speeds, the effects of drivers’ errors are magnified. Aarts and van Schagen (2006) reported that the increase in collision rate is proportional to the increase in driving speed. Furthermore, Cooper (1997) reported that the probability and extent of injury in collisions is a direct function of initial impact speed.

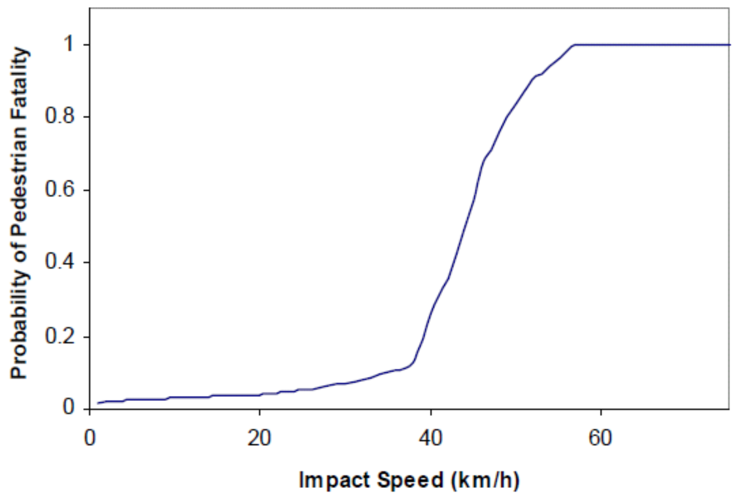

Figure 1. Relationship between Risk of Death to Pedestrians & Impact Speed (Anderson et al, 1997)

Many studies have shown that reduced speeds greatly increase safety for road users (see for example, Aarts and van Schagen, 2006). Travelling at lower speeds improves a driver's ability to stop and avoid collisions. Where collisions do occur they are less severe, especially for children and the elderly. Lower speeds on residential streets help create a more livable and comfortable environment for cyclists, pedestrians and residents, who are often considered as vulnerable road users. The speed limit has been used as a way of controlling drivers' speed choices. In Sweden, Wallén Warner and Åberg (2008) reported that 20% of all people killed on the road would have survived if all drivers obeyed the speed limit. In addition to the benefits associated with reduced casualty collisions, lower vehicle speeds also can reduce fuel use, greenhouse gas emissions and air and noise pollution (Archer et al., 2008).

The reduction of residential road speed limits to 40 km/h in cities such as Edmonton, Montreal, Ottawa and Vancouver is one of many hot issues for Canadian cities. Six boroughs in Montreal have implemented 40 km/h on their local residential streets since the last week of December 2009 (Lalonde, 2010 and Ville de Montréal). On October 28, 2009, Ottawa City Council approved the 'The City of Ottawa Speed Zoning Policy for Urban and Rural Roads' policy. This policy offers residents the ability to request, by means of a petition, a reduction in the speed limit to 40 km/h on streets designated as 'local residential' in the City of Ottawa Transportation Master Plan 2008. To qualify, there must be a consensus of 66 per cent of residents on the entire street (City of Ottawa, 2010). The City of Vancouver is currently awaiting the necessary change to the Motor Vehicle Act that will enable them to introduce the new speed limit of 40 km/h on local side streets (City of Vancouver, 2010).

In Edmonton, several factors converged to lend support for a speed reduction pilot project of 40 km/h in both local and collector residential roads. The 2004, 2007, and 2009 Citizen Satisfaction Surveys of the Edmonton Police Service identified speeding and careless driving as the top problem in Edmonton's neighbourhoods (Edmonton Police Service 2007 and 2010). City Councilors were receiving ongoing and sustained speeding complaints in their wards that were not being satisfactorily addressed and were repeated yearly. The City of Edmonton, Office of

Traffic Safety (OTS) became increasingly involved in these speeding issues due to their complexity and a need for a broader systemic solution. Finally, the first Edmonton International Urban Conference held in March 2009, showcased leading global practices that supported the reduction of speeds in residential areas.

These factors engaged Edmonton City Council's Transportation and Public Works Committee (TPW) to review the idea of reducing speed limits on residential roads and asked the city administration to consult the public. OTS was identified as the lead agency for this initiative and worked with community partners including the Edmonton Federation of Community Leagues (EFCL) to obtain their input. In agreement with OTS, a reduced speed limit workshop was arranged at the EFCL office on June 16, 2009. The OTS, Community Leagues, Edmonton Public School Board, Edmonton Catholic School Board, Alberta Motor Association, Edmonton Police Service, and other community stakeholders participated in the workshop. The EFCL also placed an online speed reduction survey on its website to solicit wider community feedback and determine the level of community support for a reduced residential speed limit and the creation of school zones. One of the recommendations coming out of the workshop and online survey was to implement a speed limit of 40 km/h or less on residential roads (EFCL, September 2009). The current default speed limit on residential roads in the City of Edmonton is 50 km/h.

On October 6, 2009, Edmonton City Council's Transportation and Public Works Committee gave approval to commence work on the residential road speed reduction pilot project. OTS was tasked with initiating the process and identifying six communities for the proposed reduced speed limit pilot project. The goals of the pilot were to assess the impact of the 40 km/h speed limit on speeding behaviours and traffic safety. OTS then identified several different criteria for selecting the communities for piloting the new residential road speed limit of 40 km/h. To analyze these different criteria, a Multi-Criteria Decision Analysis (MCDA) tool called the Analytic Hierarchy Process (AHP) was used.

AHP is a method that derives ratio scales from reciprocal pairwise comparisons. It is a method of breaking down a complex decision making criteria into its component parts, arranging these parts, or variables, into a hierarchic order, assigning numerical values to subjective judgments on the relative importance of each variable, and synthesizing the judgments to determine the overall priorities or weights of the variables. AHP has been applied in numerous fields since its development in the 1970s (Saaty, 1980). A long list of applications can be found in the works of Zahedi (1986) and Vaidya and Kumar (2006). In the traffic safety area, AHP has been applied to help many decision making processes such as estimating the perceptibility levels and ranking safety systems (Grembek and Daganzo, 2010), to determine the preferable speed limit on roads for logistics-based businesses (Thanesuen, Kagaya, and Uchida, 2007), and to prioritize traffic-calming projects (Guegan, Martin, and Cottrell, 2000).

This paper reports the selection criteria and the use of AHP to create a ranked list of neighbourhoods for piloting the new residential road speed limit of 40 km/h. AHP was selected as the selection methodology due to its capability for solving complicated and elusive decision problems, practical nature of the method, and its capability to evaluate the consistency of the assessment of the criteria. Moreover, additional criteria such as incoming and ongoing neighbourhood road rehabilitation plans, neighbourhood development, and roadway network types were used to further scrutinize the ranked list and select the six communities for the pilot project. The project commenced on May 1, 2010 and concluded October 31, 2010. The available data was based on the neighbourhood level, and was adjusted to meet the community level requirements of the project. Since the spatial boundaries of the neighbourhoods could be different from those of communities, the analysis focused on the neighbourhoods and at the end an adjustment was made to represent the selected communities. While the neighbourhood boundaries were set by the City, the community (or officially called Community League) boundaries were set by the communities themselves in consultation with the Edmonton Federation of Community Leagues. One community may include residents from multiple neighbourhoods. By October 2010, 154 community leagues have been established in the City of Edmonton in contrast to 320 neighbourhoods.

Fundamental concept of Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) is a structured technique for dealing with multi-criteria complex decisions based on mathematics and psychology developed by Professor Thomas L. Saaty (Saaty, 1980). AHP lies on the decision hierarchy by breaking down the decision problem into a hierarchy of interrelated criteria and alternatives. At the top of the hierarchy lies the decision making ultimate goal. The lower levels of the hierarchy contain criteria and the details of these criteria increase at the lower levels of the hierarchy. The last level of the hierarchy contains decision alternatives or selection choices. Figure 2 shows an AHP structure of a decision problem with four levels.

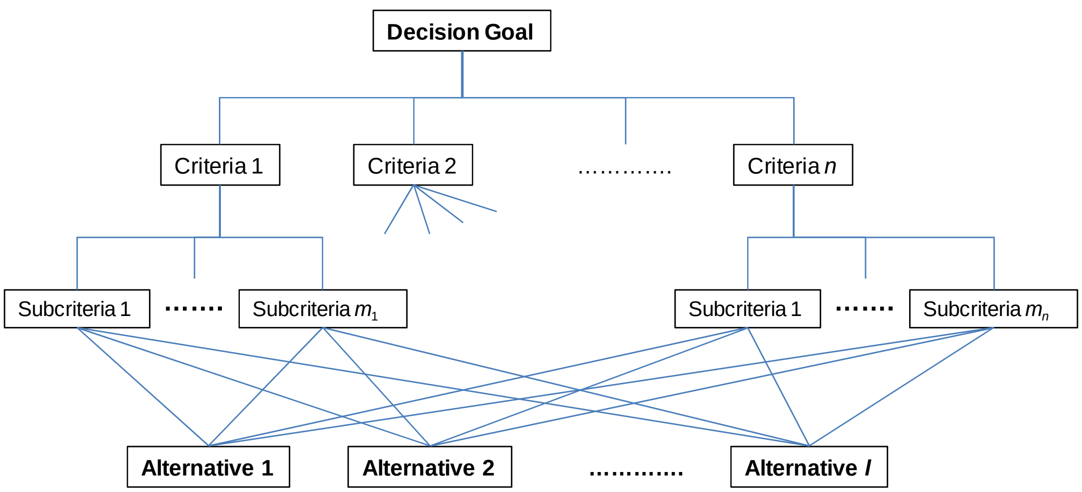

Figure 2 AHP decision structure with 4 levels.

Once the hierarchy is built, the criteria and alternatives with respect to each criterion are evaluated by pairwise judgment, i.e., comparing them to one another two at a time. In making the comparisons, the decision makers can use data from actual measurement such as average speed, traffic volume, and number of vulnerable road users, or they can use their judgments about the elements' relative meaning and importance. The number of pair-wise judgment is $n(n-1)/2$, where

n is the number of decision elements (criteria or alternatives) that share the common parent. To evaluate the preference of one decision element to another, AHP uses a ratio scale, from 1 to 9 in which a score of "1" represents the view that the elements are of equal importance and "9" that one of them is extremely important with respect to the other as shown in Figure 3.

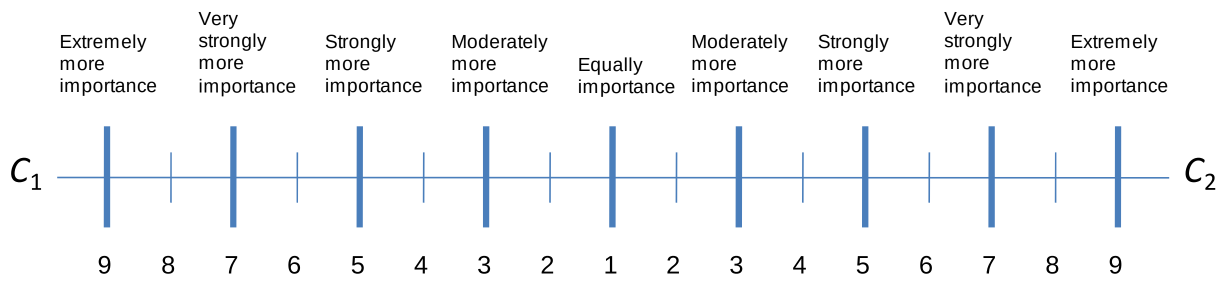

Figure 3. Pairwise comparison ratio scale.

After evaluating the pairwise judgment, the values are accumulated into a matrix (called "pair-wise comparison matrix)

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix}$$

in which a_{ij} = pairwise judgment rating for element i versus element j with $a_{ji} = 1/a_{ij}$ and $a_{ii}=1$; n is the number of decision elements of the same parent. For example, if the decision maker thought that C_1 is of greater strongly more importance than C_2, then $a_{12} = 5$ and consequently $a_{21} = 1/5 = 0.2$.

In general, the pairwise comparison matrix A contains inconsistencies of the subjective judgments from the decision makers. Suppose that the decision maker prefers C_1 to C_2 and prefers C_2 to C_3. The logical consequence is the decision maker will prefer C_1 to C_3. In this case, this logic of preference is called to have a transitive property. If the decision maker judgment follows this property, then it is concluded that the decision maker is consistent. Mathematically, a pairwise comparison matrix A is consistent if $a_{ij}a_{jk} = a_{ik}$ for all i, j, and k. However, AHP also values the inconsistency in decision maker's judgments. It turns out that A is consistent if and only if $\lambda_{\max} = n$ and we always have $\lambda_{\max} \geq n$, where $\lambda_{\max}$ is the largest eigenvalue of A. Since small changes in a_{ij} imply a small change in $\lambda_{\max}$, the deviation of the latter from n is a deviation from consistency and can be represented by $(\lambda_{\max} - n)/(n-1)$ which is called the *Consistency Index* or CI (Saaty, 1994). When the CI has been calculated, the result is compared with those of the same index of a randomly generated reciprocal matrix from the scale 1 to 9, with reciprocals forced. This index is called the *random index* or RI as shown in Table 1. The consistency of decision maker's judgments is considered satisfactory if the ratio CI/RI is 0.10 or less (Saaty, 1994).

Number of decision elements of the same parent *n*	2	3	4	5	6	7	8	9	10
Random Consistency Index RI	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49

Table 1. Random Consistency Index.

A numerical weight or priority is derived for each element of the hierarchy using the eigenvalue method, allowing diverse and often incommensurable elements to be compared to one another in a rational and consistent way. If W denotes the vector of weights of decision elements, then W can be obtained by solving the following eigenvalue problem

$$AW = \lambda_{\max} W$$

Because of the reciprocal property of matrix A, the eigenvalue problem can be solved by using the power method (also called vector iteration method; see for example, a lecture note on Power method by Pitman, 1998).

The last step is to aggregate relative weights of various levels in order to produce a vector of composite weights which serves as ratings of decision alternatives. The composite relative weight vector of decision alternatives at the last level k with respect to the decision making ultimate goal (i.e., level 1 of the decision structure) can be calculated from

$$C[1,k] = \prod_{i=2}^{k} B_i \tag{1}$$

, where $C[1,k]$ is the vector of composite weights of decision alternatives at level k with respect to the ultimate goal on level 1, and B_i, is the n_{i-1} by n_i matrix with rows consisting of weight vectors of decision elements on level i to the corresponding parent in level (i-1); n_i represents the number of elements at level i (see for example, Zahedy, 1986).

Applying AHP to rank neighbourhoods

The ultimate goal of the decision making process is to create a ranked list of neighbourhoods for piloting the residential road speed limit of 40 km/h based on criteria summarized in Figure 4. These criteria and the pairwise comparison scores were decided by OTS senior management staff and the Executive Director of OTS in consultation and agreement with a consultant from the Department of Civil and Environmental Engineering and the School of Mining and Petroleum Engineering, University of Alberta.

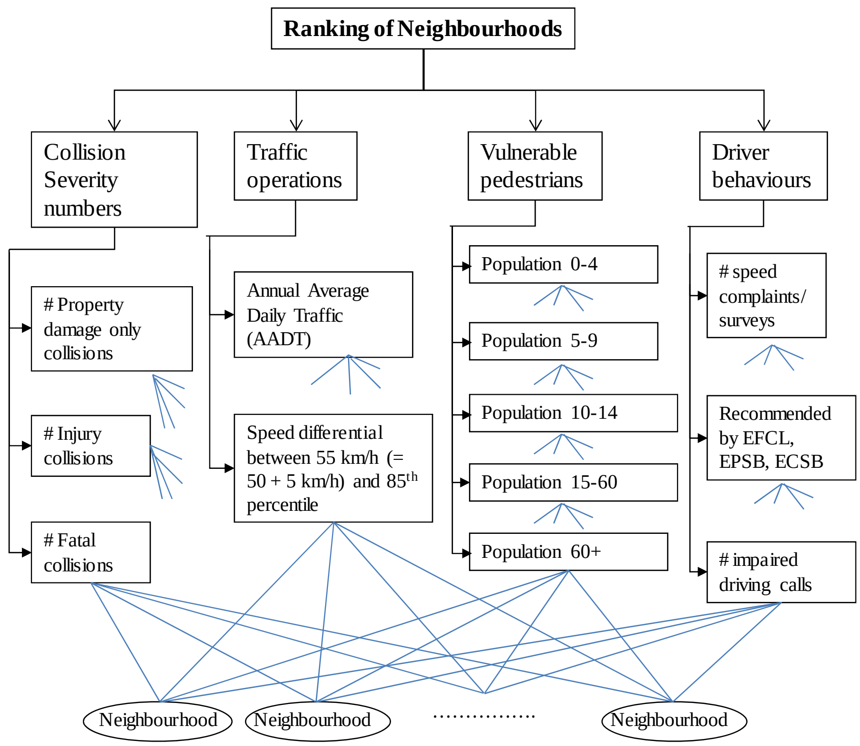

Figure 4. Decision hierarchy for ranking neighbourhoods.

The decision criteria in terms of the ***collision severity numbers*** were created to weight the number of collisions so that fatality and injury collisions were given more importance than property-damage-only (PDO) collisions. A weight of 10 was assigned to a fatal collision, 5 to an injury collision, and 2 to a PDO collision. The sum of these weighted numbers is called the collision severity number that is also known as the equivalent-property-damage-only (EPDO) number. For example, a community that has 260 PDO collisions, 86 injury collisions and 1 fatal collision will have a collision severity number of 960.

The collision data was provided by the Edmonton Police Service and recorded in the Motor Vehicle Collisions System (MVCIS) managed by the City of Edmonton Office of Traffic Safety. A spatial analysis was done to carefully select collision events that occurred from January 2006 to December 2008 within the neighbourhood residential roads with the following assumptions:

1. Included all collisions that were not on an arterial road; included arterial collisions only if they were proximal (within 15 meters) to a school;
2. Included collisions that were at collector arterial intersections where the collector roadway would bring in traffic to the neighbourhood;
3. If the collision was on a collector and the collector neighbors more than one neighbourhood, all the neighbourhoods that the collision occurred in were recorded. The collision was then counted as a collision in all of the neighboring neighbourhoods;
4. Excluded collisions occurring on back alleys.

The ***characteristics of traffic operations*** for each neighbourhood were assessed through the estimated Annual Average Daily Traffic (AADT) and the speed differential between the posted speed limit plus ten percent (i.e., 55 km/h) and the 85th-percentile speed. A worst case scenario was adopted to evaluate the sub-criterion. The highest AADT as well as the highest value of 85th-percentile speed were selected whenever a neighbourhood had multiple speed surveys available. Equal weights were assigned to AADT and speed differential criterion.

To assess the ***vulnerability level of pedestrians*** for each neighbourhood, the population data by different age groups in the neighbourhoods from the 2009 City of Edmonton municipal census was utilized. Safe Kids Canada reported that in 2007-2008, children 10-14 years have the highest rate of child pedestrian casualties, followed by age groups 5-9 and 0-4 (Safe Kids Canada, 2009). Furthermore, it is widely recognized that children 10-14 and seniors over 60 are the two most vulnerable pedestrian groups (Tight, Carsten, and Sherborne, 1989). Consequently, the 10-14 and over 60 age groups were assigned higher weights than the other age groups. The AHP pairwise comparison matrix for different age groups is shown in Table 2.

Pairwise comparison (1-9 Scale)	Population 0-4	Population 5-9	Population 10-14	Population 15-60	Population 60+
Population 0-4	1	1/4	1/7	3	1/6
Population 5-9	4	1	1/5	6	1/3
Population 10-14	7	5	1	9	3
Population 15-60	1/3	1/6	1/9	1	1/7
Population 60+	6	3	1/3	7	1

Table 2. AHIP pairwise comparison matrix for different age groups.

To assess the ***driver behaviours*** within the residential roads for each neighbourhood, three components were investigated:

- The number of speed complaints or speed surveys (conducted by the Transportation Department) based on the resident requests after witnessing or feeling that there were speeding issues in their neighbourhood. The speeding related complaint data from January 2009 to November 2009 and speed surveys that were conducted from May 2008 to July 2009 were used to capture this aspect. Only speed data (complaints or surveys) collected on collector or local roads were included. Also, non-speed related complaints, such as drivers not paying attention in cul-de-sacs or on blind curves that requested additional signs, were excluded.
- Recommendations from the Edmonton Federation of Community Leagues (EFCL), Edmonton Public School Public Board (EPSB), or Edmonton Catholic School Board (ECSB). Each recommendation was given a value of one; a neighbourhood that has recommendations from EFCL, EPSB and ECSB will get a score (or weight) of 3.
- The number of impaired driving calls that occurred within the neighbourhood residential roads where at least one police unit was dispatched to respond to the call. The same spatial rules applied for the collision data were applied to filter the impaired driving call data from May 2007 to October 2009.

These three components share the same weight.

The pairwise comparison matrix for criteria in level 2 is given in Table 3. The AHP criteria weights and their corresponding consistency ratios are summarized in Table 4.

Pairwise comparison (1-9 Scale)	Collision Severity numbers	Traffic operations	Vulnerable pedestrians	Driver behaviors
Collision Severity numbers	**1**	**3**	**1**	**1**
Traffic operations	**1/3**	**1**	**1/3**	**1/3**
Vulnerable pedestrians	**1**	**3**	**1**	**1**
Driver behaviors	**1**	**3**	**1**	**1**

Table 3. AHP pairwise comparison matrix for criteria in level 2.

Criteria	Collision Severity numbers	Traffic operations	Vulnerable pedestrians	Driver behaviors	AADT	Speed differential	Population 0-4	Population 5-9	Population 10-14	Population 15-60	Population 60+	# Speed complaints/ studies	Recommended by EFCL or EPSB	# Impaired driving calls
AHP Weights	0.3000	0.1000	0.3000	0.3000	0.5000	0.5000	0.0570	0.1405	0.5045	0.0316	0.2664	0.3333	0.3333	0.3333
Consistency Ratio CI/RI	0				0		0.0725					0		

Table 4. Criteria wieghts and the corresponding Consistency Ratios.

There were a total of 77 out of 320 neighbourhoods, which had speed surveys conducted on either a collector or local road within their boundaries. To evaluate the weight of each neighbourhood with respect to the lowest level of criteria, data from actual measurements were used. To eliminate the dimension effect, the weights were normalized using the following equation:

$$w_{normalized} = \frac{(w_{actual} - w_{\min})}{(w_{\max} - w_{\min})}$$

where w_{actual} is the actual weight, e.g., the collision severity number; $w_{normalized}$ is the normalized weight; $w_{\min}$ and $w_{\max}$ are the lowest and highest actual weight of the same criterion over all neighbourhoods. For an example, the corresponding normalized weight of a neighbourhood with collision severity number of 960 is 0.4459.

The composite weights of all neighbourhoods with respect to the decision making ultimate goal (i.e., ranking of neighbourhoods) were calculated by applying Equation (1) to normalized weights. The top 25 neighbourhoods with their AHP scores and criteria values are listed in Table 5**Error! Reference source not found.**. Although Woodcroft has a fairly low collision severity number (439) and medium level of vulnerable pedestrians (as indicated by the population age groups 10-14 and 60+), this neighbourhood had the highest speed complaints and had also been recommended by the EFCL. In addition, the traffic volume was relatively high. These facts gave Woodcroft a ranking of 7 for possible consideration of the new speed limit of 40 km/h.

Selecting six communities for the pilot project

In addition to the above criteria, a number of additional factors were included to select the six communities (or community leagues) for piloting the new residential speed limit of 40 km/h.

- Neighbourhoods that are under ongoing redevelopment or are included in the future road neighbourhood rehabilitation plan were excluded from the lists;
- Partially or under development neighbourhoods were also excluded;
- The selection was made to allow for different neighbourhood development (e.g., 1950's/60's versus 1970's/80's) and roadway network types (e.g., grid, cul-de-sac, 3 way offset);
- The geographic coverage by the Edmonton Police Service (EPS) divisions as well as by the census wards was considered. EPS has five divisions: West, North, Southwest, Southeast, and Downtown. At the time when the analysis was completed, the City of Edmonton was divided into six census wards. Selection ensured one census ward per community
- For analysis purposes, three pairs of neighbourhoods with each pair sharing similar characteristics were considered.

Table 6 shows the top 25 neighbourhoods and their corresponding EPS divisions and census wards.

Ranking	Neighbourhoods	AHP Score	# PDO collisions	# Injury collisions	# Fatal collisions	Collision Severity numbers	AADT	Speed differential	Population 0-4	Population 5-9	Population 10-14	Population 15-60	Population 60+	# speed complaints/ studies	Recommended by EFCL/EPSB /ECSB	# Impaired driving calls
1	OLIVER	0.5350	661	159	1	2,127	1,844	6	193	80	77	10,631	3,006	0	0	158
2	TWIN BROOKS	0.4099	71	7	1	187	4,448	19	236	443	492	4,156	913	7	1	10
3	OTTEWELL	0.3869	122	33	0	409	4,096	1	215	247	289	3,134	1,497	6	1	95
4	KING EDWARD PARK	0.3625	260	86	1	960	6,994	19	182	163	156	2,648	492	2	0	100
5	BALWIN	0.3620	295	79	0	985	290	1	212	239	264	2,370	687	0	1	107
6	GARNEAU	0.3386	443	116	0	1,466	552	0	85	49	55	4,873	555	0	1	86
7	WOODCROFT	0.3299	107	45	0	439	3,780	11	101	117	112	1,333	807	10	1	36
8	INGLEWOOD	0.3206	296	116	1	1,182	1,129	0	293	184	164	4,077	1,119	0	0	97
9	BEVERLY HEIGHTS	0.3103	182	52	0	624	5,032	10	116	111	96	1,944	879	7	0	84
10	KINISKI GARDENS	0.3083	140	20	0	380	3,450	4	338	377	476	4,391	496	2	0	54
11	WILD ROSE	0.2937	90	13	0	245	842	2	586	564	575	4,784	514	1	0	30
12	TERWILLEGAR TOWNE	0.2831	118	11	0	291	3,125	6	596	428	337	3,514	485	1	1	12
13	CUMBERLAND	0.2790	137	28	0	414	3,776	10	513	413	381	3,828	301	2	0	15
14	JACKSON HEIGHTS	0.2730	145	24	0	410	8,178	15	196	257	325	2,637	506	0	0	29
15	EVANSDALE	0.2718	155	35	0	485	1,368	5	425	401	408	3,211	854	0	0	30
16	BEACON HEIGHTS	0.2692	215	56	0	710	4,648	9	146	126	143	1,798	584	1	0	91
17	BONNIE DOON	0.2622	284	84	0	988	754	0	167	138	149	2,569	671	0	0	92
18	FOREST HEIGHTS	0.2606	193	62	1	706	6,325	6	121	123	141	2,123	718	0	0	84
19	DELWOOD	0.2524	131	33	0	427	1,990	10	141	177	189	1,794	1,015	4	0	58
20	RUNDLE HEIGHTS	0.2501	66	11	0	187	4,900	10	278	237	238	1,984	424	6	0	39
21	GLENGARRY	0.2496	179	37	2	563	266	7	127	128	137	1,606	781	3	0	106
22	OLESKIW	0.2476	94	15	0	263	1,762	13	63	95	146	1,739	553	2	2	6
23	WELLINGTON	0.2426	147	43	0	509	1,712	7	168	157	163	1,746	588	1	1	37
24	LARKSPUR	0.2352	92	27	0	319	588	0	263	306	365	3,217	381	3	0	46
25	THE HAMPTONS	0.2301	78	8	0	196	2,149	7	592	371	260	3,588	208	6	0	9

Table 5. Top 25 Neighbourhoods with their corresponding AHP scores and criteria values.

Ranking	Neighbourhoods	AHP Score	EPS Division	Census Ward	Final 6 Selected Communities (1: selected; 0: not selected)
1	OLIVER	0.5350	DOWN,WEST	4	0
2	TWIN BROOKS	0.4099	SWEST	5	1
3	OTTEWELL	0.3869	SEAST	6	1
4	KING EDWARD PARK	0.3625	SEAST	4	1
5	BALWIN	0.3620	NORTH	3	0
6	GARNEAU	0.3386	SWEST	4	0
7	WOODCROFT	0.3299	WEST	2	1
8	INGLEWOOD	0.3206	WEST	2	0
9	BEVERLY HEIGHTS	0.3103	NORTH	3	1
10	KINISKI GARDENS	0.3083	SEAST	6	0
11	WILD ROSE	0.2937	SEAST	6	0
12	TERWILLEGAR TOWNE	0.2831	SWEST	5	0
13	CUMBERLAND	0.2790	WEST	2	0
14	JACKSON HEIGHTS	0.2730	SEAST	6	0
15	EVANSDALE	0.2718	NORTH	2	0
16	BEACON HEIGHTS	0.2692	NORTH	3	0
17	BONNIE DOON	0.2622	SEAST	4	0
18	FOREST HEIGHTS	0.2606	SEAST	4	0
19	DELWOOD	0.2524	NORTH	3	0
20	RUNDLE HEIGHTS	0.2501	NORTH	3	0
21	GLENGARRY	0.2496	NORTH	2	0
22	OLESKIW	0.2476	SWEST	1	1
23	WELLINGTON	0.2426	WEST	2	0
24	LARKSPUR	0.2352	SEAST	6	0
25	THE HAMPTONS	0.2301	SWEST	1	0

Table 6. Top 25 Neighbourhoods and their corresponding police division and census ward.

Following the direction of the Transportation Operations Branch Manager, a representative sample of three different styles of neighbourhoods was selected. Three neighbourhoods are paired with similar ones in other census wards based on ranking score, no rehabilitation work, and a balanced city wide perspective:

- 1970’s/80’s neighbourhooods:
  - Twin Brooks (AHP ranking number 2, Southwest division, Census ward 5)
  - Oleskiw (AHP ranking number 22, Southwest division, Census ward 1)

- 1950’s/50’s neighbourhooods:
  - Ottewell (AHP ranking number 3, Southeast division, Census ward 6)
  - Woodcroft (AHP ranking number 7, West division, Census ward 2)

- Grid pattern neighbourhoods:
  - Beverly Heights (AHP ranking number 9, North division, Census ward 3)
  - King Edward Park (AHP ranking number 4, Southeast division, Census ward 4)

After several meetings with EFCL and community representatives, the Oleskiw neighbourhood boundaries were extended to include the entire Westridge-Wolf Willow community. As shown in Figure 5, this extension added Westridge Road and Wolf Willow Crescent into the pilot project. To cover the entire Beverly Heights community, both Beverly Heights and Rundle Heights neighbourhoods were included. The other four neighbourhoods have the same boundaries and names as their communities. The maps of six selected communities are shown in Figure 6 - Figure 12.

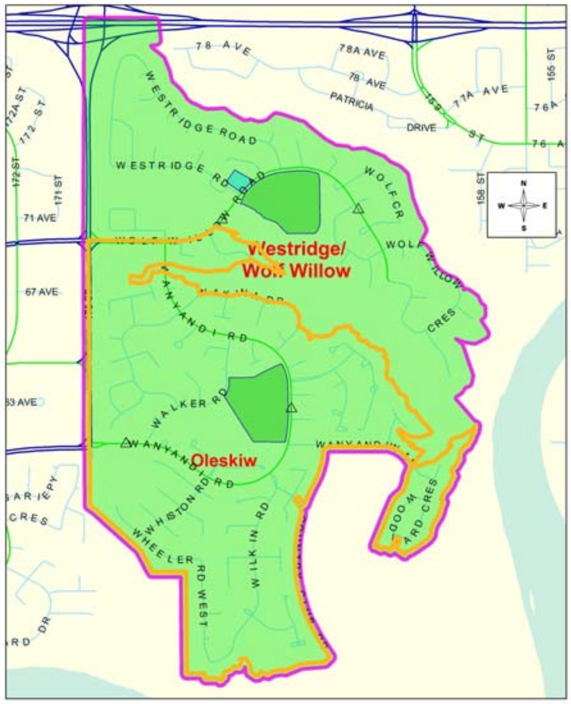

Figure 5. Neighbourhood Oleskiw vs. Westridge-Wolf Willow Community League

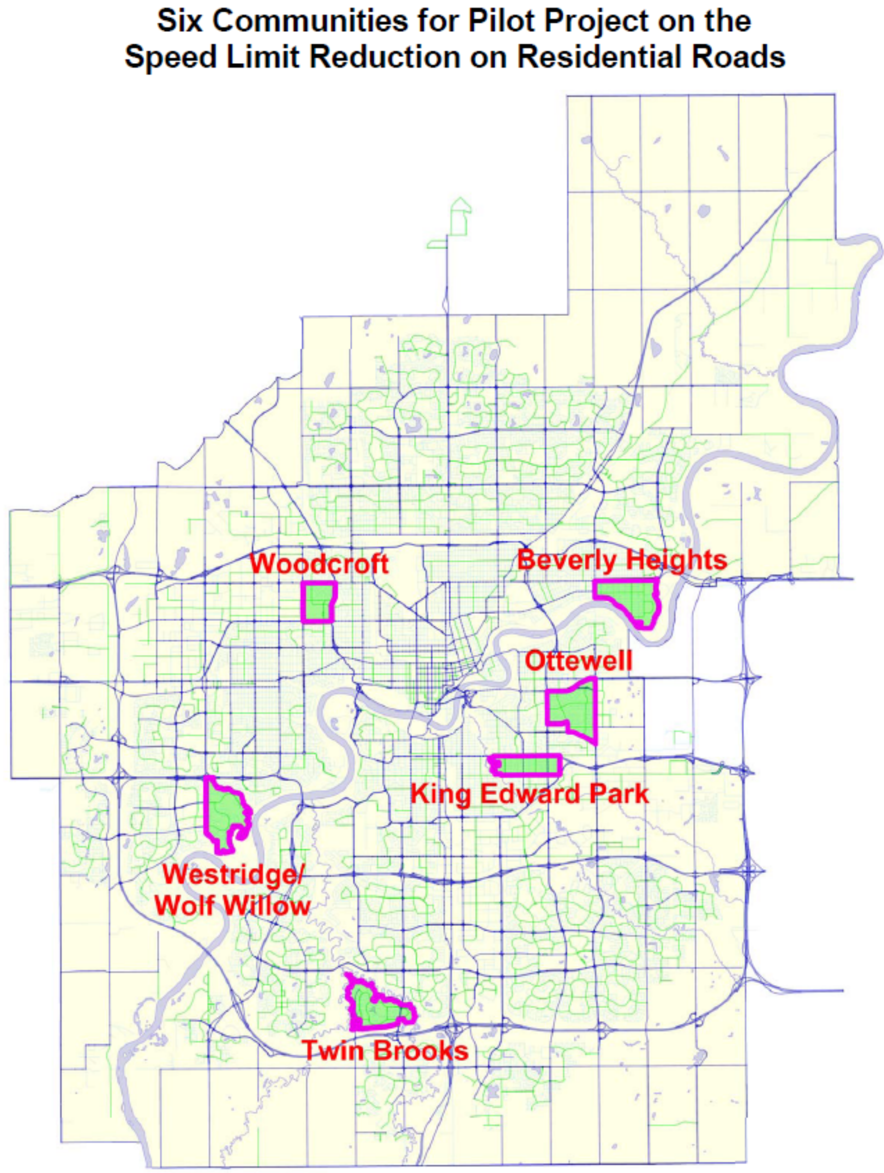

Figure 6. Six selected communities for piloting the 40 km/h speed limit on residential roads.

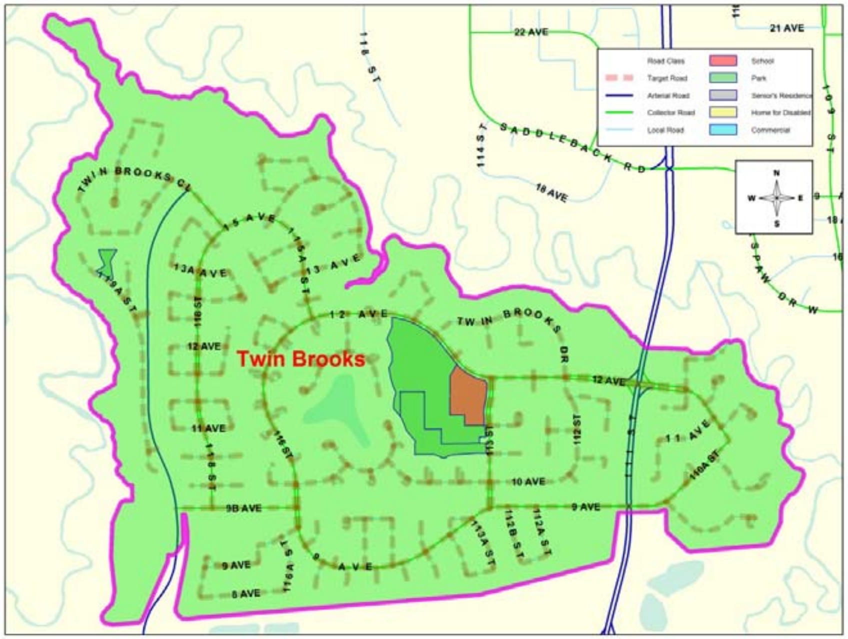

Figure 7. 1970's/80's community: Twin Brooks.

Figure 8. 1970's/80's community: Westridge-Wolf Willow.

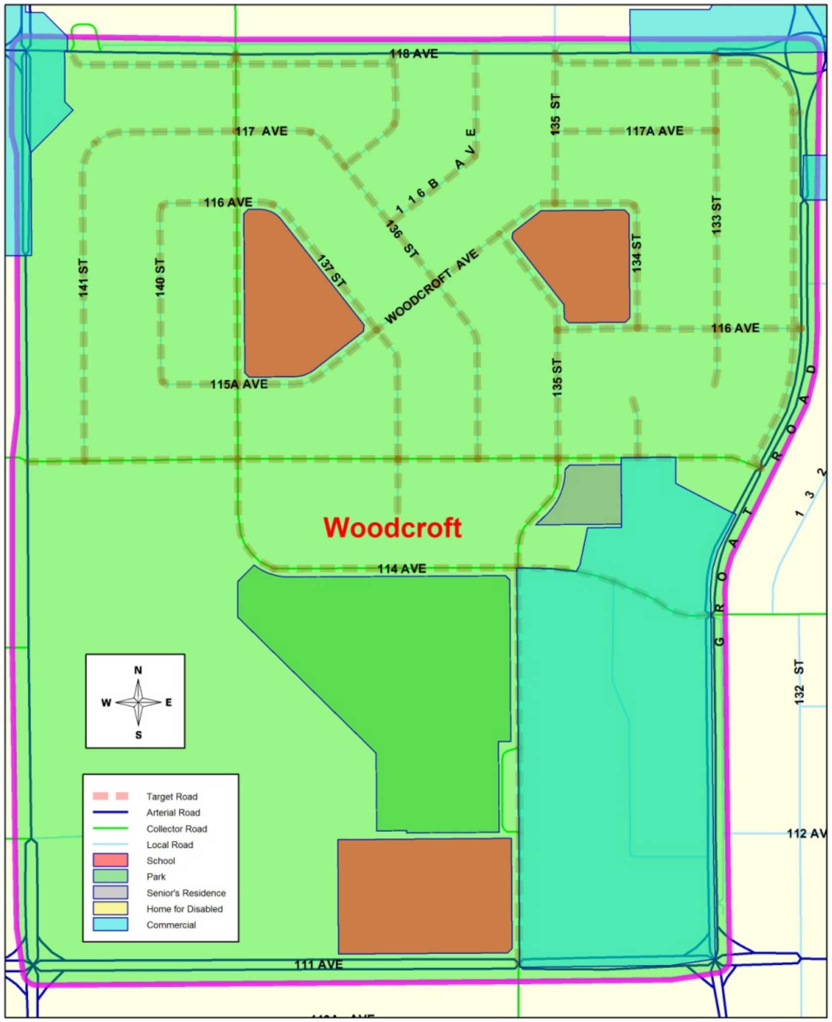

Figure 9. 1950's/60's community: Woodcroft.

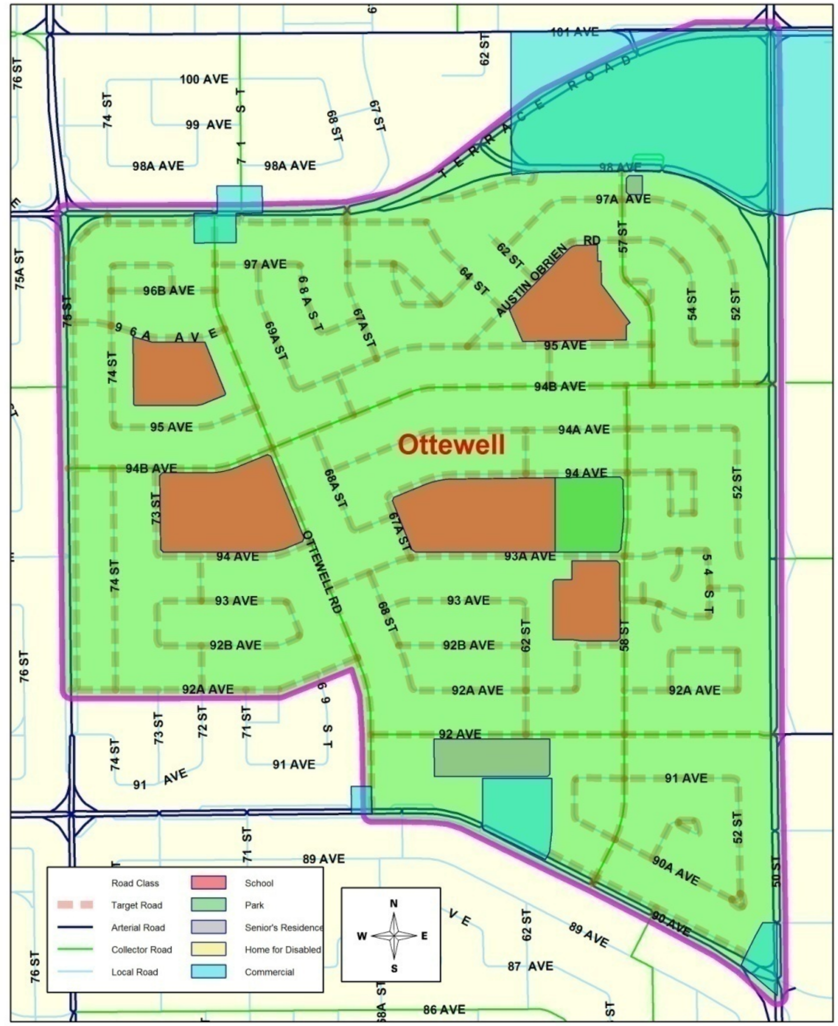

Figure 10. 1950's/60's community: Ottewell.

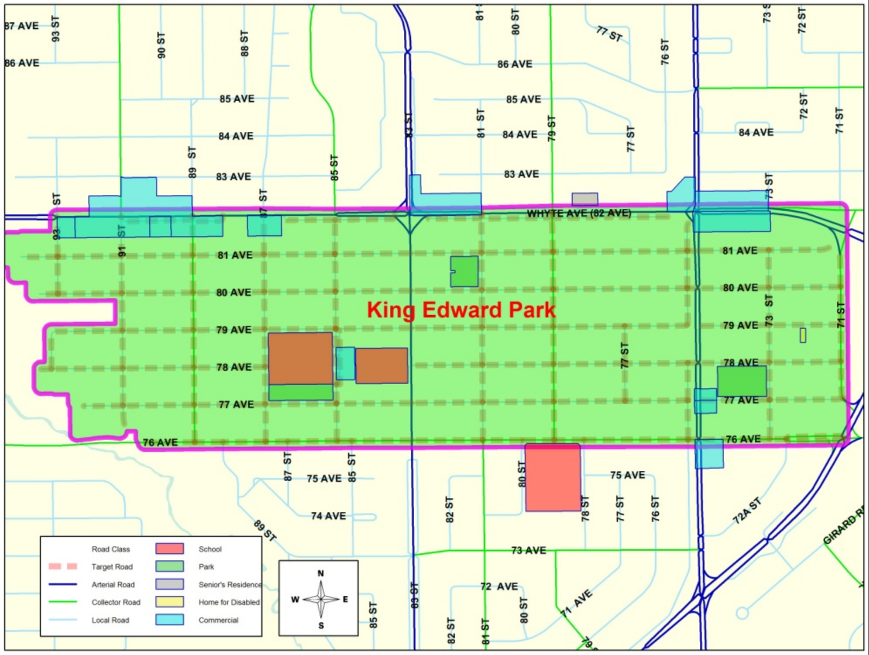

Figure 11. Grid pattern community: King Edward Park.

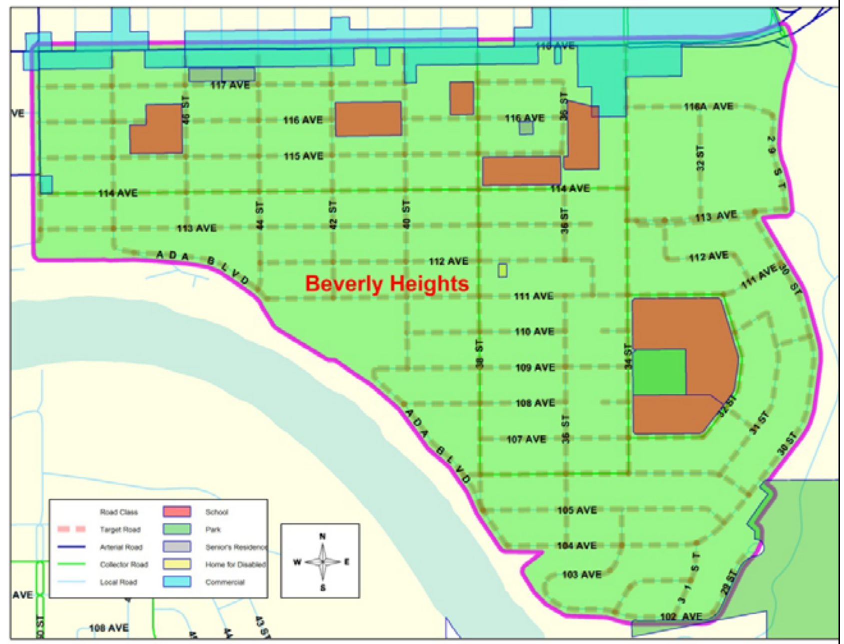

Figure 12. Grid pattern community: Beverly Heights.

Concluding remarks

An application of the Analytic Hierarchy Process to select six communities for piloting the new residential road speed limit of 40 km/h was presented. The consistency ratio from AHP was used to ensure that the assessment of the given criteria was done consistently. Six communities have been identified and the new speed limit of 40 km/h on residential roads (collector and local roads) within these six communities was implemented on May 1, 2010. The criteria and the six selected communities were presented to the media and public on February 17, 2010.

The impact of the new speed limit will be reviewed closely to determine if the goals regarding improved motorist behaviour and traffic safety were achieved. Traffic monitoring data such as vehicle speeds, traffic volumes, headways, and tailgatings (measured through gap times) have been collected at pre-determined sites in the selected communities, control communities, and adjacent communities for 24 hours per day and 7 days per week (i.e., 24/7) throughout the pilot project. Although the pilot project and the reduced speed limit of 40 km/h began on May 1, 2010, data collection started April 1, 2010. This was done in order to capture behaviour differences before and during the pilot. Data collection is scheduled to end on October 31, 2010 due to equipment limitations, below freezing temperature change, and snow. A comprehensive report, including the analysis of collision and vehicle speed profiles, is available online http://www.edmonton.ca/transportation/OTS_Speed_Limit_Reduction_Report.pdf. However, the speed limit signs of 40 km/h in those six selected communities are kept until the speed zone bylaws change.

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