COUNTERMEASURES TO ADDRESS MOTORCYCLE SAFETY:

Building a Foundation to Support Canada’s Road Safety Strategy 2015

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The Vulnerable Road Users’ Expert Working Group on Motorcycles

June 2012
An important note for the reader

The Canadian Council of Motor Transport Administrators is a non-profit organization comprising representatives of the provincial, territorial and federal governments of Canada which, through the collective consultative process, makes decisions on administration and operational matters dealing with licensing, registration and control of motor vehicle transportation and highway safety. It also includes associate members from the private sector and other government departments whose expertise and opinions are sought in the development of strategies and programs.

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EXECUTIVE SUMMARY

Introduction

The Vulnerable Road User Strategy developed by the CCMTA as part of Road Safety Vision (RSV) 2010 established targets with the ultimate goal of reducing motorcycle deaths and serious injuries. In spite of the efforts under RSV 2010, motorcycle safety outcomes in Canada have been mixed as a result of jurisdictional variations in traffic collisions involving motorcycles. Data from Transport Canada indicate that during the period 2004-2006, motorcyclists accounted for about 7% of road user fatalities, with an average of 211 motorcyclists killed each year. This represents an increase of 41% over the 1996-2001, the baseline period for RSV 2010.

The lack of overall positive motorcycle safety outcomes presents us with an opportunity to develop a unique motorcycle safety countermeasures report to reduce, and maintain, low levels of fatalities and injuries among motorcycle users that will contribute to achieving the ultimate national goal – having the safest roads in the world. This document identifies some proven and promising strategic initiatives to provide additional set of actions—over what has been developed for the new Road Safety Strategy 2015, for the benefit of jurisdictions looking to develop their own road safety plans.

The Strategic Context

Contemporary issues identified in developing this report include:

- An upward trend in motorcycle sales in Canada since 2000, which, has been curtailed in the last two years by the recession.
- A corresponding increase in motorcycle registrations since 2000, with significant implications for motorcycle safety.
- An increasing number of “born again” riders over 40 years of age and females taking up riding.
- A demographic shift in motorcycle fatal crashes as a result of increasing numbers of older drivers and females taking up motorcycle riding across Canada. There is now a preponderance of older drivers aged 40-54 years involved in motorcycle crashes.
Risk Profile of Motorcycle Accidents

- Young people under 20 years of age and over 40 year olds who ride mostly for recreational purposes have increased risk of collision involvement.
- Motorcycle crashes are more likely to occur on weekends, between May and October under dim light or dark conditions.
- Motorcyclists involved in single-vehicle collisions normally lose control due to speeding or other high risk behaviours.
- Multiple-vehicle collisions with motorcycles involve other vehicles turning left, head-on collisions, and right-angled collisions.
- The major contributing factors in single-vehicle fatal crashes include speed, alcohol and drugs, driver inexperience, inattention and distraction, animal action, and road surface conditions.
- Most fatal crashes involving motorcycles with other vehicles involve speeding, inattention or failure to yield by other drivers, impaired driving, inexperience and passing or improper lane usage.

The Approach

This report covers key targets segments, strategic initiatives and actions that complement those developed for the general driving population in the new Road Safety Strategy 2015. The key target segments are:
- Young drivers less than 25 years old
- Older drivers over 40 years of age
- Unlicensed Drivers
- Drivers of other vehicles (general population)
Female cohorts who are increasingly entering the motorcycle riding environment will be monitored over the next five years; they are currently underrepresented in crashes.

Strategic Thrusts

The suggested strategic thrusts, along with a list of actions, are aligned with the safe systems approach to reducing deaths and serious injuries that include targeting road users, ensuring road infrastructure is safe, and promoting new vehicle safety standards and technology.

Strategy 1: Address driver inexperience among motorcycle riders: This includes the enhancement of the motorcycle Graduated Driver Licensing programs to ensure that new riders are adequately skilled, as well as addressing the increasing crash rate of older riders.
Strategy 2. Address speeding and other high-risk behaviours of motorcyclists and drivers of other vehicles: This covers high-risk behaviours such as stunting, exceeding the speed limit in excess of 50km/hr, racing, and contest of speed.

Strategy 3. Develop initiatives to further reduce impaired driving: The suggested actions complement proven initiatives directed at reducing impaired driving for the general population in the new Road Safety Strategy 2015.

Strategy 4. Promote the use of appropriate protective gear and enhance rider visibility: Includes enforcement of helmet use and the wearing of high visibility clothing.

Strategy 5. Discourage unlicensed and improperly licensed drivers: This could be accomplished through targeted enforcement through the use of ALPR technology and regular police checks.

Strategy 6. Enhance awareness and education of the inherent risk of motorcycling: This involves working with key safety partners and industry to raise awareness of motorcycle safety for all road users.

Strategy 7. Promote motorcycle-friendly road design, maintenance and infrastructure: The aim of these initiatives is to ensure that the safety of motorcycle riders is considered in the design and maintenance of roads, provisions of road infrastructure and the implementation of traffic management plans.

Strategy 8. Pursue vehicle-based countermeasures: The aim is to improve the safety of motorcycle by taking advantage of new motorcycle technology and monitoring after-market modifications.

A list of research initiatives have been provided to support the report by keeping abreast with new developments in the motorcycle industry and potential safety impacts for motorcycle riders.
COUNTERMEASURES TO ADDRESS MOTORCYCLE SAFETY IN CANADA

INTRODUCTION

The Canadian Council of Motor Transport Administrators (CCMTA) has, through extensive consultations with stakeholders, developed a third generation road safety strategy to succeed Road Safety Vision (RSV) 2010. The ultimate goal of the new plan is to continue to reduce fatalities and serious injuries resulting from traffic collisions on Canadian roads, thus becoming one of the safest jurisdictions in the world.

Vulnerable road users, including motorcyclists, pedestrians and bicyclists, form part of the key target groups identified in the Strategy. The CCMTA Vulnerable Road User Strategy developed as part of Road Safety Vision 2010 produced general collision information and trends on motorcycle crashes in Canada, leading to the establishment of set targets. In spite of the efforts under RSV 2010, motorcycle safety outcomes in Canada have been mixed as a result of jurisdictional variations in traffic collisions involving motorcycles.

Data from Transport Canada indicate that during the period 2004-2006,1 motorcyclists accounted for up about 7% of road user fatalities, with an average of 211 motorcyclists killed each year. This represents an increase of 41% over the 1996-2001 periods. (Chart 1) Newfoundland, Prince Edward Island, Alberta, New Brunswick, and British Columbia in particular recorded significant increases in the percentage of traffic fatalities that were motorcyclists over the periods of comparison. The growth in motorcyclist fatalities occurred in spite of declines in fatalities for other types of road users.

The lack of overall positive motorcycle safety outcomes presents us with an opportunity to develop a unique motorcycle safety countermeasures report to reduce, and maintain, low levels of fatalities and injuries among motorcycle users that will contribute to achieving the ultimate national goal. It is against this background that the Expert Working Group on Motorcycle Safety was charged with the responsibility of developing a dedicated a comprehensive list of initiatives that could be included in the new RSS 2015 framework. This document identifies proven and promising initiatives and provides an additional set of actions for the benefit of jurisdictions looking to develop their own road safety plans.

THE STRATEGIC CONTEXT

Trends in Motorcycle Ownership and Registrations

Motorcycle sales in Canada have increased in recent times from 52,000 new motorcycles in 2000 to 64,000 in 2009 as depicted in Chart 2. Ownership of motorcycles have trended upward since 2000 until recently, when the impact of the recession has resulted in a sharp drop in sales of new motorcycles—new motorcycle sales have seen a decrease of 25% to 30% in the past two years. (MMIC, 2009). A similar trend has been identified in the US in recent times, where sales of new motorcycles have exceeded one million units.

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As expected, motorcycle registrations (Chart 3) have been increasing since 2000, with significant implications for motorcycle safety.
There are indications of a corresponding demographic shift in motorcycle registrations as a result of more riders over 40 years and females taking up riding. According to a report prepared by the Motorcycle and Moped Industry Council (MMIC, 2009), most of the recent sales were to riders over 40 years while sales to those under 30 were on a decline. This shift in demographics could change if the current economic and financial difficulties persist for a longer period.

With increasing numbers of older drivers and females taking up motorcycle riding across Canada, there have been some demographic changes in motorcycle fatal crashes. There is now a preponderance of older drivers aged 30-54 years involved in crashes. Insurance administrators also continue to deal with unlicensed or improperly licensed motorcyclists, a group that has consistently shown an increased risk of being involved in a collision compared to those who are properly licensed.

RISK PROFILE OF MOTORCYCLISTS IN CANADA

Collision and fatality analyses of motorcycle crashes in Canada, conducted by Transport Canada, along with a literature review of contemporary motorcycle issues formed the basis for developing the motorcycle safety report. The Transport Canada report, prepared for the CCMTA looked at traffic crashes during 2004-2006 where a vulnerable road user was killed, with a vulnerable road user being defined as a pedestrian, a motorcyclist, or a bicyclist. In the report, statistics from the years 2004-2006 were sometimes compared to statistics from the 1996-2001 period, which is the baseline period for the Road Safety Vision 2010 Strategy.

Who is involved?

- Between 1996-2001 and 2004-2006, fatalities increased among all age groups of motorcyclists except those under the age of 20. The crash risk of young motorcyclists continues to be higher than other cohorts.
- Over the period of analysis, 25-34 year old motorcyclists were the most frequently killed in accidents involving motorcycles, accounting for 23% of riders killed.
- Most riders in Canada use motorcycles for recreational purposes.
- Fatalities among motorcyclists aged 45-54 years increased by 109% between 1996-2001 and 2004-2006. Motorcyclist traffic deaths among this group more than doubled, even though the number of licensed motorcyclists from this age group grew by only about 40%.
- On average, fatally injured motorcyclists involved in rural crashes were older than those involved in urban crashes. Specifically, 41% of victims in rural crashes were 45

5 http://www.tc.gc.ca/eng/roadsafety/tp-tp2436-rs201002-1067.htm Updated June, 6, 2010
years or older, while only 28% of victims in urban crashes were 45 years or older.

- Although the numbers of motorcyclists increased for both males and females, the number of female motorcyclists killed increased by 48% compared to 40% for male motorcyclists.

**When do they occur?**

- Most motorcyclist fatalities occur on weekends between May and October, peaking in the month of August. Fatalities in August account for almost 19% of the year’s fatal injuries.
- Almost one in four of the deaths on motorcycles (24%) occur between the hours of 3 p.m. and 6 p.m. Another 20% normally between 6 p.m. and 9 p.m. , making the late evening the most deadly time of day for motorcycle riders.
- About 29% of motorcyclist fatalities occur in dim light or darkness compared to 46% of all road user fatalities combined.

**Crash Configuration**

- Overall, single-vehicle motorcycle crashes represent a significant number of crash types in Canada, accounting for about 37% of all motorcycle fatalities in Canada.
- Single-vehicles crashes mostly involve ‘ran off the road’ types of crashes where the rider lost control of the vehicle either through speeding or other high-risk behaviour.
- The predominant crash configurations for multiple-vehicle collisions involving motorcycles are the left-turning syndrome, head-on, and right-angled collisions.
- When looking at multiple and single-vehicle collisions together, motorcycles are at-fault more than 50% of the time.

**Where Do the Crashes Occur?**

- Location – almost 40% of motorcyclists were killed and more than 45% were seriously injured in crashes at or near intersections during 2004-2006.
- Urban Areas – almost half (45%) of motorcyclists who were killed and more than half (57%) who were seriously injured sustained their injuries in crashes that occurred in urban areas (posted speed limit of 70 km/h or lower).
- Rural Roads – About 55% of motorcyclist traffic deaths occurred on rural roads during

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9 Insurance data from Saskatchewan, British Columbia and Manitoba.  
• Between 1996-2001 and 2004-2006, motorcyclist fatalities on rural roads increased by 49% while motorcyclist fatalities on urban roads increased by 22%.

What Contributes to Motorcycle Crashes and Casualties11?
• Alcohol and drugs: The incidence of drinking and riding declined between 2004 and 2006. About 13% of fatally injured motorcycle operators had been drinking prior to the crash, compared to 25% during 1996-2001. Fatally injured motorcyclists aged 35-44 years were the most likely to have been drinking prior to the crash (23% of victims in this age group).

• Speeding: About 38% of fatally injured motorcyclists had been speeding prior to the crash. This was a slightly lower figure than in 1996-2001. The most likely age group to be speeding was motorcyclists aged 20-24 years (55% of victims in this age bracket had been going too fast). Fatally injured motorcyclists aged 45 years or older were less likely to have been speeding than those under 45.

About 64% of motorcyclists killed in traffic crashes had committed some type of traffic infraction prior to the crash such as speeding, disobeying traffic controls, or failing to yield the right of way. In contrast, only 43% of fatally injured drivers who were not motorcyclists had committed an infraction.

• Driver inexperience: Data from Saskatchewan and other jurisdictions indicate that the first three years post-licensing is a critical period for new riders with respect to involvement in traffic accidents.12

• Non-Use or Improper Use of Equipment: The lack of proper protective gear leads to preventable deaths and serious injuries in the event of crashes.

• Detection of Motorcycles: There appears to be two main issues with other drivers not seeing the motorcycle driver on the road. These are
  1) Difficulties in detection motorcycles due to their smaller sizes compared to other vehicles, and
  2) The lower frequency of motorcycles on the road at any given time.

Drivers of other vehicles motorcycle riding experience are purported to be better at detecting motorcycles than those with no riding experience.

- **Unlicensed Drivers and Improper Licensure**: Riding a motorcycle without the proper or valid licence continues to be a problem in some Canadian jurisdictions such as New Brunswick and Ontario. For example, about 24% of all motorcyclists involved in fatal crashes in New Brunswick were not properly licensed\(^\text{13}\).

- The major contributing factors for motorcycle single-vehicle fatal collisions include speed, alcohol and drugs, driver inexperience, inattention and distraction, animal action, and road surface conditions.

- Most fatal crashes involving motorcycles with other vehicles involve speeding, inattention or failure to yield by other drivers, impaired driving, inexperience and passing or improper lane usage.

### THE COUNTERMEASURES

This report outlines the key target groups and contributing factors, which form the bulk of the strategic thrusts and actions to support the reversal of the increasing motorcycle fatalities. In order to align this document to the new Road Safety Strategy, it is imperative that the recommended actions reflect proven and promising initiatives that have the potential to effect downward reductions in both motorcycle fatalities and injuries.

Although many of the initiatives identified in the new Road Safety Strategy apply to motorcycles—especially road infrastructure and vehicle-based initiatives—the inherent risky nature of motorcycles warrants the identification of further actions that are not currently covered.

Jurisdictions are encouraged to regard the strategic elements and actions in this document as complementary to the initiatives outlined in the Road Safety Strategy. Each jurisdiction is encouraged to prioritize the actions according to their respective needs and resources. What is essential is that whatever is implemented be reviewed periodically to ensure that the selected actions provide the maximum safety impact to contribute to the overall national vision.

**Key Targets Groups and Contributing Factors**

Based on the key issues outlined above, Table 1 covers the key target groups and the contributing factors associated with deaths and serious injuries to motorcyclists. The key targets identified in the development of this strategy include:

- Young drivers less than 25 years old
- Older drivers over 40 years of age
- Unlicensed Drivers
- Drivers of other vehicles

The growth in the female cohort’s involvement in motorcycle collisions--although females are underrepresented in deaths--is reason enough to monitor them before their situation worsens in the future. This will address the social preconceptions about motorcycle deaths and injuries being a “male problem.

<table>
<thead>
<tr>
<th>Key Target Groups</th>
<th>Contributing Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Impaired Driving</td>
</tr>
<tr>
<td>Young Drivers less than 25 years</td>
<td>X</td>
</tr>
<tr>
<td>Older Drivers 40-54</td>
<td>X</td>
</tr>
<tr>
<td>Unlicensed Drivers</td>
<td>X</td>
</tr>
<tr>
<td>Other Vehicle Drivers</td>
<td>X</td>
</tr>
<tr>
<td>Women Riders*</td>
<td>X</td>
</tr>
</tbody>
</table>

*Group to be monitored over the life span of the strategy.
INITIATIVES AND ACTIONS

1: Address driver inexperience among motorcycle riders, especially older returnee drivers.

Actions
1. Jurisdictions to introduce a single stream Graduated Driver Licensing programs targeted at all new motorcycle riders. This will ensure that inexperienced road users get more attention, and that experienced car drivers on motorcycles for the first time go through the stages of the program.
2. Enhancements to existing motorcycle graduated licensing systems by introducing pre-learner mandatory training programs, and training for learners, including consideration of hazard perception and on-road testing.
3. Enforce new legislation pertaining to unaccompanied learner motorcyclists.
4. Review current training curriculum for possible improvements. This could involve overhauling rider training and on-road mandatory curriculum standards or teaching quality pre-trip inspection before the ride.
5. Introduce refresher courses for returnee riders.
6. Introduce advanced courses for all motorcycle riders.
7. Develop public education campaigns and/or communication activities for returning riders—illustrate risks for riders returning after an extended break from riding, and to encourage participation in the refresher training, maybe with some incentives.
8. Introduce or enhance motorcycle awareness as part of the standard driver testing program.

2. Address Speeding and Other High-Risk Behaviours:
This includes stunting, exceeding speed limit by over 50km/hr, racing and contest of speed.

Actions
9. Establish remedial programs or special initiatives to address high-risk behaviour on motorcycles.
10. Develop consistent fine amounts for speeding or standardize penalties across jurisdictions.
11. Education motoring public on the detrimental effects of speed and aggressive driving.

3. Reduce Impaired Driving
In addition to road user strategies directed at the general population to reduce impaired driving, jurisdictions consider
Actions:
12. Extending zero BAC tolerance to all new motorcycle riders regardless of age
13. Improving recording and monitoring of motorcycle collisions in which alcohol or drug use are contributing factors.

4. Promote the use of appropriate protective gear and enhance rider visibility

Actions:
15. Address issues with DOT standard with respect to labelling by promoting changes to prevent label forgery when dealing with AMMVA and NHTSA.
16. Implement and enforce approved helmet standards across all jurisdictions.
17. Remove helmet exemptions for medical reasons.
18. Develop public education campaigns and/or or communication activities to encourage riders to:
   - wear protective clothing to mitigate injury severity in the event of a crash; and
   - wear high visibility clothing to improve motorcyclist visibility to other road users.

5. Discourage unlicensed drivers

Actions:
19. Motorcycle impoundment and progressive sanctions based on incident frequency.
20. Use publicity and enforcement to increase awareness of the consequences of riding whilst uninsured.
21. Safety administrators working with the insurance industry to exchange information on uninsured vehicles.
22. Deploy Automatic Licence Plate Recognition technology. The size of licence plate font could be increased without increasing the size of the plate to assist the police with the deployment of the ALPR

6. Enhance awareness and education

Jurisdictions should be encouraged to use publicity and other campaigns to raise awareness of key issues identified with motorcyclists in a two-part approach:

1. Those targeted at the motorcyclists themselves, and
2. Those targeted at other road users that are likely to interact with motorcyclists in the driving environment.

Actions:
23. Developing messages that match the profile of the key target groups using casualty characteristics and seasonal trends.
24. Encourage industry to play significant roles in promoting motorcycle safety awareness in the provinces.

7. Promote motorcycle-friendly road design, maintenance and use of infrastructure

Support road maintenance and infrastructure initiatives as outlined in new road safety strategy. To the extent that road surface condition is a contributory factor to motorcycle collisions, road design must take into consideration road maintenance, traffic engineering and management.

Actions:
25. Pay particular attention need to road surface grip and consistency, factors critical to motorcycle stability in the process of leaning, braking or accelerating, which could lead to loss of control.
26. Manage intersections for motorcyclists since a good number of motorcycle crashes occur at intersections. Road furniture and curb cut at the vertical are hazardous to motorcyclists and cyclist alike.
27. Traditional designs of guard railing target the prevention of car-object interactions with almost no consideration for the motorcyclist. Design engineers must be encouraged to consider motorcycle safety through the design of motorcycle-friendly barriers.
28. Safety audits must be conducted with consideration given to motorcyclists as well as other drivers.
29. Given that a good number of motorcycle collisions occur under dark conditions, jurisdictions could improve lighting conditions at high accident locations.

8. Pursue vehicle-based countermeasures

Actions:
30. Support manufacturers to design motorcycles with technologically advanced brakes, airbags, and leg protection systems.
31. Put measures in place to minimize after-market motorcycle modifications, which makes motorcycles worse in performance.
32. Encourage manufacturers to design cars that minimize the driver’s blind spot and the use of tinted windows that impact motorcyclist’s safety.
33. Continually discourage after-market window tinting.

**RESEARCH AND COORDINATION**

- Conduct research to obtain relevant and accurate data on the use of mopeds and motorcycles, including crash involvement and exposure factors.
- Research best practice moped and motorcycle training and licensing options.
- Research the risks associated with returning riders, and investigate options to encourage appropriate skills refreshment for such returnees.
- Investigate the benefits of introducing a zero alcohol limit for all motorcycle riders.
- Investigate improvements to the quality of motorcycle crash and exposure data.
- Investigate alternative methods to identify speeding motorcyclists.
- Conduct on-going research into motorcycle rider behaviour.
- Liaise with industry to develop advanced safety technology and promote features showing evidence of road safety benefits via public education campaigns.
- Monitor Canadian, Provincial and international developments relating to targeted road safety improvements for motorcycle safety.
- Conduct evaluation of the effectiveness of motorcycle safety programs for publication.
- Research best practice to identify appropriate methods for recording and reporting motorcycle speeds to enable the assessment of the level of non-compliance of posted speed limits by motorcyclists.
- Conduct speed surveys at high collision sites to implement appropriate enforcement measures.