



TSB Newsletter

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TECHNICAL STANDARDS BRANCH

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Editor's Remarks

The March Newsletter contains articles on the 13th International Winter Roads Congress, Road Animal Fatality Information Application, Over Proliferation of Signs, Placement of Alberta Transportation Staff with Consulting Engineers for Experience, and Ditch Erosion Repair.

*in a rapidly changing world,
it is necessary
to constantly challenge
and to constantly rethink
the prevailing wisdom*

Moh Lali

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Ron Stoski

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Road Safety is No Accident

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World Roads 13th International Winter Roads Congress

*Steve Otto
Highway Operations*

I had the rare pleasure to attend the 2010 PIARC 13th Winter Roads Congress as the Alberta Transportation representative. From February 8-10, about 900 delegates from Europe, Asia and North America met in Quebec City, Quebec to partake in this Congress, which is held every four years as a compliment to the PIARC World Roads Congress. Holding the Winter Roads Congress in Quebec is a first for North America.



Quebec Exhibit

In addition to 120 technical presentations, there was the first International Snowplow Operators competition and seven different technical tours. The 7,000m² exhibition hall, with its amazing booths and equipment demonstrations, was the social centre of the conference. Something that I had never seen before were booths for countries to showcase their highway networks and winter maintenance practices – and since this was Quebec - there were plenty of opportunities to sip a glass of wine and nibble on delicacies from whichever country was being showcased at that time.

But the **real purpose of the conference was to exchange ideas and to learn from others.** Technical presentations ranged from sustainable winter highway operations to equipment improvements to contracting practices across the globe. Five simultaneous sessions made it difficult to be everywhere: fortunately, many summaries of technical presentations are posted at: <http://www.aipcrquebec2010.org/content/view/16/22/lang.english/>

At the April Tech Talk, I will highlight some of the presentations I attended and outline how Alberta can benefit from other research projects around the world.



First International Snowplow Operator's Competition



Tow-plow Demonstration

The blizzard journal has a daily summary of events: <http://www.aipcrquebec2010.org/content/view/24/28/lang.english/>

Details for the XIV Winter Road Congress in Andorra la Vella (between France and Spain) February 4 -7, 2014 will be posted at the PIARC website at: <http://www.piarc.org/en/congresses-seminars/winter-congresses.htm>

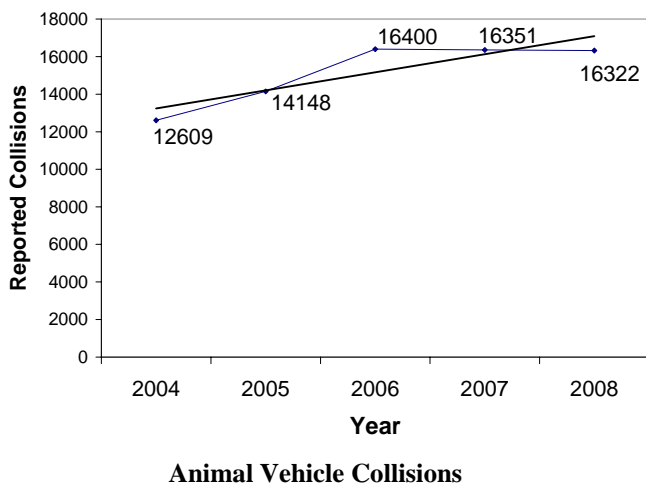
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Road Animal Fatality Information Application (RAFIA)

*Muhammad Imran
Highway Operations*

Animal-vehicle collisions (AVCs) on Alberta highways are a serious problem; nearly half of rural collisions involve an animal. These collisions affect human safety, property and wildlife. Given the extent of Alberta's rural road network (approximately 30,000 km) and the level of taxpayer investment (\$2.2 billion for budget 2008-09 or 5.9% of Provincial expenditures) directed at transportation infrastructure and development, it is critical to understand the risks posed by AVCs to motorist safety and costs of AVCs to society¹. Besides, as AVCs include a wildlife component, it is important to understand how transportation affects wildlife resources and conservation. The financial impacts of AVCs include cost of: reported collisions, unreported collisions, accident clean-up, lost provincial hunting licence revenues, and lost value of wildlife.

Reducing AVCs has been a significant challenge for transportation and wildlife professionals. Over the past twenty years, Alberta Transportation (AT) has implemented various animal collision countermeasures on Alberta highways; including signing, wildlife mirrors, right of way clearing, fencing and underpasses etc. However, no significant reduction in animal/vehicle collisions has been shown and the number of AVCs has increased from 12,609 in 2004 to 16,322 in 2008 (approximately 30% increase in five years). In 2008, the AV collisions included nine fatalities and 498 injuries, resulting in a total monetary loss of \$240 million. AVCs represent a small but steadily increasing share of overall collision picture.



One of the reasons for not achieving significant reduction in AVC is the lack of a true picture of how many AVCs have taken place and where exactly are these collisions occurring.

Systematically collected and accurate AVC data will help to estimate the magnitude of the problem and identify/ prioritize locations requiring mitigation. A well maintained AVC database will also help in monitoring the potential changes in AVCs over time and allow for the evaluation of the effectiveness of mitigation measures in reducing the number of AVCs.

In Alberta, police reports are required for collisions with damage of \$1,000 or more. Collisions with less than \$1,000 damage may go unreported, but the animal carcass could be left on the roadway for the maintenance contractor or others to remove. It has been estimated that for every reported collision there is an equal or greater number of unreported collisions. Moreover, the police reports have a varying degree of accuracy on the incident location (usually not visited by the police and based on driver's memory recollection), and do not provide information on the animal species. To overcome these data deficiencies, the RAFIA project was initiated to effectively collect all reportable and unreported animal collision events by equipping highway maintenance contractors with global positioning system (GPS) enabled data collection tools to obtain the animal fatality location and other data in the field at the time the animal carcass is removed from the road. The project supports the department's Alberta Traffic Safety Plan to reduce motor vehicle collisions.

RAFIA Pilot project:

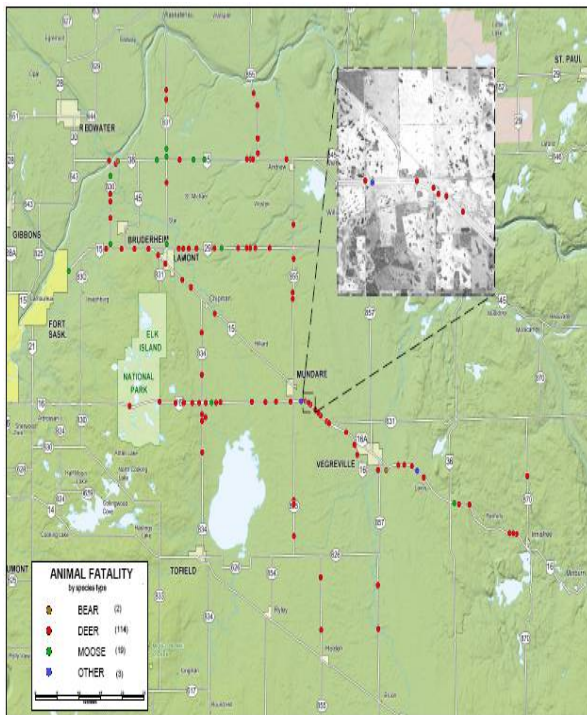
In June 2008, the pilot project was implemented in the Lamont and Vermilion areas to collect one year's worth of AVC data. Six GPS units (Thales Mobile Mapper CE) were used by the maintenance crew of Carillion Inc. The AVC data was digitally collected in the field at the time of carcass removal.



Thales Mobile Mapper

Data included information on the location, date, time, type of animal, sex and its age (adult or calf). No major problems were reported by the maintenance staff in using the GPS units. The accuracy of GPS fixes was generally found to be sufficient even without post processing.

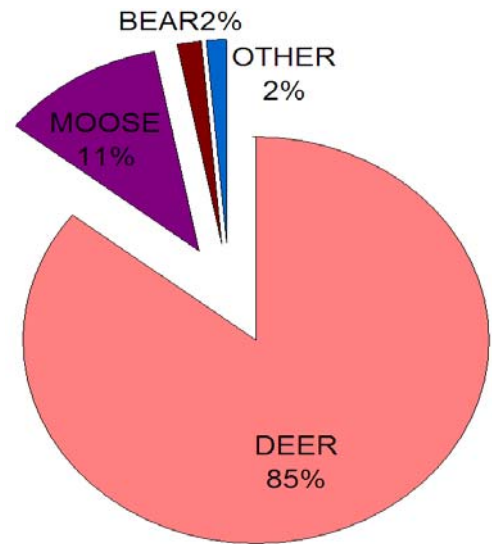
The data was then downloaded in a GIS environment and reports were developed. To identify hot spots/clusters of collisions, the data was displayed graphically on the road network. A user guide was designed to provide assistance in data collection and in using RAFIA application.



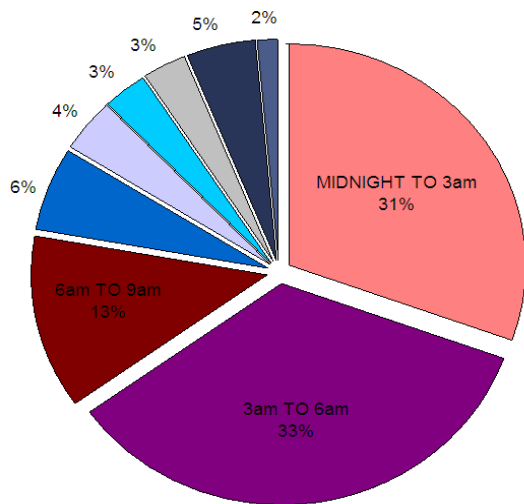
Distribution of AVC (2008-09)

Conclusions and Recommendations:

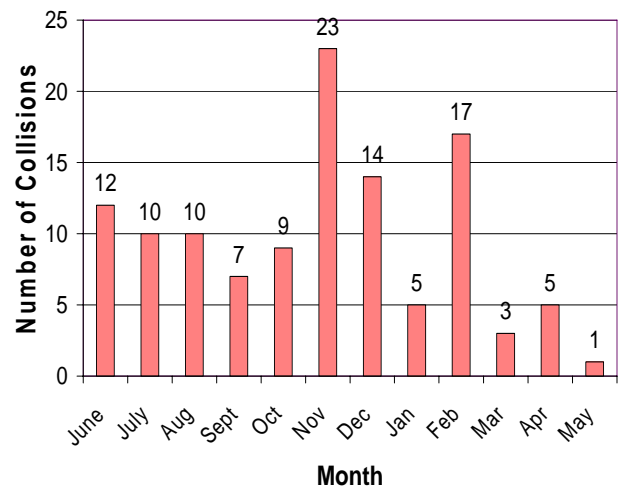
Results of the one year pilot study were reviewed by the Safety Process Management Committee (SPMC). The monthly kills, type, sex, and age of animals were all discussed in detail and the information/technology was found to be very useful. It was observed that the time of highest number of kills was during the midnight to dawn period and on a month-to-month basis, November and February were the highest observed months for kills. Deer were the most commonly reported animals involved; moose were the next highest, while only two collisions involved a bear. An effort will be made later to correlate police reports with the kill data to determine the actual number of unreported AVC.



Types of animals killed in AVC



Daily Distribution of AVC



Monthly AVC Distribution

OVER PROLIFERATION OF SIGNS

Ron Stoski

Design, Project Management and Training

The recommendations from the pilot study are:

1. Since the GPS units used in the pilot study have high prices (approximately \$3,000/unit), other low cost devices will be investigated and employed for future data collection. It would be ideal if the maintenance contractors can use their own communications devices (like smart phones) to perform data collection. This would not only reduce the cost but also not require maintenance staff to carry multiple devices in their vehicles.
2. The AVC data collected should be integrated into the CIA (Collision Information Application) as a new inventory layer for collision analyses, and to support NESS (Network Expansion Support System) in screening of high-crash locations.
3. The data collection work may need to be added into the maintenance contracts.
4. Depending on fund availability, the program should be expanded across the provincial road network on the basis of analysis that will identify locations with high risk of wildlife collisions.
5. Develop risk maps to identify wildlife conflict areas and provide this information to the road users.

It was also proposed to use RAFIA for the Highway 63 Fort McMurray corridor for the purpose of experimenting and evaluating innovative countermeasures.

References:

¹ A. P. Clevenger, A. Ford, and S. MacDougall; Strategies workshop on the reduction of animal-vehicle collisions on Alberta's roadways, final report to Alberta Transportation, December 2008

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Problem: Drivers have the ability to only absorb a fixed amount of information at any one time.

Too many signs confuse motorists, making it difficult for motorists to comprehend what is required of them and making it difficult for motorists to react on time in a safe and correct way.

The principles for signs are simple. They should be:

- easy to recognize early and easy to read
- clear and provide time to allow safe flow of traffic
- easy to understand and comprehensive
- in accordance with standard markings



Try to find "your" sign at 100 km/h.



Find posted speed limit on Base Line Road

Placement of Alberta Transportation Staff with Consulting Engineers for Experience

Jeffrey Xu

Design, Project Management and Training

Background

In 2008 Alberta Transportation (AT) began to implement a strategy to “Retain Technical Expertise”. The objective and goal of this initiative is for the department to maintain status as a knowledgeable owner. The department staff placement in consulting engineer’s design offices and project management teams for work experience is one of the three main components in this initiative. Others are formal training and in-house engineering projects.

A standard secondment agreement template is used for placement of Alberta Transportation employees with consulting companies. The agreement covers financial, legal, engineering and other responsibilities with input from Human Resources, Professional Services, Alberta Finance, Alberta Justice and CEA representatives.

Purpose

The purpose of this initiative is to 1) allow department staff to better understand how consulting engineers work while delivering planning, design and project management for Alberta Transportation and 2) allow department staff to learn engineering and technical skills as required so that they can be more effective in their current and future roles for AT.

Scope

This initiative is intended to “retain technical expertise” in all aspects of the Transportation and Civil Engineering Division’s work. All department engineering and technical staff is eligible to participate in this initiative (subject to workload constraints). The work in question is generally described as “engineering and related.” The types of work include Highway Planning, Highway Design, Traffic Engineering, Safety Analysis, Geotechnical Engineering, Pavement Design, Environmental Engineering and Project Management.

Staff Placement

Placement of department staff with consulting companies will be done in one of two ways as follows:

1. Either the need to include a department staff member will be included in the Terms of Reference (TOR) for a project or
2. The need is identified on a project where a consultant has already been awarded the work.

Details of the objectives to be achieved are to be documented in a “Secondment Agreement Contract” prepared by the Alberta Transportation employee, together with their departmental supervisor and their proposed supervisor in the consulting company. Generally assignments are confined to a single department project however there is flexibility to work on several department projects where feasible. The contract shall require reporting at appropriate intervals and a list of deliverables to be completed prior to completion of the contract. The consulting company shall be responsible for any errors or omissions that take place on their projects (even if a department staff member has made the error or omission). Department staff should not be placed on non-department projects.

Funding

The salary and expenses for all department staff is paid by the department. Where overtime is required by department staff, the employee must obtain approval in writing in advance from his or her departmental supervisor prior to working the overtime (as per normal practice). In the case of employees in the “Opted Out and Excluded” group, any overtime worked shall be either paid out or taken as “time off in lieu of overtime” with an allowance of one hour for each hour of overtime. Employees working under the Bargaining Agreement shall be subject to the terms of the Agreement.

Safety

Department staff shall complete basic first aid and CPR training in advance of beginning a placement with a consulting company. If additional safety training is required to comply with the consultant’s COR certification, this will be provided by the consultant.

Documentation

A secondment agreement contract shall be prepared and signed by the employee, the consultant and the department as required to cover all financial, legal, engineering and other responsibilities. The contract documents shall be kept as simple as possible while still capturing all of the essential information.

All related documents can be found in the folder of “Placement of AT Staff with Consulting Companies Reference Documents” at the intranet:

<https://intranet.transportation.alberta.ca/TCE/TSB/RTE/Shared%20Documents/Forms/AllItems.aspx>

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Ditch Erosion Repair - Vermilion Area

*Fred Cheng - Geotechnical and Materials Section
Tom Somerville, Vermilion District - Central Region*

Background

Over the years, severe ditch erosion has occurred at two sites that are 500m apart and overlooking each other in the Vermilion area - H614:02 north ditch and H894:04 east ditch. Continuous erosion has resulted in gullies up to 2m in depth in some areas at both sites and the eroded materials have been washed away causing an unsafe slope at H614 and side slope erosion at H894.

The site conditions of both sites are similar in nature and soil materials are sandy and silty. It was determined in 2009 that repairs to the ditches were badly needed before further aggravation that might increase risks to the environment and to public safety.

H614:02 north eroded ditch is 90m long with a 7% grade. In 2006, ditch scour was in the order of 1m to 1.5m in depth; in 2009 erosion doubled scour size to more than 2m in some areas. The existence of thick sand intrusions have added to the erodibility of the sandy and silty soil material. This ditch is also bordering the south edge of the farmer's field and may post liability to the department should farm equipment roll into the ditch. Public safety will also be jeopardized should a vehicle roll off the road into the ditch. With the steep 7% slope and the large ditch void there is potential danger of losing the roadway during large storm events. Added to the risk is the existence of a gas pipe line running across the ditch at the east end of the ditch.

H894:04 east eroded ditch is 120m in length with a 5.4% grade. In 2006, the ditch had gone through severe erosion; in 2009, the scoured area had doubled in size.

ArmorMax System

A new product to Alberta Transportation, ArmorMax Anchored Reinforced Vegetation System was chosen for its robust protection of soil surfaces from two failure mechanisms: surface erosion and shallow plane instability due to both steel pins and duck-bill anchoring. This project also serves as a pilot project for new materials as well as a demonstration to contractors and department staff of the proper installation of an erosion matting, as the materials manufacturer was on site to supervise the installation.

The ArmorMax system comprises of high performance Turf Reinforcement Mat (TRM) and percussion driven anchors. The matting is a 3-dimensional woven polypropylene geo-synthetic and exhibits high interlocking and reinforcement capacity with soil and root systems. Percussion duck-billed anchors, connected by stainless steel cable and an end-lock device, are driven up to 700mm into the soil by a Hilti percussion hammer which makes the installation easy and fast. However intense labour is involved for the full installation of the system (see Table 1 below).

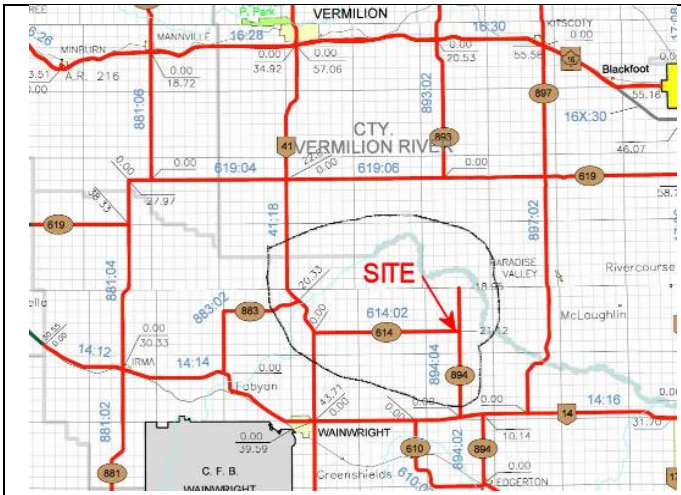
Construction

Organic material was removed before back filling and compaction of the gullies with imported competent material. This was native soil extracted from a local property adjacent to the job site. The ditches were graded to a trapezoidal cross-section with 4:1 side slopes. A 300mm x 300mm trench was dug at all 4 sides of the ditch to allow for edge embedding and anchoring of the matting. By properly burying the edge of the mat in the trench unraveling of the matting due to runoff was prevented. Seed and fertilizer was applied after grading was complete. Starter ArmorMax rolls were keyed in at the bottom of the ditch and worked uphill. Roll overlap was 300mm. The matting was anchored with 2 types of pins: deep duck-bill anchors at overlap and edge locations and 500mm x 5mm steel rods also at manufacturer prescribed grid locations. A backhoe was used to "knuckle" the trenched keys to compaction. At the H894 site, riprap was placed at the culvert as a stilling basin.

Georidge, a synthetic ditch check, was installed at 3.5m intervals in the ditches. Finally, Flexterra, a hydromulch that has synthetic fibers embedded to improve adhesion in addition to natural fibers and tackifier, was sprayed on the matting and all disturbed surfaces. Zone 5 seed was included. Flexterra hydromulch was applied in 4 stages to ensure that all openings of the 3-dimensional matting were filled and covered. The site will be monitored closely in spring melt and intense rainfall for erosion control and for grass growth.

	Ditch Length	Matting Row Width	Installation Time	Labour
H614:02	90 m	3	10 hr.	8 men
H894:04	123 m	2	14 hr.	8 men

Table 1: ArmorMax installation time and labour



Project location



H614:02 – 2009 During construction



H894:04 – 2006



Hilti hammering the duckbill anchors



H614:02 – 2006



Placement of anchor pins

The application of the product is labour intensive as the pin and anchor pattern is tight. The ground conditions in September made hammering the pins slow due to dry, hard packed material.

Once Carillion mastered the installation procedure, the application of the ArmorMax product was placed quite quickly. The time consumption for this job was in the preparation of the site. In all, the project took 4 days.



2009 Placement of Georidge



Placement of Hydromulch

Conclusion:

The cost of ArmorMax placement was \$50/sq. m. The cost of hydromulching 1500 sq. m. was \$6,000. The total cost of the project was \$135,000. This was an extra work project for the maintenance contractor.

This project could not have been possible without the expertise from Fred Cheng and Roger Skirrow from Geotechnical and Materials in Edmonton, the good people at Nilex who provided the material and design for the product and its application, and the dedication from our maintenance contractor Carillion.

All in all, the project went without a hitch and time will tell if this product will perform as advertised.

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