

The Official Newsletter of the Canadian Association of Road Safety Professionals

THE SAFETY NETWORK ***LE RÉSEAU-SÉCURITÉ***

Le bulletin officiel de l'Association canadienne des professionnels de la sécurité routière

2014, Issue 1

DANGER
WINTER
AHEAD

Inside this issue:

Editorial



It is cold! It is very cold! The winter of 2013-2014 will likely go into history as one of the severest winters ever. Record freezing temperatures have been measured across North America. Roads were closed, flights were canceled. Suffice to say that it is timely to devote this issue of our newsletter to winter driving and road conditions and how these can affect road safety.

Estimates of the extent of crashes resulting from weather-related collisions generally or winter conditions specifically provide some insight into the magnitude of the problem and its costs. Nationally, using aggregate risk and cost data, a 2003 study estimated that weather-related collisions in Canada cost \$1.1 billion per year, and among these

collisions are those that occur in winter conditions. Provincial measures from the Royal Canadian Mounted Police (RCMP) in British Columbia stated in 2010 that the fall and winter seasons are when motorists are most inclined to speed and drive too fast for road conditions and that 44% of casualty collisions can be attributed to these factors. In 2011 Aviva Canada reported a 49% increase in customer auto claims between December and February in comparison to the rest of the year. While winters may be less severe overseas, a study from the United Kingdom (UK) Department for Transport reported that in 2003, 48% of collisions were caused by skidding during winter conditions, as opposed to 11% during dry conditions and 19% during wet conditions.

There is no doubt that winter road conditions affect road safety. Drivers may not adjust their driving to the changes in road conditions, and even when they do, roads are less safe and may contribute to an increased crash risk. So what can we do? In this 2014 winter issue we focus on some winter driving strategies that can help protect us from crashing under such hazardous circumstances. One mitigation strategy that is garnering more attention is the use of winter tires to reduce winter crashes and improve driver safety in a wide range of winter road conditions; this is discussed in the newsletter. Other topics include tips on driving after dark and winter road maintenance. We hope you enjoy the reading. Stay safe, stay warm!

Ward Vanlaar
Traffic Injury Research Foundation

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Éditorial

Il fait froid ! Il fait vraiment froid ! L'hiver 2013-2014 fera probablement partie de l'histoire comme étant l'un des hivers les plus froids. Des températures froides brisant les records ont été mesurées partout en Amérique du Nord. Des routes ont été fermées, des vols ont été annulés. Il va sans dire que de consacrer ce numéro du Réseau-Sécurité à la conduite hivernale, aux conditions routières en hiver et aux conséquences de ces conditions sur la sécurité routière est opportun.

Des statistiques sur les collisions dues aux conditions routières en général ou aux conditions hivernales en particulier nous donnent un aperçu de l'ampleur du problème et des coûts qui y sont associés. Une étude effectuée en 2003 utilisant des données agrégées sur les risques et les coûts a estimé que les collisions reliées au mauvais temps, incluant les collisions qui se produisent en hiver, coûtent 1.1 milliard \$ par année au Canada. Des statistiques provenant de la Gendarmerie royale du Canada (GRC) montrent qu'en 2010, en Colombie-Britannique, l'automne et l'hiver étaient les saisons lors desquelles les conducteurs étaient les plus enclins à faire des excès de vitesse ou à conduire trop rapidement pour les conditions routières et que 44 % des collisions graves pouvaient être attribuées à ces facteurs. En 2011, Aviva Canada a signalé une augmentation de 49 % du nombre de déclarations de collisions de la part de leurs clients pendant les mois de décembre à février comparativement au reste de l'année. De plus, bien que les hivers y soient peut-être moins sévères, une étude réalisée par le Département des transports du Royaume-Uni a montré qu'en 2003, 48 % des collisions étaient causées par un dérapage lors de conditions hivernales, alors que seulement 11 % des collisions y étaient dues lors de conditions de chaussée sèche et 19 % lors de conditions de chaussée mouillée.

Il ne fait aucun doute que les conditions routières hivernales affectent la sécurité routière. Les conducteurs n'ajustent pas tous leur conduite en fonction des différentes conditions routières, mais même quand ils le font, les routes sont tout de même moins sécuritaires et peuvent contribuer à un risque de collision plus élevé. Que pouvons-nous faire alors ? Dans cette édition hivernale de 2014, nous dirigeons notre attention vers



Courtesy of TIRF via istockphoto.com

Il ne fait aucun doute que les conditions routières hivernales affectent la sécurité routière.

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quelques stratégies de conduite hivernale qui peuvent aider à nous protéger contre des collisions dues aux conditions routières dangereuses. L'une des stratégies présentées dans ce bulletin et qui attire de plus en plus l'attention est l'utilisation de pneus d'hiver pour réduire le nombre de collisions hivernales et améliorer la sécurité lors de la conduite dans plusieurs types de conditions routières hivernales. D'autres sujets sont aussi abordés, comme des trucs pour la conduite après la tombée de la nuit et l'entretien hivernal des routes. Nous espérons que vous apprécierez ce numéro. Soyez prudents et restez au chaud !

Ward Vanlaar
Traffic Injury Research Foundation

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Winter Tires

A significant number of people are killed and injured in road crashes in Canada each year. One mitigation strategy that is garnering more attention is the use of winter tires to reduce winter crashes and improve driver safety in a wide range of winter road conditions.

The Traffic Injury Research Foundation (TIRF) was contracted by the Winter Driving Safety Coalition to review the literature on winter tires. The objective of this work was to compile and synthesize available information and develop a current state of knowledge regarding the efficacy of winter tires and their potential effects on traffic safety, within the broader context of safe winter driving strategies. The review, published in 2012, included domestic and international research and other relevant winter tire information.

Based on the available information from experimental studies and demonstration projects it appears that in winter driving conditions, winter tires outperform other types of tires, notably all-season tires and summer tires. However, public opinion research reveals that the public does not fully appreciate the benefits of winter tires, suggesting education may be beneficial. For example, many people believe winter tires are only useful when it is snowing. However, winter tires outperform other types of tires during all winter conditions, including dry surfaces, once temperatures drop below +7 degrees Celsius.

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The Traffic Injury Research Foundation (TIRF) was contracted by the Winter Driving Safety Coalition to review the literature on winter tires.

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Despite the apparent advantages of using winter tires, the research available about this topic is outdated and fairly limited. There is an insufficient body of literature, especially in terms of epidemiological collision studies to validate the limited experimental findings. In particular, the question whether this apparent advantage of superior performance of winter tires in winter conditions translates into fewer collisions, injuries and fatalities remains largely unanswered. The issue is compounded by the fast and continuous improvements to winter tire technology in recent years. While more studies focusing on the effectiveness of modern winter tires may become available, findings can still be considered limited and more research would be beneficial to further inform sound decision-making.



Courtesy of TIRF via istockphoto.com

The report ends with some recommendations, notably with respect to research and education. The review also debunks several myths, including:

Myth: Regular tires provide sufficient traction in winter; Reality: Winter tires are superior to summer tires and all-season tires in terms of traction, braking performance, and cornering in all winter conditions.

Myth: Winter tires are only useful in regions with lots of snow; Reality: Winter tires outperform other types of tires during all winter conditions, including dry surfaces, once temperatures drop below +7 degrees Celsius.

Myth: Vehicles with ABS, Electronic Stability Control (ESC), all-wheel (AWD) or four-wheel drive do not need winter tires; Reality: In winter driving conditions such safety features like ABS, ESC, AWD or four-wheel drive are compromised without the use of winter tires.

Myth: Two winter tires instead of a complete set of four winter tires is sufficiently safe; Reality: Mixing different types of tires can cause a vehicle to fishtail.

The review can be obtained at no cost from www.tirf.ca.

Ward Vanlaar
Traffic Injury Research Foundation



Despite the apparent advantages of using winter tires, the research available about this topic is outdated and fairly limited.

Les pneus d'hiver



Chaque année au Canada, un grand nombre de personnes sont blessées ou tuées lors de collisions. Une stratégie pour réduire le nombre de collisions qui attire de plus en plus d'attention est l'utilisation de pneus d'hiver pour réduire le nombre de collisions hivernales et améliorer la sécurité lors de la conduite dans plusieurs types de conditions routières hivernales.

La Coalition pour la sécurité routière hivernale (Winter Driving Safety Coalition) a demandé à la Traffic Injury Research Foundation (TIRF) d'effectuer une revue de littérature sur les pneus d'hiver. L'objectif de cette revue était de faire l'inventaire et la synthèse de

l'information disponible sur le sujet et de développer une liste des connaissances actuelles sur l'efficacité des pneus d'hiver et leurs effets potentiels sur la sécurité routière, dans une perspective générale de conduite hivernale sécuritaire. Cette revue, publiée en 2012, inclut des études canadiennes et internationales, de même que d'autres informations pertinentes sur les pneus d'hiver.

Selon les informations disponibles provenant d'études expérimentales et de démonstrations, il semble que lors de conditions routières hivernales les pneus d'hiver soient plus performants que les autres types de pneus, comme les pneus quatre saisons et les pneus d'été. Cependant, des études sur l'opinion publique démontrent que le public ne comprend pas pleinement les avantages des pneus d'hiver, ce qui suggère que des campagnes d'éducation pourraient être bénéfiques. Par exemple, plusieurs personnes croient que les pneus d'hiver ne sont utiles que lorsqu'il neige. Pourtant, les pneus d'hiver sont plus performants que les autres types de pneus pendant tous les types de conditions hivernales, incluant une chaussée sèche, lorsque la température est de moins de +7 degrés Celsius.

Malgré les avantages apparents des pneus d'hiver, les études sur le sujet sont désuètes et plutôt limitées. Il y a un nombre insuffisant d'études, particulièrement d'études épidémiologiques sur les collisions pour confirmer les résultats expérimentaux. En particulier, il y a peu de conclusions concernant un lien entre les avantages

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La Coalition pour la sécurité routière hivernale (Winter Driving Safety Coalition) a demandé à la Traffic Injury Research Foundation (TIRF) d'effectuer une revue de littérature sur les pneus d'hiver.

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apparents d'une performance supérieure liée aux pneus d'hiver lors de conditions hivernales et une possible diminution du nombre de collisions, blessures et décès en hiver. Ce problème de manque de connaissances est aggravé par les progrès constants et rapides de la technologie des



pneus d'hiver dans les dernières années. Alors que des études additionnelles sur l'efficacité des pneus d'hiver modernes deviennent disponibles, les conclusions demeurent limitées et des recherches supplémentaires seraient bénéfiques afin de prendre des décisions mieux informées.

Le rapport contient quelques recommandations, particulièrement reliées à la recherche et à l'éducation. Cette revue discrédite aussi quelques mythes, comme les suivants.

Mythe: Des pneus réguliers fournissent suffisamment d'adhérence en hiver; **Fait:** Les pneus d'hiver surpassent les pneus d'été et les pneus quatre saisons en termes d'adhérence, de freinage et de virage dans toutes les conditions hivernales.

Mythe: Les pneus d'hiver sont utiles seulement dans les régions où il neige beaucoup; **Fait:** Les pneus d'hiver sont plus performants que les autres types de pneus pendant tous les types de conditions hivernales, incluant une chaussée sèche, lorsque la température est de moins de +7 degrés Celsius.

Mythe: Les véhicules équipés de freins ABS, d'électro-stabilisateur programmé (ESP), de transmission intégrale ou de transmission à quatre roues motrices n'ont pas besoin de pneus d'hiver; **Fait:** Lors de conditions de conduite hivernale, ces équipements de sécurité sont compromis s'ils ne sont pas utilisés avec des pneus d'hiver.

Mythe: Deux pneus d'hiver, au lieu de quatre, sont suffisamment sécuritaires; **Fait:** Combiner plusieurs types de pneus peut causer une perte de contrôle du véhicule.

L'étude (en anglais) peut être obtenue gratuitement au www.tirf.ca.

Ward Vanlaar
Traffic Injury Research Foundation

Malgré les avantages apparents des pneus d'hiver, les études sur le sujet sont désuètes et plutôt limitées.

Obligation des pneus d'hiver obligatoires au Québec et effet de la mesure sur le bilan routier

Abstract: In 2008, Québec became the first North American jurisdiction to legislate on winter tires. Between December 15 and March 15, all taxis and passenger vehicles registered in Québec must be equipped with winter tires. This requirement also applies to rental passenger vehicles in Québec. After four seasons of enforced mandatory winter tires, accident data show that the measure has had a positive effect on the road safety record: a 4% net reduction in road accidents, which means 460 fewer accident victims annually.

Depuis 2008, le Code de la sécurité routière prévoit notamment qu'au cours de la période du 15 décembre au 15 mars, le propriétaire d'un taxi ou d'un véhicule de promenade immatriculé au Québec ne peut mettre en circulation ce véhicule, à moins qu'il ne soit muni de pneus conçus spécifiquement pour la conduite hivernale selon les normes prévues par règlement du gouvernement. Cette interdiction s'applique également à quiconque offre en location au Québec un véhicule de promenade qui n'est pas muni de ce type de pneu.

En introduisant cette mesure, le Québec est devenu la première administration nord-américaine à légiférer sur les pneus d'hiver. Le message est clair : afin d'accroître la sécurité routière durant la saison froide, les pneus d'hiver constituent un équipement de base d'un véhicule.

Après quatre saisons d'application, les données d'accidents montrent que la mesure a eu un effet positif sur le bilan routier. La comparaison des données 2008-2009 à 2011-2012 avec celles des cinq années précédentes indique que la diminution du nombre de victimes d'accidents est plus marquée durant la période de l'année où les pneus d'hiver sont obligatoires que durant le reste de l'année (17 % par rapport à 13 %). Cela représente une amélioration nette de 4 % et signifie qu'annuellement la mesure a permis à 460 personnes de ne pas être victime d'accident.

À l'approche de l'hiver 2008-2009, le ministère des Transports a investi des efforts importants dans l'élaboration d'une campagne de promotion pour informer la population de l'introduction de cette obligation et des détails de son application. Les activités de communication se poursuivent toujours. À compter du 15 décembre 2014, seul un pneu sur lequel est apposé le pictogramme qui représente une montagne sur laquelle est surexposé un flocon de neige ou un pneu muni de crampons sera reconnu comme un pneu conçu spécialement pour la conduite hivernale.

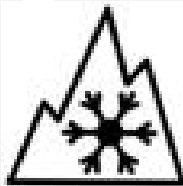
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Cette initiative concernant l'obligation des pneus d'hiver, qui s'ajoute à l'ensemble des actions récemment mises en place en matière de sécurité routière au Québec, a eu un effet important sur le bilan routier. C'est en agissant à la fois sur les facteurs humains, sur l'environnement routier et sur l'amélioration des caractéristiques des véhicules, comme le fait l'obligation de pneus d'hiver en saison hivernale, que l'on parvient à diminuer le nombre d'accidents et à réduire les traumatismes résultant de collisions routières.

Lise Fournier, ing.
Direction de la sécurité en transport

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Effective December 15, 2015, only tires marked by an icon representing a mountain with a snowflake on top or studded tires will be recognized as tires specifically designed for winter driving.



Le message est clair : afin d'accroître la sécurité routière durant la saison froide, les pneus d'hiver constituent un équipement de base d'un véhicule.

The Nature of Winter Tires and the Canadian Federal Regulations That Apply

Les technologies sous-jacentes à la fabrication de pneus d'hiver sont complexes en raison de la nature des matériaux utilisés et la même complexité des méthodes de construction. Tout cela pour remarquer la performance améliorée des pneus d'hiver par rapport aux pneus toutes saisons dans des conditions d'hiver extrêmes. Des changements récents dans les règlements sur la sécurité des pneus de véhicule automobile comprennent les exigences pour les tests de pneus d'hiver afin d'assurer une performance adéquate.

When this article went to press, we found ourselves firmly in the grasp of another Canadian winter. But this winter was different! November 20, 2013 marked the coming into force of the new Canadian Motor Vehicle Tire Safety Regulations (MVTSR). These regulations not only set the bar higher for the performance of summer and all-season tires, but they also introduced another first in a Canadian context: regulations for winter tire testing. The MVTSR now include a performance-based definition for winter tires bearing the alpine symbol. The alpine symbol is also known as the three-peak mountain snowflake symbol (3PMSF).

Some might be asking, "What makes a good winter tire", and "How do winter tires differ from all-season tires"? There are no brief, simple answers to these questions,

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due to the complexities of tire engineering. The explanations depend on many factors, including, but not limited to, the selection of rubber compounds (some 15 different rubber mixtures per tire), the materials and constructions of the body plies and belts, and the design of the tread patterns. The proof of a good winter tire is in the driving: winter tires provide better vehicle control margins and shorter braking distances in winter conditions when the temperature drops below 7°C.



Winter Tire Demonstration (video)

<http://www.youtube.com/watch?v=UX1UmYG1nyk>

Choisir des pneus d'hiver (vidéo)

<http://www.youtube.com/watch?v=maHO7MSIHTI>

The tire is arguably the most complex, highly-engineered component used on a motor vehicle. Tire characteristics are important in defining a vehicle's ride and handling characteristics, and are usually the driver's only conduit of fundamental control inputs for the vehicle. Part of the tire's complexity is due to rubber characteristics. Rubber's visco-elasticity is the source of some of the desirable tire behavior, yet rubber is highly non-linear, which makes tire engineering so challenging. Rubber properties change as a function of load, temperature, time, and input frequency. To illustrate this complexity, published attempts to cover tire engineering with any sort of academic rigour have resulted in 700-page tomes.

Tires provide grip with the ground plane not only by developing shear forces, but also by gripping surface asperities; this is made possible by rubber elasticity. The performance envelope of rubber tires is limited to specific temperature ranges. At the bottom end of a particular rubber blend's temperature range, it loses elasticity. So, tread designs notwithstanding, a rubber compound that provides good grip in summer will not be sufficiently elastic in winter temperatures. We need a tire's elasticity in order to grip road irregularities – but this is just one of the components of tire traction. The notional cutoff temperature for a summer/all-season rubber formulation is typically 7° C. Thus, summer and all-season tires should be swapped for winter tires when the ambient temperature is consistently below 7° C.

Some of what can be gleaned from published sources is that low-glass transition temperature, high hysteresis rubber formulations are part of the greater rubber formulation puzzle. In addition, the proportions of natural rubber and extender oils

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can be varied, as can the fillers. Tire manufacturers also use a myriad of other techniques to achieve desirable winter traction characteristics. Such techniques are closely-guarded trade secrets.

Effective winter tread patterns tend to feature short, heavily-siped tread blocks with lots of space between them. These tread features provide good ice and cold pavement performance, and also perform well on loose surfaces, such as snow and slush. This is in marked contrast to road-going summer/all-season passenger tire tread patterns, which are optimized for dry and wet asphalt and concrete road surfaces.



Following the MVTSR transition period, after September 1, 2014, all tires bearing the alpine symbol, or 3PMSF, must be capable of passing a packed-snow traction test defined by an American Society of Testing Materials (ASTM) test method F 1805-06, Standard Test Method for Single Wheel Driving Traction in a Straight Line on Snow- and Ice-Covered Surfaces, under specific test conditions. This test compares the driving traction of a winter tire against an ASTM E 1136 radial reference test tire. The winter tire must provide at least 10% better snow traction than the reference tire to warrant the presence of the 3PMSF on the tire sidewall.

Road users should always remember the importance of the Transport Canada and the Rubber Association of Canada recommendation that winter tires be installed in sets of four of the same model, and sized according to the manufacturer's tire placard found on each vehicle. It is also important to note that the frequent temperature fluctuations experienced during Canadian winters result in pressure changes in the tires without any actual air loss from the tires, thus it is critical that inflation pressures are monitored regularly. A 5.5° C temperature drop will result in a 1 psi tire pressure reduction. In closing, as with all tires, winter tires should be rotated at recommended intervals to maximize tread life, and adequate tread depth should be present to provide winter traction and controllability.

Roland Jonasch
Motor Vehicle Safety Directorate, Transport Canada

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Winter Tires and Stopping Distance

Résumé

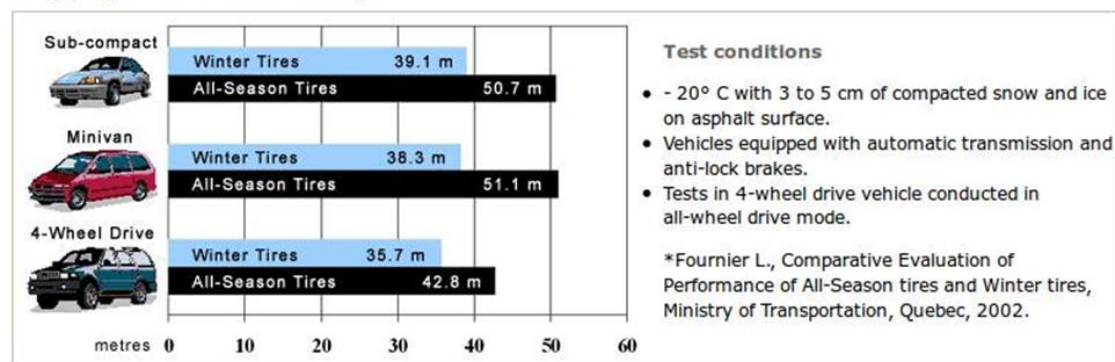
Par temps froid, les pneus d'hiver procurent une adhérence à la chaussée qui surpasse celle des pneus quatre-saisons. Ils améliorent le contrôle du véhicule, notamment lors de freinages brusques, et réduisent la distance requise pour immobiliser le véhicule en situation d'urgence. À l'inverse, les pneus quatre-saisons peuvent rendre certaines collisions inévitables, et aussi accroître la vitesse à laquelle se produit l'impact.

For the frequently harsh winter conditions on Canada's roads, the use of specialized winter tires is preferred over all-season designs. Winter tires essentially use a softer rubber compound that retains its flexibility at cold temperatures and provides greater adhesion to the road surface.

In 2008, the Province of Quebec enacted legislation requiring residents to use winter tires during the period from December 15 to March 15. Prior testing of motor vehicles equipped with winter tires and all-season tires had shown the benefits to be derived from the use of winter tires in braking, acceleration, and evasive steering maneuvers. (Fournier, 2002)

In particular, the results for straight-line braking tests from an initial speed of 50 km/h are shown in the following chart:

Stopping distances at 50 km/h*



The results obtained clearly demonstrate that, for the different categories of vehicles tested, with both winter and all-season tires, the stopping distances were reduced considerably when winter tires were installed. This finding is consistent with many other similar test programmes that have been performed. (Brown, Vanlaar and Robertson, 2012)

Considering just the sub-compact, the stopping distance with all-season tires was more than 11 m (30%) longer than for the same vehicle equipped with winter tires.

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Winter tires essentially use a softer rubber compound that retains its flexibility at cold temperatures and provides greater adhesion to the road surface.

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This additional stopping distance is not inconsiderable, and could clearly make the difference between becoming involved in a collision and being able to avoid any such involvement.

However, the reduction in the available friction between the tires and the road surface has a further effect when we consider the potential impact speed. Suppose, for example, a pedestrian were to enter a snow-covered roadway (under the above-noted test conditions) ahead of our case vehicle. The vehicle's driver recognizes the hazard and brakes hard at a point where the pedestrian is 39.11 metres ahead of the vehicle. Clearly, if the vehicle were equipped with winter tires, the driver would be able to bring the vehicle to a stop in 39.1(0) metres and thus avoid contact with the pedestrian.



Image courtesy of Transport Canada
<http://www.tc.gc.ca/eng/motorvehiclesafety/menu.htm>

However, consider the same situation where the vehicle is equipped with all-season tires. The laws of physics enable us to calculate the available coefficient of friction for the all-season tires in the slide-to-stop test for these conditions.

$$\mu = v^2 / 2gd$$

where

μ = Coefficient of friction

v = Test speed = 50 km/h = 13.9 m/s

g = Gravitational acceleration = 9.81 m/s²

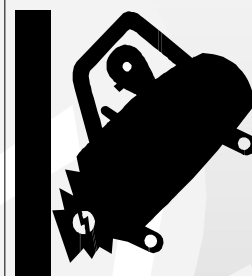
d = Stopping distance = 50.7 m

$$\mu = 13.9^2 / 2 \times 9.81 \times 50.7 = 192.9 / 994.7 = 0.194$$

We know from the test that this vehicle will require a distance of 50.7 m to come to a stop. The question then becomes what will be the speed of the vehicle after it has travelled through 39.1(0) metres and is about to contact the pedestrian?

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This additional stopping distance is not inconsiderable, and could clearly make the difference between becoming involved in a collision and being able to avoid any such involvement.



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One of the laws of uniform motion provides the answer as follows:

$$v^2 = u^2 - 2as$$

where

v = Final speed (m/s)

u = Initial speed = 50 km/h = 13.9 m/s

a = Vehicle deceleration (m/s²)

s = Distance travelled = 39.1m

Newton's second law ($F = ma$) gives the vehicle acceleration in terms of the frictional force (F) and the vehicle's mass (m) so that:

$$a = F / m = \mu mg / m = \mu g$$

We can now calculate the vehicle's speed as it approaches the pedestrian as:



$$v^2 = (13.9^2) - (2 \times 0.194 \times 9.81 \times 39.1)$$

$$v^2 = 192.9 - 148.8 = 44.1$$

$$v = 6.64 \text{ m/s} = 23.9 \text{ km/h}$$

Thus, when equipped with all-season tires, not only is the vehicle incapable of stopping in order to avoid hitting the pedestrian, it will still be travelling at almost 24 km/h at the point of impact. In such circumstances, perhaps physics provides some reinforcement for the notion that winter tires are preferable to all-season tires!

Alan German
Road Safety Research



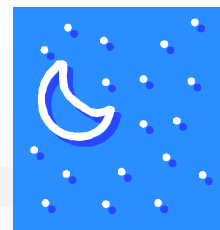
Perhaps physics provides some reinforcement for the notion that winter tires are preferable to all-season tires!

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Brown SW, Vanlaar WGM and Robertson RD; Winter Tires: A Review of Research on Effectiveness and Use; Traffic Injury Research Foundation; February, 2012 (http://www.tirf.ca/publications/document_request.php?docid=255)

Own the Night: Tips for Driving In the Dark



Popular Mechanics recently published an interesting article written by Phil Berg about making your 'nocturnal migrations safe and better' - here's a few of their tips and a link to the full article.

1. Clean the headlights and aim them correctly – frequently remove road crud; check your owner's manual to see if your lights are uneven, pointed lower than normal, or sky high.
2. Dim the instrument panel - if your dash lights are on max, your forward vision becomes less effective
3. Learn to spot wildlife – those tiny red dots off in the distance might be retinas staring back at you.
4. Don't stare at oncoming lights – avert your gaze, scan, keep your eyes moving
5. Wipe the inside of the windshield with newspaper – a car detailer's trick to remove streaks and reduce glare
6. Clean and adjust exterior mirrors - grimy mirrors create glare, reflected light appears wider and diffused.

Reference:

http://www.popularmechanics.com/cars/how-to/repair/10-safety-tips-for-driving-after-dark?link=rel&dom=yah_auto&src=syn&con=art&mag=pop#slide-1

Ten WORST things to do when Driving in Winter

Winter driving takes special skills and often a modified setup for your car. Prepare for the season, think ahead and don't panic. And for starters, avoid the following ten mistakes.

10. Go without practice— Without endangering anybody including yourself, go out there and practice. Winter driving is something they don't teach you when you get your license. Unless you live in Finland.
9. Leave traction control on—You might think traction control is great when the

(Continued on page 16)

Winter driving takes special skills and often a modified setup for your car. Prepare for the season, think ahead and don't panic.

(Continued from page 15)

roads are slippery (and it is!), but it's quite the opposite if you if you get stuck in deep snow

8. Overreact— You start sliding. You brake hard on snow. You crash. You start sliding. You oversteer on ice. You crash.
7. Tailgate— You don't see the bumper sticker that says "if you can read this you're too close"? Good. You're not supposed to.
6. Leave snow on your vehicle— That massive crash in your mirror? Well, that's due to the snow from your roof blinding everybody behind.
5. Drive too slow for conditions— Slow and safe aren't always appropriate.
4. Leave it all to AWD—all wheel drive won't save you if you don't respect the conditions.
3. Use summer tires— Yes, you can use summer tires in the winter. They will stop the car. At some point, somewhere.
2. Leave your lights off— Visibility suddenly changes for the worse during a snowfall. Push the switch, turn the knob, shine like a Christmas tree.
1. Speed in bad conditions— Don't risk it, speed kills on an icy road.

From Jalopnik.com by Máté Petrány (see link to full article below)

<http://jalopnik.com/the-ten-worst-things-you-can-do-while-driving-in-winter-1498639091>

Road weather information technologies for road safety

Many of us are interested in the weather forecast; it affects our choice of clothes and plans for the day for example. But to what extent does the weather forecast affect our choice of transportation? Do we think it's important enough to make us postpone our travel plans or cancel them altogether?

Analyzing the impact of the weather on road conditions is complex: forecasting the weather cannot always be done with the same degree of reliability and local conditions can make it impossible to predict where weather-related hazards will occur. For example, two similar types of snowfall do not necessarily lead to the same road conditions. Local characteristics and conditions such as temperature of the asphalt, number of vehicles driving by, and the types of vehicles can lead to different levels of risk.

In the past decade in Québec, Intelligent Transportation Systems (ITS) have been

(Continued on page 17)



Do we think it's important enough to make us postpone our travel plans or cancel them altogether?

(Continued from page 16)

used to collect data that are more precise or better suited for the improvement of the evaluation of road conditions. Devices installed along the road are used to capture different parameters including temperature of the road surface, what covers the road (water, snow, ice), visibility, as well as temperature and humidity of the immediate surroundings of the road. Taken together, these data, collected at different strategic locations on the road network inform monitoring systems of surveillance centres, which make this information available to decision-makers and road users.

In the near future ITS will use road users' vehicles to collect data and to communicate with drivers about the road conditions at their respective locations. Today many vehicles are equipped with Antilock Braking Systems (ABS) and electronic stability control. Tomorrow's vehicles will be capable of interpreting and using data collected by other vehicles that are close by to alert the driver, for example when the vehicle in front of the driver loses grip. A Centre of Excellence is underway at Université de Sherbrooke in Québec and will study existing technologies and ways to improve the use of data necessary to create realistic and pertinent information.

Two trends suggest the use of ITS in this way will happen in a not too distant future. First, due to the exponential growth in the use of smart phones and tablets, information technologies are everywhere. Second, auto manufacturers have for several years now worked toward the common goal of building cars that are connected to the Internet and finding safe ways to communicate with the driver. Who knows, in another ten years from now, perhaps the driver will no longer need to be informed about hazards on the road because the vehicle will anticipate and respond automatically to situations that are more difficult for humans to handle during emergencies.

By Étienne Morin, M.Sc.

PhD Candidate, Department of Applied Geomatics, Université de Sherbrooke
President, Vision Météo +

Les technologies de l'information au service de la sécurité routière

La météo suscite l'intérêt d'un grand nombre de personnes : pour savoir comment nous devons nous habiller, pour planifier nos activités par exemple. Mais dans quelle mesure l'information météo peut-elle influencer nos choix dans nos moyens de transport ? A-t-elle un impact suffisamment important pour reporter un déplacement routier ou abandonner un projet de déplacement en situation hivernale ?

(Continued on page 18)

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A-t-elle un impact suffisamment important pour reporter un déplacement routier ou abandonner un projet de déplacement en situation hivernale ?

(Continued from page 17)

L'analyse des impacts de la météo sur les conditions routières est complexe : les prévisions météo ont un pourcentage de fiabilité variable et plusieurs éléments locaux ou certains facteurs d'instabilité ne permettent pas de prédire en tout point les endroits dangereux pour la conduite d'un véhicule. Deux situations similaires de précipitations de neige ne rendent pas forcément la route enneigée avec le même degré de glissance : des caractéristiques in situ telles que la température de la chaussée, le débit de circulation et le type de trafic routier peuvent engendrer des niveaux de risques différents.



Depuis une dizaine d'années déjà au Québec, les Systèmes de transport intelligent (STI) contribuent à collecter des données plus précises ou plus adaptées afin d'améliorer l'évaluation des conditions de circulation routière : des capteurs situés sur le bord des routes mesurent plusieurs paramètres comme la température de la surface de la chaussée, ce qui recouvre la chaussée (eau, neige, glace), les conditions de visibilité ainsi que la température et l'humidité de l'air à proximité de la route. L'ensemble de ces données, pour plusieurs endroits stratégiques situés sur le réseau routier, alimente des tableaux de bord pour des Centres de surveillance qui relaient l'information aux décideurs et aux usagers de la route.

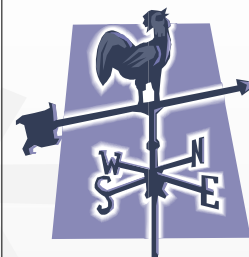
Dans un avenir relativement proche, les STI vont utiliser les véhicules des usagers pour collecter des données et pour communiquer avec le conducteur de façon à lui fournir des renseignements spécifiques à sa situation. Nous connaissons déjà plusieurs systèmes d'aide à la conduite comme le freinage ABS et le contrôle de stabilité du véhicule. Les véhicules de demain seront capables d'interpréter les informations des systèmes d'aide à la conduite collectées par les autres véhicules à proximité et d'alerter le conducteur : « Attention, le véhicule en avant de vous détecte une perte d'adhérence ! ». Un Centre d'expertise, qui est sur le point de voir le jour à l'Université de Sherbrooke au Québec, étudiera les technologies existantes et les façons d'optimiser le traitement des nombreuses données nécessaire pour aboutir à une information réaliste et pertinente.

Deux tendances nous laissent penser que cette vision des déplacements routiers n'est pas dans un futur très lointain : 1- les technologies de l'information explosent grâce à la progression fulgurante des téléphones intelligents et des tablettes ; 2- les constructeurs automobiles se sont rassemblés en consortium depuis plusieurs années pour offrir dans leur prochain véhicule une connexion internet et des moyens sécuritaires d'informer le conducteur. Qui sait, dans une dizaine d'années, il se pourrait même que le conducteur n'ait plus besoin d'être informé des dangers, et que le véhicule gère lui-même les situations que l'humain a de la difficulté à gérer en situation d'urgence.

Par Étienne Morin, M.Sc.
 Doctorant au Département de géomatique appliquée
 de l'Université de Sherbrooke
 Président de Vision Météo +

Qui sait, dans une dizaine d'années, il se pourrait même que le conducteur n'ait plus besoin d'être informé des dangers, et que le véhicule gère lui-même les situations que l'humain a de la difficulté à gérer en situation d'urgence.

Tracking weather-related collision rates in Canada



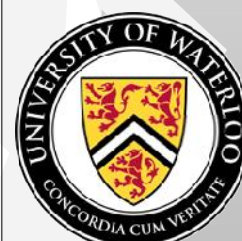
La sécurité routière est influencée par la météo et le climat. Les recherches menées par Jean Andrey et ses collègues ont démontré un risque élevé de collision dans des conditions de pluie et de neige. S'il existe des preuves que les conducteurs réussissent de mieux en mieux à adapter leur conduite lorsque les conditions sont pluvieuses et neigeuses - les taux de collisions lors d'événements climatiques extrêmes se révèlent être très élevés. On s'attend à ce que les événements extrêmes de pluie et de neige augmentent à l'avenir, alors que le climat du Canada se réchauffe.

The winter of 2013-2014 has challenged transportation systems in a number of ways—from the 'ground stop' at Pearson Airport in Toronto to road closures and strained maintenance budgets across the country. Road safety is also affected by weather and climate. Weather that impairs visibility, reduces road surface friction, or makes vehicle handling more difficult is associated with elevated collision rates—regardless of the season. Research by Jean Andrey and colleagues from the University of Waterloo has resulted in a number of insights into weather-related collision patterns.

The good news is threefold: (1) Most drivers adjust to inclement weather by reducing speed, increasing headway and taking care in other ways. Not surprisingly, therefore, property-damage-only collisions increase the most during inclement weather, and serious crashes increase, but not to the same extent, (2) In most cases, risks return to near-normal as soon as rain stops falling, and risk also is reduced considerably after snowfall, even though roads may remain snow-covered for an extended period, and (3) In Canada, precipitation-related driving risks have decreased over time—both in absolute terms and relative to normal seasonal driving conditions.

But challenges also remain. Collision rates remain highly elevated during heavy rains and moderate or heavy snowfalls. Relative to normal seasonal conditions, on average, injury collisions are 25% higher on days when 10 mm or more of rainfall occurs, and 35% higher on days with 10 cm or more of snowfall. Also, the frequency of precipitation and heavy precipitation events in particular have been increasing and these conditions are projected to increase even more in future decades, as the climate warms. A recent report by Andrey and others, published by the Transportation Association of Canada, details how changing weather patterns may affect road safety in many of Canada's largest cities. Findings show that snow-related events are likely to become less frequent in most of southern Canada, but safety benefits are likely to be largely offset by increased rainfall frequency and intensity.

Jean Andrey
Department of Geography & Environmental Management
University of Waterloo



Research by Jean Andrey and colleagues from the University of Waterloo has resulted in a number of insights into weather-related collision patterns.

(Continued on page 20)

(Continued from page 19)

Articles of possible interest include:

Andrey, J., Hambly, D., Mills, B. and Afrin, S. (2013) Insights into driver adaptation to inclement weather in Canada. *International Journal of Transport Geography* 28: 192-203.

Hambly, D., Andrey, J., Mills, B. and Fletcher, C. (2013) Projected implications of climate change for road safety in Greater Vancouver, Canada. *Climatic Change* 116:613-629.

Winter Maintenance of Pedestrian Facilities

Abstract: Les efforts visant à fournir un système de transport équitable doivent tenir compte de l'entretien des aménagements pour piétons. Bien que le fait de disposer d'infrastructures pour piétons favorise des communautés en bonne santé et le choix d'un mode de transport durable, sans l'entretien à longueur d'année de ces installations, leur état peut être préjudiciable à la sécurité, la mobilité et l'accessibilité des utilisateurs. L'accumulation de neige et de glace peut détériorer la qualité des aménagements pour piétons, entraîner l'augmentation des blessures causées par des chutes et forcer les gens à circuler dans la rue, à travers la circulation automobile. De fortes chutes de neige peuvent recouvrir les réseaux de transports multimodaux en quelques heures, créant ainsi d'importants défis de maintenance pour les responsables. Les stratégies d'entretien hivernal accordent traditionnellement la priorité aux infrastructures destinées aux véhicules, et ce, même si les meilleures pratiques soulignent l'importance d'inclure les aménagements pour piétons dans la philosophie de « rues complètes ». Les initiatives qui encouragent la participation du public, comme « adoptez un trottoir » ou d'autres programmes citoyens, peuvent être profitables aux stratégies d'entretien.

The Need for Winter Maintenance

In the efforts to provide an equitable transportation system, the upkeep of pedestrian facilities should not be overlooked. Although the provision of pedestrian facilities can promote healthy communities and sustainable mode choice, without year-round maintenance the condition of these facilities can be detrimental to the safety, mobility, and accessibility of their users. Snow and ice accumulation can degrade the quality of pedestrian facilities, increasing the instances of slip and fall injuries and forcing people to walk on the street with vehicular traffic. Elderly pedestrians and people with impairments have a greater need for snow clearing than those using motorized modes of transportation. Although vehicles can traverse patches of ice and

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In the efforts to provide an equitable transportation system, the upkeep of pedestrian facilities should not be overlooked.

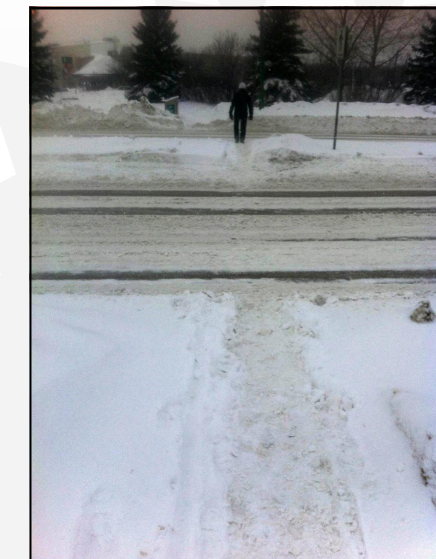
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snow, pedestrians with mobility impairments need a better maintained surface to travel. Visibility is a key contributing factor to pedestrian collisions, and during the winter months increased hours of darkness compromises visibility for a greater portion of the day and pedestrian collisions become more common [1].

Challenges and Strategies for Winter Maintenance

Winter maintenance poses different challenges for officials. Heavy snowfalls are generally not localized to one area: rather, in a matter of hours snowfall can cover an entire multi-modal network and require intensive maintenance for restoration. Some of Canada's major cities receive over 300 cm of snow annually, with record blizzards dropping over 100 cm in a single day [2]. Site prioritization and resource allocation can be a sensitive decision, as facilities that are cleared in a timely fashion can entrap people in their homes, force them to take longer routes, and incur greater travel times. Priority is traditionally given to vehicular facilities, although best practices stress the importance of maintaining pedestrian facilities under the complete streets philosophy [3].

In addition to responses immediately following a major snow event, medium-term maintenance is needed to manage snowmelt, ice buildup, and piled snow obstructions within the right-of-way. The deployment of equipment depends on the type of facility being maintained. For example, a high-powered plow may efficiently clear a sidewalk, while hand-powered equipment like shovels and brooms are required for clearing pedestrian passage at an at-grade railroad crossing. Maintaining network connectivity, adequate path width, crossing opportunities, and access to



facilities that encourage multi-modal trips such as parking lots, bicycle racks, and transit facilities, are important goals for winter maintenance strategies.

Initiatives that encourage public involvement and provide information on winter maintenance are important elements to maintenance strategies. Adopt-a-sidewalk programs encourage citizens to

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Adopt-a-sidewalk programs encourage citizens to take ownership and be involved in snow clearing operations.

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take ownership and be involved in snow clearing operations. Chicago's Adopt a Sidewalk Program allows citizens to register online, claim sidewalks that they will shovel and share supplies like snow blowers, shovels, and de-icers with neighbours [4]. Citizen assistant programs, like Snow Angels in Calgary, encourage volunteers to assist elderly persons or people with impairments with snow removal [5]. Delaware has an Adopt-a-Shelter program which enlists community and business partnerships to adopt and maintain bus shelters [3].



Rebecca Peterniak
Road Safety Youth Committee

References

- [1] Urban Systems. (2012). *City of Vancouver Pedestrian Safety Study*. Vancouver: City of Vancouver.
 [2] Current Results. (n.d.). Retrieved from <http://www.currentresults.com/Weather/Canada/Cities/snowfall-annual-average.php>
 [3] Scott, M., & Rudd, B. (2012). *Winter Maintenance of Pedestrian Facilities in Delaware: A Guide for Local Governments*. Newark: Institute for Public Administration University of Delaware.

Shift Into Winter

En Colombie-Britannique, une alliance comprenant 11 membres procède, durant les mois hivernaux, à une campagne de sensibilisation aux bonnes habitudes de conduite hivernale. La campagne a fait effet – un sondage effectué en 2013 a démontré que 76 % des conducteurs qui conduisent pour leur travail font des ajustements majeurs à leur conduite pendant l'hiver.

Drivers in British Columbia experience varied winter weather, from heavy snow, ice and significant cold in the north and interior regions, to rain, fog and occasionally freezing temperatures in the Lower Mainland and southern Vancouver Island. As road conditions worsen due to winter weather, the number of vehicle crashes in which someone is killed or injured due to driving too fast for the conditions almost doubles, from 138 in October, to over 260 in December.¹

In an effort to reduce the number and severity of winter-weather-related vehicle crashes, a group of road safety stakeholders came together in 2006 to form what eventually became the Winter Driving Safety Alliance. Since its inception, the goal of the Alliance has been to increase awareness of the risks associated with winter driving in an effort to positively influence the driving practices of motorists during the B.C. winter driving season (October 1st to April 30th.)

In an effort to reduce the number and severity of winter-weather-related vehicle crashes, a group of road safety stakeholders came together in 2006 to form what eventually became the Winter Driving Safety Alliance.

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Today, the Alliance includes members from 11 organizations, including the Automotive Retailers Association, BC Forest Safety Council, BC Road Builders and Heavy Construction Association, BC Trucking Association, Insurance Corporation of BC, Justice Institute of BC, Ministry of Transportation and Infrastructure, Pacific Coach Lines, RCMP, Trucking Safety Council of BC, and WorkSafeBC.

In 2009, the Alliance launched *Shift into Winter*, an annual public awareness campaign held in Kamloops, Prince George and Kelowna, communities that experience a higher-than-average number of seasonal vehicle crashes. *Shift Into Winter* promotes safe winter driving and offers online resources to inform and educate B.C. drivers about the road hazards caused by winter weather, and what they can do to minimize the risk of being involved in a crash.

While the campaign's primary audience is the general driving public, the Alliance recognized the need to address winter driving issues in the workplace. In B.C., more work-related vehicle crashes that result in worker injury and lost time from work occur between October and February.

ShiftIntoWinter.ca provides resources for employers and supervisors to help them implement safe winter driving work practices. In the near future, the website will offer a suite of winter driving safety tools and resources designed for B.C. workplaces.

Whether you drive for work or leisure, the campaign promotes the following safety messages:

- Prepare yourself — and your vehicle — for winter conditions
- Check road and weather conditions before heading out; postpone trips when necessary
- Slow down and drive for the conditions

The *Shift Into Winter* campaign has resonated with drivers. An annual post-campaign survey conducted in 2013 indicates that 76% of work drivers report making major adjustments to their driving in winter. This is an increase of 8% over 2012. *Shift Into Winter* is also the winner of the 2012 Public Relations Society Canadian Advocacy and Social Marketing Award.

Visit www.ShiftIntoWinter.ca for more winter driving safety information.

Lennea Durant
Road Safety at Work



The Shift Into Winter campaign has resonated with drivers.

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- (1) ICBC Casualty Crashes by Contributing Factor. Driving Too Fast for the Conditions 2008 – 2012 Police Reported Data.
- (2) Source: WorkSafeBC Stat. Services, 2013



Safer Roads; Healthier Communities

24th Canadian Multidisciplinary Road Safety Conference
Mark your calendar!



If you are concerned about road safety, June 1 - 4, 2014 promises to be an inspiring and educational time. Join the Canadian Association of Road Safety Professionals and the British Columbia Injury Research and Prevention Unit as they host the 24th Canadian Multidisciplinary Road Safety Conference. Register and see the preliminary program at: www.cmrrsc.ca. The conference is aimed at everyone who works in road safety including health professionals, engineers, government officials, crash reconstructionists, insurers, researchers, enforcement, and others.

To be held at the Coast Plaza Hotel in beautiful Vancouver, British Columbia, near the majestic North Shore Mountains, this conference will bring together stakeholders in road, vehicle and human factors safety to facilitate exchange between disciplines and to promote strategies that will improve road safety.

The theme this year is Safer Roads; Healthier Communities to emphasize that traffic injuries and deaths are a major public health problem in Canada. In fact, motor vehicle deaths are the leading cause of death for those aged 5-29 years. Vulnerable road users, like pedestrians, cyclists and motorcyclists, are particularly at risk. Furthermore, traffic injuries and deaths have a significant impact on individuals, families and on society as a whole. Loss of income, long-term care and rehabilitation are some of the burdens experienced, and the economic burden at a societal level is staggering. The theme of this conference is designed to stress the importance of sharing strategies across disciplines to improve the safety of our roads thus lowering traffic injuries and deaths.

Delegates will enjoy discovering Vancouver, which was voted Canada's most walkable city. This diverse and multicultural city has much to offer; from festivals to gardens, suspension bridges to aquariums. Delegates will also want to take in its energetic restaurant and entertainment scene.

Best Regards,

Ms. Mavis Johnson
Co-Chair, CMRSC XXIV /
President, CARSP /
President, Canadian Traffic Safety Institute
mavis@ctsinsitute.com

Dr. Ian Pike
Co-Chair, CMRSC XXIV /
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*If you are
concerned about
road safety, June
1 - 4, 2014
promises to be an
inspiring and
educational time.*



Des routes plus sécuritaires; des communautés plus saines

24^e Conférence canadienne multidisciplinaire en sécurité routière
À mettre à votre calendrier!



Si la sécurité routière vous préoccupe, du 1^{er} au 4 juin 2014 se tiendra un événement qui promet d'être à la fois inspirant et enrichissant. Joignez-vous à l'Association canadienne des professionnels en sécurité routière et à la British Columbia Injury Research and Prevention Unit alors qu'ils seront les hôtes de la 24^e Conférence canadienne multidisciplinaire en sécurité routière. Vous pouvez vous inscrire dès aujourd'hui et obtenez une version préliminaire du programme: www.cmrsc.ca. La conférence s'adresse à tous ceux qui travaillent dans le domaine de la sécurité routière, y compris les professionnels de la santé, les ingénieurs, les représentants gouvernementaux, les reconstitutionnistes d'accident, les assureurs, les chercheurs, les agents de la paix, et les autres.

La conférence se tiendra au Coast Plaza Hotel, dans la belle ville de Vancouver, en Colombie-Britannique, à proximité des majestueuses montagnes du North Shore. Elle réunira des acteurs s'intéressant à la sécurité dans les domaines des infrastructures routières, des véhicules ainsi que celui des facteurs humains, facilitera les échanges entre les spécialistes de ces disciplines et fera la promotion de stratégies qui permettront d'améliorer la sécurité routière.

Le thème de cette année, « Des routes plus sécuritaires; des communautés plus saines », met en évidence le fait que les accidents de la route ainsi que les décès qui en résultent représentent un problème majeur de santé publique au Canada. En fait, les décès routiers sont la principale cause de décès chez les personnes âgées entre 5 et 29 ans. Les usagers vulnérables, tels que les piétons, les cyclistes et les motocyclistes sont particulièrement à risque. En outre, les accidents routiers entraînant des blessures ou la mort ont un impact significatif sur les individus, les familles de même que sur la société dans son ensemble. La perte de revenus, les soins de longue durée et de réadaptation ne sont que quelques-uns des coûts indirects à considérer, et le fardeau économique sur le plan sociétal est stupéfiant. Le thème de cette conférence est pensé pour souligner l'importance de partager les stratégies des diverses disciplines afin d'améliorer la sécurité de notre réseau routier et, conséquemment, réduire les blessures et les décès de la route.

Les participants auront du plaisir à découvrir Vancouver, qui a d'ailleurs été votée la ville canadienne la plus propice à la marche. Cette ville diversifiée et multiculturelle a beaucoup à offrir : festivals, jardins, ponts suspendus, aquariums, etc. Les participants voudront également tirer partie de ses restaurants et des nombreux spectacles.

Salutations cordiales,

Mme Mavis Johnson
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Présidente, ACPSER /
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Si la sécurité routière vous préoccupe, du 1^{er} au 4 juin 2014 se tiendra un événement qui promet d'être à la fois inspirant et enrichissant.

Acknowledgements

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Editorial Board

- ◇ Jean-Francois Bruneau— Université de Sherbrooke, Sherbrooke, QC
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Guest Contributors

- ◇ Jean Andrey — University of Waterloo, Waterloo, ON
- ◇ Lennea Durant — Road Safety at Work, Vancouver, BC
- ◇ Lise Fournier — Ministère des Transports du Québec, Québec, QC
- ◇ Roland Jonasch — Transport Canada, Ottawa, ON
- ◇ Étienne Morin — Université de Sherbrooke, Sherbrooke, QC



Next issue

The theme of the next issue of the Safety Network will focus on injury prevention and a medical perspective on road safety. If you have any articles of interest on this topic, please forward them to Rebecca Peterniak (rebecca.peterniak@gmail.com) by April 28th, 2014. Articles should be between 300 – 500 words and accompanying pictures/graphics are encouraged.



Prochain numéro

La prochaine édition du Réseau-Sécurité portera sur la prévention des blessures et un point de vue médical sur la sécurité routière. Si vous avez un article sur le sujet ou êtes intéressés à en écrire un, vous êtes invités à envoyer vos contributions à Rebecca Peterniak (rebecca.peterniak@gmail.com) avant le 28 avril 2014. Les articles devraient avoir entre 300 et 500 mots, et des photos ou graphiques les accompagnant sont les bienvenus.