Councillor Request Inquiry # 29-2018

2018

Further to the March 13, 2018 PCM and April 24, 2018 Information Request, costs of collisions and the benefits or research available on the installation of large animal advisory signs through Canadian Parks has been researched and provided within the enclosures attached.

Enclosure 1 clarifies the costs of collisions in more detail and formalizes the results summarized in Strathcona County for the Traffic Safety Strategic Plan 2020 update.

Enclosure 2 examines the benefits and effects found through the use of various advisory signs for wildlife animal collisions along various roads from across the country.

STRATHCONA COUNTY

Cost of Collisions 2016

The estimated direct cost of collisions in 2016 in Strathcona County was $56 Million. Direct costs include costs for property damage, emergency response, health care services, travel delay, legal costs and short-term productivity loss. They **do not** include any of the significant human costs for discounted future earnings, pain, suffering or grief, which are much more difficult to quantify.

The following chart breaks down the cost by collision type:

Collision Type	Number of Victims	Cost per Victim	Total Cost
Fatal	5	$ 204,848.00	$ 1,024,240.00
Major Injury	64	$ 122,103.00	$ 7,814,592.00
Minor Injury	709	$ 33,979.00	$ 24,091,111.00
Property Damage	1615	$ 14,332.00	$ 23,146,180.00
			$ 56,076,123.00

These costs are borne by the residents of Strathcona County, whether directly out of pocket, through increased insurance premiums or through provincial or municipal taxes.

The following chart identifies the proportion of the cost of collisions that is attributed to property damage by collision type. This includes vehicle repairs, auto insurance administration, out-of-pocket expenses and towing services.

Collision Type	Cost per Victim	Amount of cost related to Property Damage	% cost of collision attributed to Property Damage
Fatal	$ 204,848.00	$ 36,408.00	18%
Major Injury	$ 122,103.00	$ 25,149.00	21%
Minor Injury	$ 33,979.00	$ 21,200.00	62%
Property Damage	$ 14,332.00	$ 10,974.00	77%

The total cost of collisions attributable to property damage is $34,545,386.00. This represents 61.6% of the total cost of collisions.

The following chart identifies the proportion of the cost of collisions in 2016 that was directly borne by Strathcona County through emergency response and travel delay costs:

Collision Type	Cost per Victim- Emergency Services and Travel Delay	Number of Victims	Total Cost to Strathcona County
Fatal	$ 37,154.00	5	$ 185,770.00
Major Injury	$ 21,884.00	64	$ 1,400,576.00
Minor Injury	$ 9,900.00	709	$ 7,019,100.00
Property Damage	$ 3,358.00	1615	$ 5,423,170.00
			$ 14,028,616.00

Cost of Collisions are calculated based on the work of Dr. Paul de Leur, PhD, P.Eng. His full 2010 study is available at http://drivetolive.ca/research/collision-cost-study/

The 2010 paper includes details regarding the methodology used to calculate collision costs, which were based on 2007 data. Dr. de Leur has updated the study for 2017 (based on 2015 data), but the final report has not been officially published online. For the purposes of these calculations, the 2017 numbers were used in order to improve accuracy of the calculations. The updated cost charts are included here for more information.

Summary of Estimated Direct Collision Costs (updated 2017)

DIRECT Collision Costs		Collision Costs (by Victim)			
Report Chapter	Cost Category	Fatality	Major Injury	Minor Injury	Property Damage
3.1	**Property Damage**				
3.1.2	Vehicle Repairs	$29,853	$21,280	$18,013	$9,410
3.3.2	Auto-Insurance Administration	$4,391	$2,156	$1,539	$423
3.3.3	Cut-of Pocket Expenses	$1,346	$1,052	$972	$633
3.3.4	Towing Services	$818	$661	$676	$508
3.2	**Emergency Response Costs**				
3.2.1	Police Costs	$6,200	$1,924	$618	$188
3.2.2	Fire / Rescue Costs	$3,023	$4,306	$1,168	$0
3.2.3	Ambulance Costs	$914	$1,933	$621	$0
3.2.4	Coroners Costs (Fatal Only)	$1,994	$0	$0	$0
3.3	**Health Service Costs**				
3.3.1	Emergency Room Costs	$2,003	$341	$288	$0
3.3.2	ICU Care Costs	$59,676	$40,443	$0	$0
3.3.3	Acute Care Costs	$11,496	$8,611	$0	$0
3.3.4	Rehabilitation Costs	$3,938	$2,209	$204	$0
3.3.5	Continuing Care Costs	$23,236	$14,387	$832	$0
3.4	**Legal Costs**				
3.4.1	Correctional Services	$1,294	$401	$13	$0
3.4.2	Court Costs	$456	$142	$5	$0
3.4.3	Legal Aid and Prosecution	$461	$143	$5	$0
3.4.4	Funeral Costs (Fatal Only)	$10,109	$0	$0	$0
3.5	**Travel Delay Costs**				
3.5.1	Delay Costs Caused by Collision	$20,511	$11,247	$6,142	$2,598
3.5.2	Extra Fuel Consumption	$1,484	$814	$444	$188
3.5.3	Environmental / Pollution Costs	$3,028	$1,660	$907	$384
3.6	**Productivity / Disruption Costs**				
3.6.1	Short-Term Work-Place (Injury)	$18,617	$8,394	$1,531	$0
3.6.2	Short-Term Work-Place (Fatal)	$4,761	$0	$0	$0
3.6.3	Short-Term Work-Place (PDO)	$0	$0	$0	$59
	TOTAL for DIRECT Costs:	**$204,848**	**$122,103**	**$33,979**	**$14,332**

Animal Collisions

Approximately 10-15 percent of total collision occurred on County roadways every year and majority of them occurred on provincial highways and on County grid roads in the rural area during winter and in the dark conditions. Limited visibility was the major contributor to these crashes and is due to insufficient sightlines, and dark conditions. To address this problem, Strathcona County is maintaining sightlines by removing vegetation on identified locations, and have installed animal warning signs in the past based on collision records. The County has refrained from installing those signs, as research has shown that signs become ineffective after certain time of installation.

A literature review is conducted to see the effectiveness of various countermeasures including animal warning signs;

STANDARD WILDLIFE WARNING SIGNS

The standard wildlife crossing warning sign in Canada is a diamond-shaped panel with a black animal symbol on a yellow background, sometimes accompanied with a tab that indicate the length of the road section to which the sign applies. Manual of Uniform Traffic Control Devices contains three warning signs with different types of animals;

WC-13 Deer Crossing Sign
WC-14 Moose Crossing Sign
WC-15 Cattle Crossing Sign

WC-13

WC-14

WC-15

From the literature review; *Meyer* investigated the effectiveness of standard deer warning signs in Kansas by comparing the accident data before and after sign installation. After taking all available accident data before sign installation and other road and landscape parameters into consideration, there was no evidence that the presence of the deer warning signs had resulted in fewer Deer Vehicle Crashes (DVCs).

Rogers also concluded that the number of DVCs had not reduced as the result of the installation of deer warning signs. Furthermore, the installation of standard camel crossing signs in Saudi Arabia did not result in reduced vehicle speed.

LARGE, NONSTANDARD WILDLIFE WARNING SIGNS

Large or enhanced animal warning signs similar to National Parks' signs may take many forms. They can be larger than the standard wildlife warning signs, include graphic images, and have permanently activated flashing amber warning lights, light emitting diodes (LEDs), or red flags attached to the signs (Figure 1, and Figure 2)

Figure 1: Roadside sign along Highway in Jasper National Park

Figure 2: Large Elk warning sign along Trans-Canada Highway in Banff National Park

The Parks Canada Drivers for Wildlife program in Jasper National Park combines public education, which includes bumper stickers and roadway billboards, with two digital signs that record speed and advise drivers to slow down in the high-risk wildlife zone. The number of road-killed animals along park highways decreased by about 15 percent after the first 10 months of the public education and roadside sign program; however, the signs were given the most credit for the reduction of Wildlife vehicle collisions.

Enhanced camel warning signs in Saudi Arabia resulted in a significant reduction of vehicle speed whereas standard camel warning signs did not. The standard warning signs were triangular where all sides were 110 cm (43 inches), with a red border and white interior with black camel silhouette, and did not have diamond reflective material. The enhanced signs were signs that were larger than the standard warning signs, had diamond reflective material, had a yellow camel on a black background, and/or were accompanied by the text message "camel crossing" and a reduced advisory speed limit. The enhanced signs reduced vehicle speed by 3–7 km/h (2–4 mi/h).

Hardy and others found that wildlife advisory messages posted on permanent and portable dynamic message signs (DMS) can reduce vehicle speeds. The greatest effect occurred during "dark" conditions, when the number of Animal-vehicle collisions (AVCs) is higher. Stanley and others conducted experiments with a driving simulator and found that enhanced wildlife warning signs resulted in lower vehicle speeds and earlier braking when drivers were confronted with a deer in the simulated environment.

The only study identified that directly looked at sign impact on Wildlife Vehicle Collisions (WVCs), rather than the impact on driver response, suggests that large or enhanced wildlife warning signs are not effective in reducing WVCs in general or Deer-vehicle collisions (DVCs) specifically. Nonetheless, the observed reduction in vehicle speed (3–7 km/h (2–4 mi/h) suggests that the signs may be somewhat effective after all, perhaps reducing the severity of the crash in terms of property damage, human injuries and human fatalities. Only limited data are available on this subject.

ANIMAL DETECTION SYSTEMS

Animal detection systems use sensors to detect large animals that approach the road. Once a large animal is detected, warning signals are activated to inform the drivers that a large animal may be on or near the road at that time (figure 38). The warning signals are extremely time specific. Huijser and others listed more than 30 locations in North America and Europe that have had an animal detection system installed, and they describe the experiences with installation, operation and maintenance, reliability, and effectiveness.(197) Since August 2007, a number of additional locations were equipped with an animal detection system, including along SR 260 near Payson, AZ (David Bryson, Electrobraid Fence Ltd., personal communication; Norris Dodd, Arizona Game and Fish Department, personal communication). An animal detection system combined with electric fencing was used at these locations.

Two broad categories are commonly used in animal detection systems: area-cover systems and break-the-beam systems. Area-cover systems detect large animals within a certain range of a sensor. Area-cover systems can be passive or active. Passive systems detect animals by only receiving signals. The two most common systems are passive infrared and video detection. These systems require algorithms that distinguish between, e.g., moving vehicles with warm engines and moving pockets of hot air and movements of large animals. Active systems send a signal over an area and measure its reflection. The primary active area-cover system is microwave radar. Break-the-beam sensors detect large animals when their body blocks or reduces a beam of infrared, laser, or microwave radio signals sent by a transmitter to a receiver. Other less common detection systems include a system that depends on radio-collared animals and receivers placed in the right of way, and a system that uses seismic sensors to detect vibrations in the soil as large animals approach. Most of these systems have or had problems with the reliability of the sensors, although some of the manufacturers seem to have overcome these problems.

Two moose detection systems that operate using break-beam technology were installed on the Trans-Canada Highway in Newfoundland by Safeguards of Canada Incorporated as part of the pilot project initiatives. From the results of the evaluation it was found that the break-beam infrared moose detection systems are not appropriate moose-vehicle collisions mitigation measure for Newfoundland and Labrador's climate and terrain. Mixed results were obtained from other jurisdictions that had used the technology, as well as in academic research. Despite positive results being observed in some instances, most studies found issues with the wildlife-vehicle collision mitigation measure in terms of reliability of performance in certain weather patterns and maintenance of the system itself.

British Columbia Transportation and Infrastructure has installed wildlife detection system as a pilot project on Hwy 3 between Fort Steele and the Alberta Border in 2015. The approximate cost is $1.5 million. The evaluation of the pilot project is still pending.

References:

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