Final Report

Rural Road Safety Survey

2007

Transport Canada and the

Canadian Council of Motor Transport Administrators

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Executive Summary

At their February 2006 meeting the Rural Road Safety Task Force of the Canadian Council of Motor Transport Administrators (CCMTA) identified a need to benchmark the current rural road safety situation with respect to "who is doing what" on Canada's rural road system. The purpose of the survey is:

- *To identify successful Canadian strategies that could be implemented nationally; and*
- *To benchmark rural road safety strategies through Canada.*

For the purposes of this project "rural roads" are defined as undivided roads with 80 or 90 km/h speed limits[1].

The Rural Road Safety Task Force identified the following categories of strategies for study:

- *Improved data*
- *Better identification of safety problems*
- *Improved design/operation of rural roads*
- *Enforcement strategies and public education*
- *Speed management programs*
- *Intelligent transport system*
- *Trauma management systems*

For the most part, engineering, education, and enforcement/emergency response are carried out within each jurisdiction by separate entities. In order to minimize extraneous questions for each entity (e.g., enforcement organizations should not be presented with road design questions) and increase response rate, three survey instruments were developed – one each for engineering, education, and enforcement.

Each survey instrument was designed to gather basic information about current practices in rural road safety and prompted respondents to indicate which activities are either in-service, being developed, or under consideration within each of the seven categories (as appropriate).

[1] This is the definition of a "rural road" contained in Road Safety Vision 2010.

Pre-testing of the survey instruments was not undertaken. The surveys were developed and distributed as electronic PDF documents in both official languages.

As this survey is mainly to benchmark rural road activities, the primary sampling frame included all Federal agencies with a stake in rural road safety (2), all Provincial/Territorial Ministries of Transportation (13), the Provincial Police and/or the equivalent RCMP Division (13), and the up to two municipalities in each province/territory (26) with the largest number of rural roads. In the end, only 17 municipal road authorities were included in the primary sampling frame as many Provinces/Territories do not have municipalities with jurisdiction over rural roads as defined for this study.

In response to the objective of identifying successful rural road safety activities for use by others, the survey was made available to rural road safety agencies that were outside of the primary sampling frame. However, only respondents from the primary sampling frame were used to benchmark the status of rural road safety activities; respondents from outside of the primary sampling frame were used only to identify additional strategies.

Appropriate individuals at each agency within the primary sampling frame were identified through personal knowledge of the Project Team members, references provided by personal contacts of Intus, reviewing the Transportation Association of Canada's 2007 Membership list, reviewing the Canadian Association of Chiefs of Police Traffic Committee membership list, and reviewing the Divisional contacts listed on the RCMP website. Surveys were circulated to organizations outside of the primary sampling frame via the Canadian Association of Road Safety Professionals electronic mail distribution, and recipients in the primary sampling frame forwarding the survey to other rural road safety agencies.

No compensation or consideration was provided to respondents, and an informed consent form was not required.

Forty-four (44) surveys were completed and returned for this project, in addition to one response from "V" Division of the RCMP that states Nunavut does not have any rural roads as defined[2]. There were 12 engineering surveys, 11 education surveys, 17 enforcement

[2] It was confirmed through personal communication with Mr. John Hawkins Director, Transportation Policy & Planning from Nunavut's Department of Economic Development & Transportation that Nunavut does not have any roads with a speed limit of 80 km/h or above. Therefore, given that Nunavut has no rural roads, it was removed from the primary sampling frame.

surveys, and 4 surveys that were categorized as "other". The "other" category included one response from an academic institution (University of New Brunswick), two from professional associations (Standing Committees of the Transportation Association of Canada), and one from a UK-based road safety consultant. See Table ES.1 for a breakdown of responses.

TABLE ES.1: Number of Survey Responses

	ENGINEERING	EDUCATION	ENFORCEMENT	OTHER	ALL
Primary Sample	*11*	*11*	*3*	*0*	*25*
Other	*1*	*0*	*14*	*4*	*19*
All	*12*	*11*	*17*	*4*	*44*

There were 56 agencies in the primary sampling frame, and 25 of the 44 surveys were returned from agencies in the primary sampling frame, for an overall response rate of 45%. Under the primary sampling frame, the response rates for the surveys are 35, 85, and 25 percent for the engineering, education, and enforcement surveys, respectively.

Results

The agencies in the primary sampling frame that responded to the education and Provincial/Territorial engineering surveys were geographically and functionally representative of the rural road situation in Canada, and are reliable for future benchmarking surveys. However, the enforcement and the municipal engineering communities identified in the primary sampling frame exhibited low response rates –hampering future benchmarking. Given the low response rate and the numerous responses from the enforcement community that are outside of the primary sampling frame, all enforcement responses and the one municipal engineering response were used to benchmark activities. This creates a bias towards Ontario municipal police services in the enforcement category.

The number of education and engineering-related rural road safety activities that are currently being employed at the Provincial/Territorial level are shown in Figure ES.1. Excluding Nunavut, which has no rural roads as defined for this study, the average number of rural road safety activities that each Province/Territory employ is 18 and 25 for education and engineering, respectively. British Columbia employs the greatest number of education activities (31); while Nova Scotia and the Yukon employ the least number of education

activities (12). The Province employing the greatest number of engineering activities is Quebec (40); the Province employing the least number of engineering activities is Nova Scotia (5).

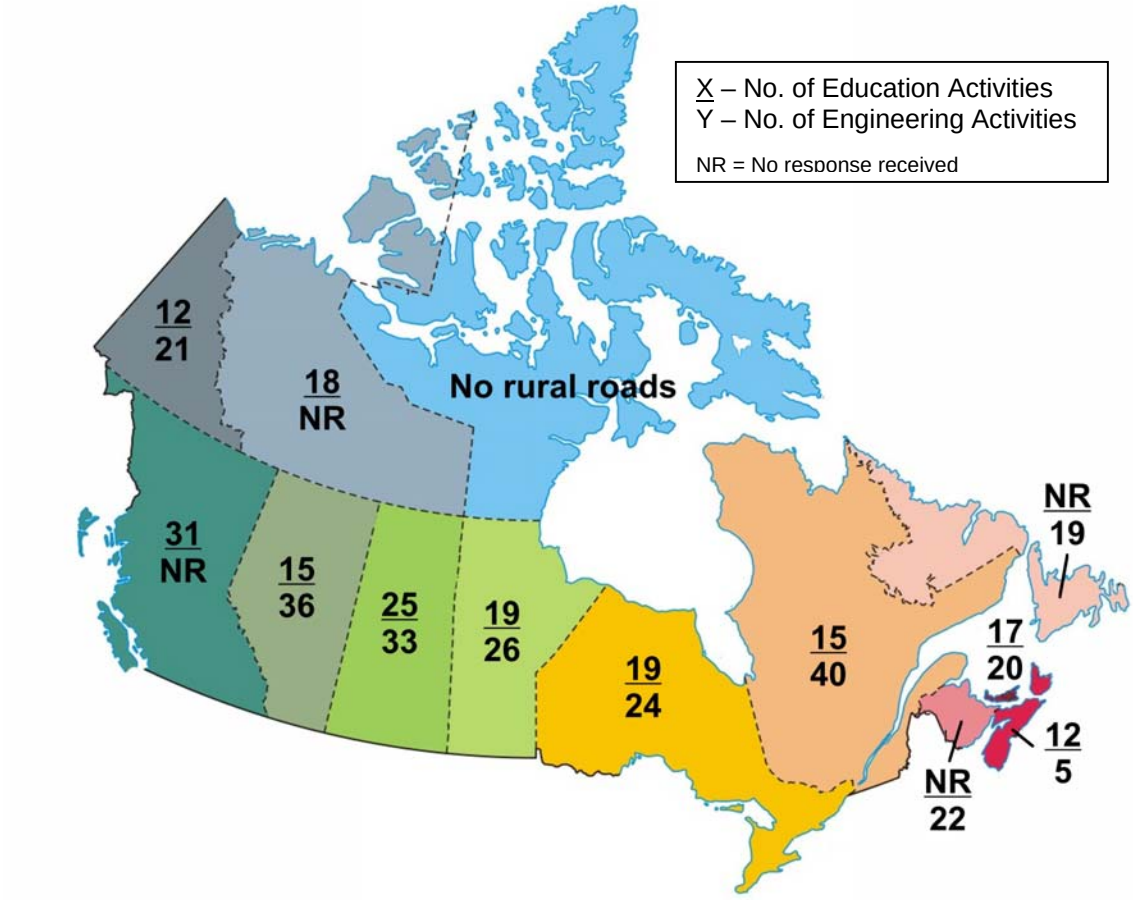

FIGURE ES.1: Overview of Current Provincial/Territorial Rural Road Safety Activities

The three Provincial responses concerning enforcement have an average of 25 rural road safety activities per Province/Territory, with a high of 32 and a low of 20.

Additional rural road safety activities are "being developed" or are "under consideration" in all of the responding Provinces/Territories. In the safety education community, all of the respondents except British Columbia and Quebec noted that they are developing or considering new activities with an average of one measure being developed, and one measure under consideration in each Province/Territory. The results are similar in the engineering

community where all of the respondents except Quebec noted that they are developing or considering new activities with an average of two measures being developed, and two measures under consideration in each Province/Territory.

Further analysis of the surveys was conducted to determine if the survey respondents are employing rural road safety activities that are (according to the reviewed literature) the most effective in crash reduction. To that end the following conclusions are drawn:

Education

1. There is a tremendous gap in the knowledge-base concerning the effect of education programs on collision occurrence.

2. The Canadian Education community has an excellent basis for developing safety programs with all responding jurisdictions managing a collision database, and using the data to develop or evaluate their safety programs.

3. The four most-used education activities are fatal vision goggles, temporary community displays on road safety, community partnerships, and public service announcements. The literature does not provide any effectiveness estimates for these activities, except for multimedia campaigns (public service announcements) which may reduce collisions by up to 22 percent.

Engineering

1. The knowledge-based concerning the effects of engineering measures on collision risk is well developed and growing. There is a current gap in the knowledge on the effects of ITS measures on collision risk.

2. The four most-used engineering activities are improving roadway alignment, improving visibility, upgrading/installing traffic control devices, and advance warning or intersection flashers.

3. In-service road safety reviews and road safety audits are very effective in reducing collisions (30 to 56 percent reductions), but are used by only 55 percent of the survey respondents.

4. Roundabouts are effective in reducing intersection collisions, but because they are relatively new devices for the Canadian engineering community, they are only being used by 3 responding jurisdictions (27%).

Enforcement

1. There is a gap in the knowledge-base concerning the effect of enforcement programs on collision occurrence.

2. With the exception of automated enforcement, which can provide collision reductions of up to 71 percent, enforcement activities generally reduce collisions from six to 25 percent.

3. The four most-used rural road safety activities in the Canadian enforcement community are 911 service (which is a supporting activity), media campaigns for safe driving, automatic license suspensions for BAC test failures, and sobriety check points. The estimated effectiveness of the latter three activities is 13 to 20 percent.

The lessons learned from this initial benchmarking effort are:

1. Since regular benchmarking is the main purpose of the survey, it is important to gain long-term commitment from a sample of municipalities across Canada to improve response rates for the municipal engineering survey.

2. Provincial/Territorial enforcement agencies should be better engaged by the CCMTA/CACP to improve the response rate for the enforcement survey.

3. Nunavut should not be included in future surveys until such time that their road system includes rural roads as defined by RSV 2010.

4. The survey type should be made more prominent on cover page, and the survey instructions should explain that there are three types of surveys (education, engineering, and enforcement) being distributed, to minimize confusion among organizations that thought another section had already responded to the survey, when in fact each section received a different survey type.

5. The first question in the Collision and ancillary data section of the survey (which appeared on all surveys) should be reworked to better sort out which agency in each jurisdiction has the responsibility of managing the collision data.

6. Project description forms could be removed from the survey as most respondents did not submit any project description forms, typically because they take too long to complete.

7. Organizations such as academic institutions and professional associations that also share a stake in rural road safety should be given an opportunity to provide input in future surveys.

8. Due to the time required to decide upon, develop, and initiate rural road safety programs and campaigns it is recommended that the Rural Road Safety Survey be repeated a minimum of once every two years, but desirably once every three years.

9. Future surveys should specifically ask about safety initiatives aimed at vehicle-animal collisions.

10. In order to understand that true allocation of resources on rural road safety, future surveys may ask respondents to clarify which initiatives are systemic and which are unique to rural roads.

Résumé

Lors de la réunion tenue en février 2006, le Groupe de travail sur la sécurité routière en milieu rural du Conseil canadien des administrateurs en transport motorisé (CCATM) a identifié le besoin de connaître l'état de la situation, en ce qui a trait à « qui fait quoi? », en matière de sécurité routière au niveau des routes situées en milieu rural sur le réseau routier du Canada.

Le but de cette enquête vise à :

- *Identifier les actions/interventions canadiennes efficaces pouvant être mises en place à l'échelle nationale;*
- *Étalonner (« benchmarking ») les actions/interventions réalisées à travers le Canada au niveau de la sécurité routière pour les routes rurales.*

Dans le cadre de ce mandat, le terme "routes rurales" fait référence aux routes à chaussée non séparée, où la vitesse affichée est de 80 ou 90 km/h[3].

Pour cette étude, le Groupe de travail sur la sécurité routière en milieu rural a identifié les catégories d'interventions suivantes :

- *Amélioration des données*
- *Meilleure identification des problèmes de sécurité*
- *Amélioration du concept/gestion des routes rurales*
- *Interventions reliées au contrôle policier et à l'éducation du public*
- *Programmes de gestion de la vitesse*
- *Systèmes de transport intelligent*
- *Systèmes de gestion des traumatismes*

En général, l'ingénierie, l'éducation et le contrôle policier/services d'urgence sont assurés par des entités différentes au sein d'une juridiction. Dans le but de limiter le nombre de questions qui ne sont pas reliées au champ d'expertise propre à certaines entités (ex. le

[3] Cette définition d'une "route rurale" provient de Vision sécurité routière (VSR) 2010

service de la police ne devrait pas avoir à répondre aux questions reliées à la conception routière) et pour augmenter le taux de réponse, trois questionnaires distincts ont été élaborés pour l'ingénierie, l'éducation et le service de police.

Chaque questionnaire a été élaboré pour recueillir de l'information concernant les pratiques courantes reliées à la sécurité routière pour les routes rurales. De plus, ces questionnaires ont été conçus pour permettre aux répondants d'indiquer les actions/interventions mises en place, celles en développement ou celles à l'étude et ce, pour les 7 catégories d'intervention (lorsque approprié). Une pré-enquête de validation n'a pas été réalisée pour évaluer les questionnaires. Les questionnaires ont été élaborés dans les deux langues officielles et distribués sous format électronique PDF.

Puisque cette enquête vise principalement à étalonner les actions/interventions visant les routes rurales, l'échantillonnage primaire a englobé toutes les agences fédérales impliquées dans la sécurité routière sur les routes rurales (2), tous les ministères des Transports provinciaux/territoriaux (13), le service de police provincial et/ou la GRC (13), et jusqu'à deux municipalités par province/territoire (26) ayant le plus grand nombre de routes rurales sous leur juridiction. Au terme de l'enquête, seulement 17 municipalités ont été incluses dans l'échantillonnage primaire car, dans plusieurs provinces/territoires, les municipalités n'ont pas la juridiction des routes rurales; telle que définie dans le cadre de cette étude.

Les questionnaires ont pu être consultés par les agences impliquées au niveau de la sécurité routière des routes rurales et qui ne faisaient pas partie de l'échantillonnage primaire. Ceci, dans le but de répondre à l'objectif d'identifier les actions/interventions efficaces pouvant être mises en place par d'autres agences. Toutefois, seuls les répondants provenant de l'échantillonnage primaire ont été considérés pour l'évaluation de la situation en termes de sécurité pour les routes rurales. Les répondants ne faisant pas partie de l'échantillonnage ont permis d'identifier des actions/interventions additionnelles.

Les personnes contactées pour chaque agence faisant partie de l'échantillonnage primaire ont été identifiées en fonction des connaissances des membres de l'équipe de projet et de la firme Intus, de la liste des membres de l'Association des transports du Canada de l'année 2007, de la liste des membres du Comité de circulation de l'Association canadienne des chefs de police, et à partir du site internet de la GRC. Les questionnaires ont été distribués aux agences ne faisant pas partie de l'échantillonnage primaire via la liste de distribution

électronique de l'Association canadienne des professionnels en sécurité routière et par les répondants de l'échantillonnage primaire ayant retransmis les questionnaires à d'autres agences.

Aucune compensation n'a été offerte aux répondants et aucune demande de consentement n'a été requise.

Quarante-quatre (44) questionnaires ont été complétés et réacheminés pour cette enquête, en plus d'un questionnaire provenant de la division « V » de la GRC et indiquant que le Nunavut ne possède pas de route rurale telle que définie dans cette étude[4]. De ces questionnaires, 12 d'entre eux sont reliés à l'ingénierie, 11 à l'éducation, 17 au contrôle policier et 4 ont été classés « autre ». La catégorie « autre » englobe un questionnaire provenant du milieu académique (Université du Nouveau-Brunswick), deux provenant d'associations professionnelles (comités permanents de l'Association des transports du Canada) et un provenant d'un consultant en sécurité routière du Royaume-Uni. Au tableau ES.1 se trouve une description des répondants.

TABLEAU ES.1: Nombre de questionnaires remplis

	INGÉNIERIE	**ÉDUCATION**	**CONTRÔLE POLICIER**	**AUTRE**	**TOTAL**
Échantillonnage primaire	*11*	*11*	*3*	*0*	*25*
autre	*1*	*0*	*14*	*4*	*19*
Total	*12*	*11*	*17*	*4*	*44*

Des 56 agences faisant partie de l'échantillonnage primaire, 25 questionnaires ont été retournés. Avec un total de 44 questionnaires retournés, le taux de réponse global est de 45%. Pour l'échantillonnage primaire, les taux de réponses se situent à 35 %, 85 %, et 25 % pour les questionnaires reliés à l'ingénierie, l'éducation et le contrôle policier.

[4] Il a été confirmé lors d'une conversation téléphonique avec M. John Hawkins, directeur de réglementation et de la planification du département du développement économique et des transports du Nunavut que le Nunavut n'a pas de route en milieu rural ayant une vitesse affichée de 80 km/h ou plus. Ainsi, puisque le Nunavut ne possède pas de route rurale, cette agence a été retirée de l'échantillonnage primaire.

Résultats

Les agences ciblées dans l'échantillonnage primaire, ayant répondu aux questionnaires reliés à l'éducation et à l'ingénierie pour les provinces/territoires, étaient géographiquement et fonctionnellement représentatives de l'ensemble du réseau routier rural du Canada. Cet échantillonnage est fiable pour des enquêtes futures. Toutefois, les agences, englobant les services de police et d'ingénierie en milieu municipal identifiées dans l'échantillonnage primaire, présentent un faible taux de réponse, ce qui affecte l'étalonnage ultérieur. Dû au faible taux de réponses et au taux élevé des réponses provenant des services de police ne faisant pas partie de l'échantillonnage primaire, toutes les réponses reliées au contrôle policier ainsi que celles provenant de l'ingénierie en milieu municipal ont été englobées pour l'étalonnage. Cette situation engendre un biais en faveur des réponses provenant de la police municipale de l'Ontario pour la catégorie portant sur le contrôle policier.

Le nombre d'actions/interventions en sécurité routière au niveau de l'éducation ou de l'ingénierie pour les routes rurales sont indiquées à la figure ES.1. En excluant le Nunavut, qui ne possède pas de route rurale telle que définie dans cette étude, le nombre moyen d'actions/interventions recensées pour chaque province/territoire est de 18 en éducation et de 25 en ingénierie. La Colombie-Britannique implante le plus grand nombre d'actions/interventions en éducation (31) alors que la Nouvelle-Écosse et le Yukon en font le moins (12). De plus, la province initiant le plus grand nombre d'actions/interventions en ingénierie est le Québec (40), tandis que la province réalisant le moins d'actions/interventions dans le même domaine est la Nouvelle-Écosse (5).

Les trois réponses reliées au contrôle policier indiquent, qu'en moyenne, 25 actions/interventions sont réalisées par province/territoire, avec une valeur maximale de 32 et une valeur minimale de 20.

Des actions/interventions additionnelles sont en cours de développement ou bien à l'étude dans toutes les provinces/territoires. En ce qui concerne le domaine de l'éducation en matière de sécurité, tous les répondants, à l'exception de la Colombie-Britannique et du Québec, ont indiqué que des actions/interventions sont en cours de développement ou bien à l'étude avec, en moyenne, une action/intervention en développement et une à l'étude dans chaque province/territoire. Les résultats sont similaires en ingénierie où tous les répondants, à l'exception du Québec, indiquent que des actions/interventions sont en développement ou à

l'étude dont, en moyenne, deux actions/interventions en développement et deux à l'étude dans chaque province/territoire.

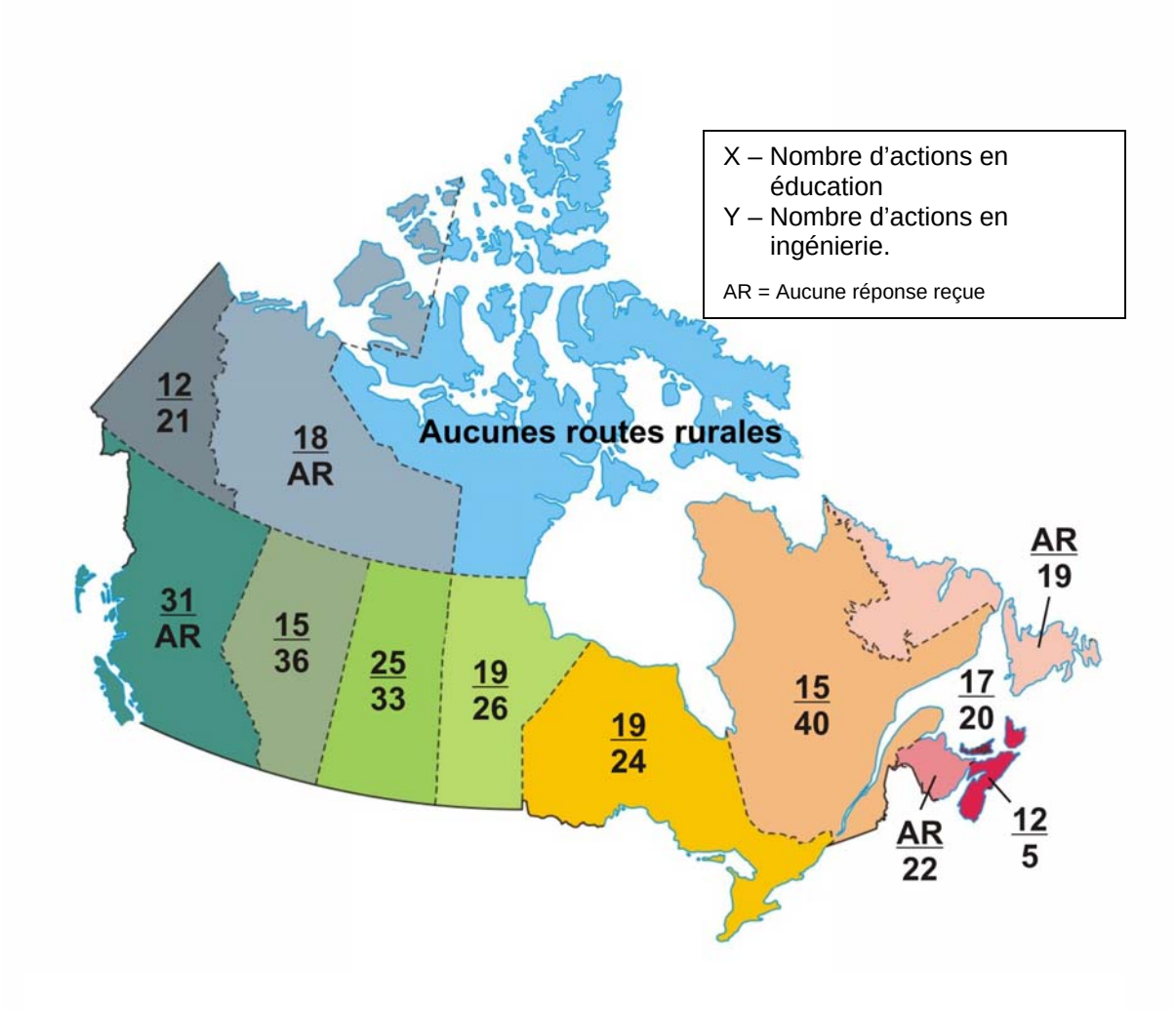

FIGURE ES.1: Survol des actions/interventions mises en place dans les provines/territoires au niveau de la sécurité routière pour les routes rurales

Une analyse approfondie des questionnaires a été réalisée pour déterminer si les agences ayant répondu aux questionnaires réalisent les actions/interventions qui sont les plus efficaces pour réduire les accidents sur les routes rurales. À cette fin, les conclusions suivantes sont tirées :

Éducation

1. Une lacune importante existe au niveau des connaissances concernant l'impact des programmes d'éducation sur la fréquence des accidents.

2. Le secteur canadien englobant l'éducation au public possède une excellente base de connaissance pour développer des programmes axés sur la sécurité routière en association avec les juridictions qui gèrent les bases de données, utilisent les données et développent ou évaluent des programmes de sécurité.

3. Les quatre actions/interventions les plus employées au niveau de l'éducation incluent les lunettes de simulation de l'état d'ébriété, les panneaux communautaires temporaires portant sur la sécurité routière, les partenariats communautaires, les communiqués auprès du public. La littérature ne fournie pas d'indication sur l'efficacité de ces actions/interventions, à l'exception des campagnes multimédia (les communiqués auprès du public) qui pourraient réduire les accidents jusqu'à 22%.

Ingénierie

1. Les connaissances reliées à l'impact des actions/interventions en ingénierie sur le risque d'accident sont bien développées et en croissance. Une lacune existe au niveau des connaissances portant sur les impacts des actions/interventions associées aux systèmes de transport intelligent sur le risque d'accident.

2. Les quatre actions/interventions les plus employées en ingénierie consistent à améliorer l'alignement des routes, améliorer la visibilité, ajouter/installer des équipements de contrôle de la circulation et installer des signaux avancés ou des feux clignotants aux intersections.

3. Les évaluations en sécurité des routes en service et les audits en sécurité routière sont efficaces pour réduire les accidents (réduction de 30 à 56 %), mais ces actions ne sont employées que par 55 % des répondants.

4. Les carrefours giratoires sont efficaces pour réduire les accidents survenant aux intersections mais, puisqu'ils sont relativement nouveaux dans le milieu de l'ingénierie au Canada, ils ne sont employés que par 3 juridictions (27%).

Contrôle policier

4. Une lacune existe au niveau des connaissances reliées à l'impact des programmes de contrôle policier sur la fréquence des accidents.

1. À l'exception de la surveillance automatique, qui permet de réduire les accidents jusqu'à 71 %, les actions/interventions portant sur le contrôle policier réduisent les accidents de l'ordre de 6 à 25 %.

2. Les quatre actions/interventions les plus employées dans le milieu policier canadien comprennent le service 911 (qui permet de supporter le contrôle policier), les campagnes médiatiques pour une conduite sécuritaire, la suspension automatique du permis de conduire suivant l'échec du test de l'ivressomètre et les points de contrôle de sobriété (barrage policier). L'estimation de l'efficacité des trois dernières actions/interventions est de 13 à 20 %.

Les leçons apprises à la suite de ce premier étalonnage sont les suivantes :

1. Puisque le principal but de l'enquête est d'étalonner de façon régulière les actions/interventions, il est important d'obtenir un engagement à long terme d'un échantillon de diverses municipalités situées à travers le Canada afin d'améliorer les taux de réponses du questionnaire portant sur l'ingénierie en milieu municipal.

2. Les agences provinciales/territoriales reliées au contrôle policier devraient être mieux sollicitées par le CCATM/ACCP dans le but d'améliorer le taux de réponses pour le questionnaire portant sur le contrôle policier.

3. Le Nunavut ne devrait plus être inclus dans les futures enquêtes tant que leur réseau routier n'inclura pas les routes rurales telles que définies par Vision sécurité routière 2010.

4. Le type d'enquête devrait être plus apparent sur la page couverture et les instructions aux répondants devraient indiquer que le document d'envoie contient trois types de questionnaires (éducation, ingénierie et contrôle policier). Ceci permettrait de réduire la confusion auprès des organismes qui croyaient que d'autres entités de leur

juridiction avaient déjà répondu au questionnaire, lorsqu'en fait chaque entité a reçu un questionnaire distinct.

5. La première question dans la section du questionnaire portant sur les accidents et les métadonnées (qui apparait sur tous les questionnaires) devrait être reformulée pour mieux identifier l'agence responsable de la gestion des données d'accidents pour chaque juridiction.

6. Les formulaires de description de projet pourraient être retirés du questionnaire puisque la plupart des répondants n'ont pas fourni de description de projet, possiblement dû au temps nécessaire pour les remplir.

7. Les organismes, tels que les institutions académiques et les associations professionnelles, qui sont impliqués dans la sécurité des routes rurales devraient avoir l'opportunité de participer aux enquêtes futures.

8. Dû au délai pour statuer, développer et mettre en place les programmes et campagnes de sécurité portant sur la sécurité routière des routes rurales, il est recommandé que l'enquête sur la sécurité routière en milieu rural soit répétée une fois au deux ans, mais de préférence, une fois au trois ans.

9. Les futurs questionnaires devraient inclure des questions concernant les initiatives reliées aux collisions véhicule-animal.

10. Dans le but de mieux allouer les ressources pour la sécurité routière des routes rurales, les enquêtes futures pourraient demander aux répondants de clarifier quelles initiatives sont de nature systémique et lesquelles s'appliquent uniquement aux routes rurales.

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1.0 Introduction

In the late 1990s the Organization for Economic Cooperation and Development (OECD) identified rural road safety as a major problem in member countries, in that the percentage of motor vehicle fatalities on rural roads was gradually increasing. Canada is a member country of the OECD, and has also identified rural road safety as an area requiring improvement, as outlined in Road Safety Vision 2010 (RSV 2010). Canada's Road Safety Vision is a national undertaking aimed at making Canada's roads the safest in the world. The national goal of achieving a 30 percent decrease in the average number of fatalities and serious injuries during the 2008-2010 period compared with 1996-2001 average figures, is supported by a sub-target calling for a 40 percent decrease in the number of fatalities and serious injuries on rural roadways during the same reference periods. According to 2004 crash data, fatalities and serious injuries account for 52% and 31% of total victims, respectively. There is room to improve. According to a 2006 OECD report on Canada's progress in achieving our road safety targets, the decrease in fatally and seriously injured road users is 10.6% and 8.2% when comparing 2004 figures to the 1996-2001 baseline.

In a 2006 report to the Canadian Council of Motor Transport Administrators (CCMTA), the rural road safety issue was quantified, and it was determined that three types of crashes result in the majority of fatalities and serious injuries on Canadian roads: single-vehicle, head-on, and intersection crashes. The report proposes infrastructure, vehicle, and driver-based strategies for improving rural road safety including: improved data systems, speed management programs, better identification of safety problems, improved design/operation of rural roads, in-vehicle technologies, improved trauma management, and education and enforcement programs aimed at seatbelt use, and drinking and driving.

The national rural road safety strategy that has been developed by the Rural Road Safety Task Force under the auspices of the CCMTA is in its formative stage. At their February 2006 meeting, the task force identified a need to benchmark the current rural road safety situation with respect to "who is doing what" on Canada's rural road system. The Rural Road Safety Survey has been conducted in response to this identified need.

1.1 Scope and Objectives

The survey has two goals:

- *To identify successful Canadian strategies that could be implemented nationally; and*
- *To benchmark rural road safety strategies through Canada.*

Both of these goals are in support of the broader goal of achieving the rural road sub-target as outlined in RSV 2010. The benchmarking of strategies is the first step in a monitoring program to determine the progress that Canadian jurisdictions are making with respect to implementing rural road safety strategies.

The Rural Road Safety Task Force of CCMTA has identified the following categories of strategies for study:

- *Improved data*
- *Better identification of safety problems*
- *Improved design/operation of rural roads*
- *Enforcement strategies and public education*
- *Speed management programs*
- *Intelligent transport system*
- *Trauma management systems*

The main objective of the study is to survey agencies and organizations that have a stake in rural road safety with a view to identifying in-service strategies, and to document the results. The scope of work included developing the survey, identification of appropriate respondents, distribution of surveys, collection and analysis of results, and reporting on findings (including any recommendations moving forward).

For the purposes of this project "rural roads" are defined as undivided roads with 80 or 90 km/h speed limits[5].

[5] This is the definition of a "rural road" contained in RSV 2010.

1.2 Survey Instruments

For the most part, engineering, education, and enforcement/emergency response are carried out within each jurisdiction by separate entities. For example, engineering strategies are typically the responsibility of the Transportation Department, and enforcement by carrier enforcement and the resident police force. In order to minimize extraneous questions for each entity (e.g., enforcement organizations should not be presented with road design questions) and increase response rate, three survey instruments were developed – one each for engineering, education, and enforcement.

Each survey instrument was designed to gather basic information about current practices in rural road safety and consisted of four sections: introduction/instructions, a checklist of road safety activities, project description forms, and respondent identification information. The survey prompted respondents to indicate which activities are either in-service, being developed, or under consideration within each of the seven categories (as appropriate).

Pre-testing of the survey instruments was not undertaken. The surveys were developed and distributed as electronic PDF documents in both official languages. The engineering, education, and enforcement survey instruments are in Appendices A, B, and C, respectively.

1.3 Sampling Frame and Distribution

Sampling Frame

The population for this survey is all road authorities and police forces that have jurisdiction over a Canadian rural road. As this survey is mainly to benchmark rural road activities, the primary sampling frame included all Federal agencies with a stake in rural road safety (2), all Provincial/Territorial Ministries of Transportation (13), the Provincial Police and/or the equivalent RCMP Division (13), and the up to two municipalities in each province/territory (26) with the largest number of rural roads. In the end, only 17 municipal road authorities were included in the primary sampling frame as many Provinces/Territories do not have municipalities with jurisdiction over rural roads as defined for this study.

In response to the objective of identifying successful rural road safety activities for use by others, the survey was made available to rural road safety agencies that were outside of the primary sampling frame. However, only respondents from the primary sampling frame were

used to benchmark the status of rural road safety activities; respondents from outside of the primary sampling frame were used only to identify additional strategies.

Appropriate individuals at each agency within the primary sampling frame were identified through:

- *Personal knowledge of the Project Team members;*
- *References provided by personal contacts of Intus;*
- *Reviewing the Transportation Association of Canada's 2007 Membership list;*
- *Reviewing the Canadian Association of Chiefs of Police Traffic Committee membership list; and*
- *Reviewing the Divisional contacts listed on the RCMP website.*

Distribution

The surveys were distributed to the primary sampling frame via electronic mail survey as PDF files in both official languages. Recipients were given two weeks to complete the surveys and return them to Intus. Two days prior to the response deadline, recipients that had not responded to a survey were sent a polite reminder via electronic mail. To maximize the response rate, extensions to the deadline were granted upon request, as were requests for the survey in alternative formats.

Surveys were circulated to organizations outside of the primary sampling frame via:

- The Canadian Association of Road Safety Professionals electronic mail distribution; and
- Recipients in the primary sampling frame forwarding the survey to other rural road safety agencies.

A second distribution of the enforcement survey was undertaken subsequent to the May 2007 meeting of the CCMTA Rural Road Safety Task Force. Shortly after the meeting enforcement personnel in attendance were provided with the survey, and given two weeks to respond. As part of this distribution, the Canadian Association of Chiefs of Police circulated the survey to their membership along with their expression of support for the effort.

No compensation or consideration was provided to respondents, and an informed consent form was not required.

1.4 Disclaimer

While every effort has been made to ensure the accuracy and completeness of this report, it is made available strictly on the basis that anyone relying on it does so at their own risk without any liability to ***Intus Road Safety Engineering Inc.***

2.0 Survey Respondents

Forty-four (44) surveys were completed and returned for this project, in addition to one response from "V" Division of the RCMP that states Nunavut does not have any rural roads as defined[6]. There were 12 engineering surveys, 11 education surveys, 17 enforcement surveys, and 4 surveys that were categorized as "other". The "other" category included one response from an academic institution (University of New Brunswick), two from professional associations (Standing Committees of the Transportation Association of Canada), and one from a UK-based road safety consultant. See Table 2.1 for a breakdown of responses.

TABLE 2.1: Number of Survey Responses

	ENGINEERING	EDUCATION	ENFORCEMENT	OTHER	ALL
Primary Sample	*11*	*11*	*3*	*0*	*25*
Other	*1*	*0*	*14*	*4*	*19*
All	*12*	*11*	*17*	*4*	*44*

There were 56 agencies in the primary sampling frame, and 25 of the 44 surveys were returned from agencies in the primary sampling frame, for an overall response rate of 45%. Under the primary sampling frame, the response rates for the surveys are 35, 85, and 25 percent for the engineering, education, and enforcement surveys, respectively.

The relatively good response from the "other" sampling frame of the enforcement community was a result of the survey re-distribution by the Canadian Association of Chiefs of Police. Of the 14 "other" respondents in the enforcement category one was a national agency (CN Police), and 13 were municipal police agencies. Ten of the 11 municipal police respondents are from Ontario.

Surveys respondents are listed in Appendix D.

[6] It was confirmed through personal communication with Mr. John Hawkins Director, Transportation Policy & Planning from Nunavut's Department of Economic Development & Transportation that Nunavut does not have any roads with a speed limit of 80 km/h or above. Therefore, given that Nunavut has no rural roads, it was removed from the primary sampling frame.

3.0 Survey Results

The agencies included in the primary sampling frame were geographically and functionally representative of the rural road situation in Canada, and were thought to be reliable for responding to future benchmarking surveys. This proved to be the case with the education community, and the Provincial/Territorial engineering community. However, the enforcement and the municipal engineering communities identified in the primary sampling frame exhibited low response rates –hampering the benchmarking. This being the case, and given that there are numerous responses from the enforcement community that are outside of the primary sampling frame it was decided to include all enforcement responses and the one municipal engineering response in the responses used to benchmark activities. It is recognized that this creates an obvious bias towards Ontario municipal police services in the enforcement category.

3.1 Overview of Current Activities at the Provincial/Territorial Level

The number of education and engineering-related rural road safety activities that are currently being employed at the Provincial/Territorial level are shown in Figure 3.1. Excluding Nunavut, which has no rural roads as defined for this study, the average number of rural road safety activities that each Province/Territory employ is 18 and 25 for education and engineering, respectively. British Columbia employs the greatest number of education activities (31); while Nova Scotia and the Yukon employ the least number of education activities (12). The Province employing the greatest number of engineering activities is Quebec (40); the Province employing the least number of engineering activities is Nova Scotia (5).

The three Provincial responses concerning enforcement have an average of 25 rural road safety activities per Province/Territory, with a high of 32 and a low of 20.

Additional rural road safety activities are “being developed” or are “under consideration” in all of the responding Provinces/Territories. In the safety education community, all of the respondents except British Columbia and Quebec noted that they are developing or considering new activities with an average of one measure being developed, and one measure under consideration in each Province/Territory. The results are similar in the engineering

community where all of the respondents except Quebec noted that they are developing or considering new activities with an average of two measures being developed, and two measures under consideration in each Province/Territory.

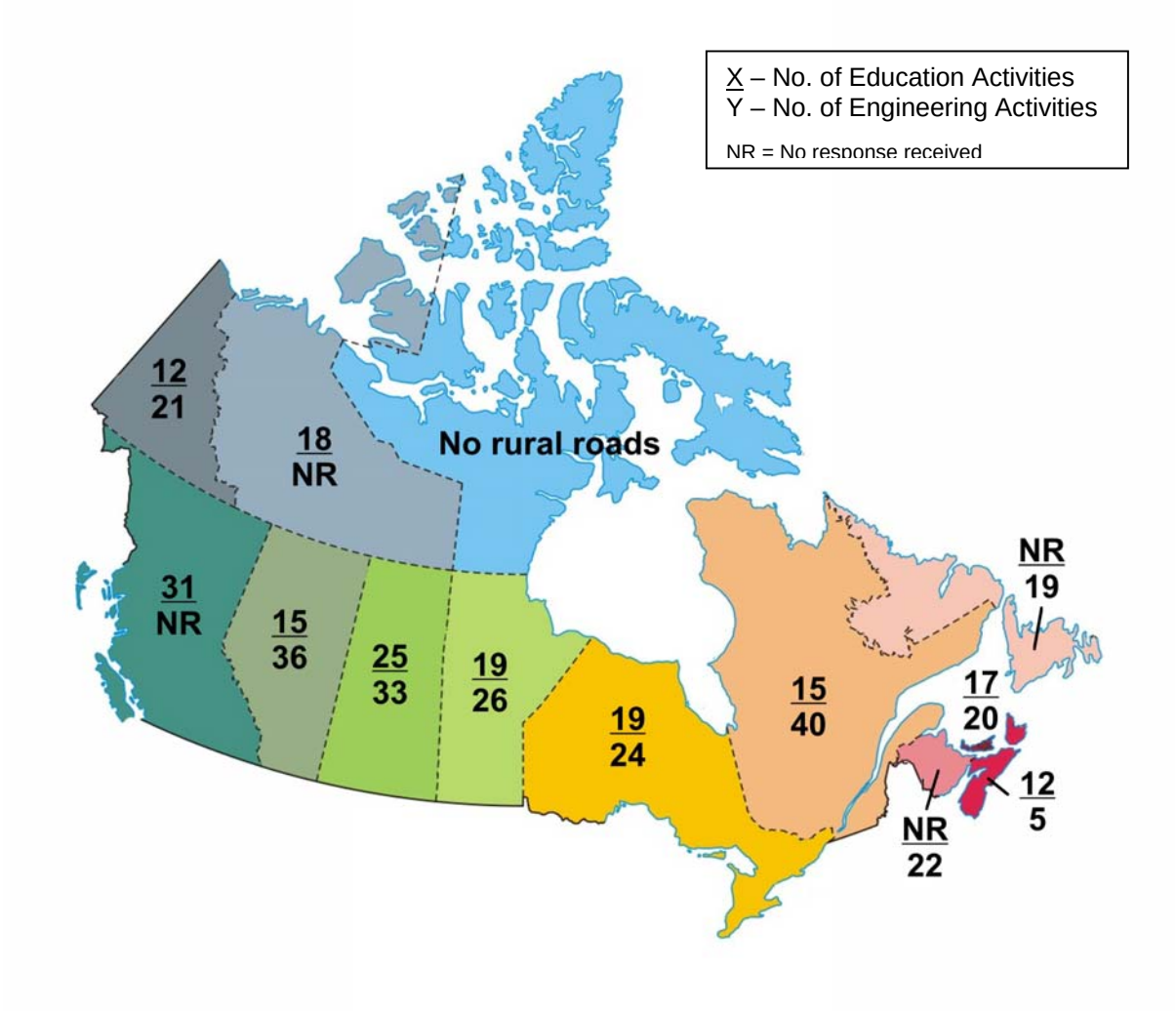


FIGURE 3.1: Overview of Current Provincial/Territorial Rural Road Safety Activities

Responses in each of the seven categories of rural road safety measures are summarized and discussed below.

3.2 Improved data

All of the surveys sought information on collision and ancillary data, with the first question *"Does your organization manage the collision database?"*, intending to sort out who the database managers are in each jurisdiction. This was not entirely successful as there were some conflicting responses. For example, Manitoba Public Insurance, the Manitoba Department of Infrastructure and Transportation, and the RCMP "D" Division (Manitoba) all indicated that they are managing Manitoba collision data. The number of conflicting responses was minimized because in most cases the education and engineering respondents are from the same organization, and of the low response rate from the Provincial/Territorial police agencies.

A cross-tabulation of the responses from all agencies to the collision data questions is contained in Table 3.1. Conflicting responses are bolded.

The multiple responses, with conflicting information make it difficult to benchmark activities in this category, although there are some activities that are clear:

- All of the responding Provinces/Territories have data that are compliant with the National Database except British Columbia and Manitoba.
- All of the responding Provinces/Territories perform data validation or quality control checks except PEI, New Brunswick, and Newfoundland & Labrador.
- Collision data is used to develop or evaluate safety programs in all jurisdictions except Newfoundland & Labrador.

3.3 Better identification of safety problems

The organizations responding to the education survey demonstrated a strong trend towards using collision data to develop education priorities, with 10 of the 11 respondents (91%) currently doing this. The remaining organization listed this activity as "under consideration". Only seven of the respondents (64%) use citation data to develop education priorities, and multi-disciplinary traffic safety committees are used in 8 of the 11 responding jurisdictions (73%) to identify safety concerns[7].

[7] It is noted that the survey did not define "multidisciplinary" and that interpretation of the term was left to the responding agencies.

Five of the 11 engineering respondents (45%) conduct network screening, and practice identification of systemic safety concerns. For both activities, three respondents list these activities as "being developed", and one lists them as "under consideration". Similarly, in-service road safety reviews are being conducted by 6 of the 11 respondents (55%), while this type of program is "being developed" in two other jurisdictions.

All three of the responding enforcement agencies from the primary sampling frame employ community traffic safety liaisons to identify safety concerns, and reviews of collision data to determine times and locations for enforcement. Two of the three respondents also use citation data to target enforcement activities.

3.4 Improved design/operation of rural roads

The road design and operations questions were only directed to the engineering community. The summary of responses is shown in Figure 3.2.

It is perhaps surprising that even though Canada has had national guidelines for Road Safety Audits since 2001, only 55% (six of the 11 respondents) are employing audits, with one respondent indicating that a road safety audit program is "being developed".

Four infrastructure improvements are used by 82% of the respondents including improving road alignment, improving visibility, upgrading or installing traffic signs or pavement markings, advance warning and/or intersection flashers. A further four improvements are used by 72% of respondents including eliminating pavement discontinuities, providing dedicated turn lanes, providing street lighting, and installing and upgrading traffic barriers.

Roundabouts, which are a relatively new form of intersection control in North America that has exhibited tremendous safety benefits[8], are currently being used by only 3 of the 11 respondents (27%). However, this strategy shows the most potential for future use with 2 jurisdictions reporting that roundabouts are "being developed", and 2 reporting that they are "under consideration".

[8] Not all circular intersections are roundabouts. Roundabouts (also known as "modern roundabouts") have unique characteristics such as yield-on-entry, and splitter islands on all approaches that distinguish them other forms of circular intersections such as traffic circles.

TABLE 3.1: Responses to the Collision and Ancillary Data Questions from Provinces/Territories

	BC	AB	SK	MB	ON	QC	PE	NS	NB	NL	NT	YK
Does your organization manage the collision database?	*Y/-/-*	***Y/Y/Y***	*Y/N/-*	***Y/Y/Y***	*Y/0/-*	***Y/Y/-***	*Y/Y/-*	***Y/Y/Y***	*-/Y/-*	*-/Y/-*	*Y/-/-*	*Y/Y/-*
Electronic data capture	*Y/-/-*	*B/U/Y*	*0/N/-*	*U/Y/Y*	*U/0/-*	***N/Y/-***	*U/U/-*	***N/N/Y***	*-/N/-*	*-/Y/-*	*Y/-/-*	***N/Y/-***
GIS technology?	*Y/-/-*	*B/N/N*	*N/N/-*	***0/Y/N***	*U/0/-*	***N/Y/-***	*U/U/-*	*N/U/0*	*-/N/-*	*-/N/-*	*U/-/-*	*N/U/-*
Linked to other types of data	*Y/-/-*	***Y/Y/N***	***N/Y/-***	*N/B/N*	*N/0/-*	*Y/Y/-*	*N/N/-*	*N/N/N*	*-/Y/-*	*-/N/-*	*Y/-/-*	*N/N/-*
Data validation/quality control	*Y/-/-*	***Y/Y/N***	*Y/Y/-*	*0/Y/Y*	*Y/0/-*	*Y/Y/-*	*N/N/-*	*Y/Y/Y*	*-/N/-*	*-/N/-*	*Y/-/-*	*Y/Y/-*
National Collision Database compliant	*N/-/-*	*Y/Y/Y*	*B/Y/-*	*0/0/N*	*B/0/-*	*Y/Y/-*	*Y/Y/-*	*Y/Y/Y*	*-/Y/-*	*-/Y/-*	*Y/-/-*	*Y/Y/-*
Linked to software that conducts safety analysis	*Y/-/-*	*Y/Y/Y*	*N/N/-*	*U/B/Y*	*N/0/-*	***N/Y/-***	***Y/N/-***	*B/B/B*	*-/N/-*	*-/N/-*	*N/-/-*	*N/N/-*
Collision data used to develop or evaluate safety programs	*Y/-/-*	*Y/Y/Y*	*Y/Y/-*	*Y/Y/Y*	*Y/0/-*	*Y/Y/-*	*Y/Y/-*	*Y/B/Y*	*-/Y/-*	*-/N/-*	*Y/-/-*	*Y/U/-*
Track police citations for use in developing or evaluating safety programs	*Y/-/-*	*Y/Y/B*	*Y/Y/-*	***Y/N/Y***	*Y/0/-*	*Y/Y/-*	*Y/Y/-*	***N/N/Y***	*-/N/-*	*-/N/-*	*Y/-/-*	*U/N/-*
Collision database or road safety analysis software developed "in house"	*Y/-/-*	*Y/Y/Y*	***Y/N/-***	***Y/Y/N***	*N/0/-*	*Y/Y/-*	*Y/Y/-*	***N/Y/Y***	*-/Y/-*	*-/N/-*	*Y/-/-*	*Y/Y/-*

X/Y/Z = Responses from Education/Engineering/Enforcement
Y = Yes
N = No
B = Being developed
U = Under consideration
0 = Left blank
- = Survey not returned from this agency

Transport Canada's activities in the infrastructure area were focused on research, evaluation and guideline development rather than on physical changes to infrastructure. They have pursued five engineering activities related to rural road safety: a passing sight distance design and marking study, a Synthesis of Practice on Roundabouts, developed a "Keep Off the Tracks" sign, a Rural Intersection Safety Handbook, and an evaluation of road safety audits.

3.5 Enforcement strategies and public education

There are four public education/awareness activities that are used by 10 of the 11 respondents (91%): Fatal Vision Goggles, temporary community displays on road safety, partnerships with community groups and/or businesses, and public service announcements. Mock collisions/trials in schools are used by 7 of the 11 respondents (64%). Permanent community displays, gateway signs to rural settlements, and safe routes to schools in rural areas are less popular with only three to four jurisdictions using these measures (27% to 36%).

None of the respondents to the Education Survey are developing or considering additional education and awareness activities.

Several respondents noted activities that they are pursuing which were not listed: British Columbia has an Aboriginal road safety awareness program, and conducts seatbelt surveys; Alberta conducts a school bus awareness campaign each September; Saskatchewan holds child car seat clinics; and the Yukon has started to employ a fatigued driving campaign.

With respect to enforcement strategies, drink-driving activities are widely used with all of the respondents employing automatic license suspensions for BAC test failures, and sobriety check points, and 16 of 17 respondents (94%) having open container laws. Passive alcohol sensors, and escalating penalties for severe BAC levels are used in 7 of the 17 responding jurisdictions (41%). At the other end of the spectrum, none of the respondents have lower BAC standards for repeat offenders.

Other enforcement activities (i.e., saturation patrols, zero tolerance programs, citizen complaint systems, and incentive programs for safe drivers) are utilized by 47% to 82% of respondents.

None of the enforcement respondents have banned cellular telephone use while driving, although it is under consideration in Nova Scotia[9].

Additional enforcement activities used by the Ottawa Police Services include dedicated enforcement programs for all-terrain vehicles, and enforcement of the Ontario Motorized Snow Vehicles Act (MSVA).

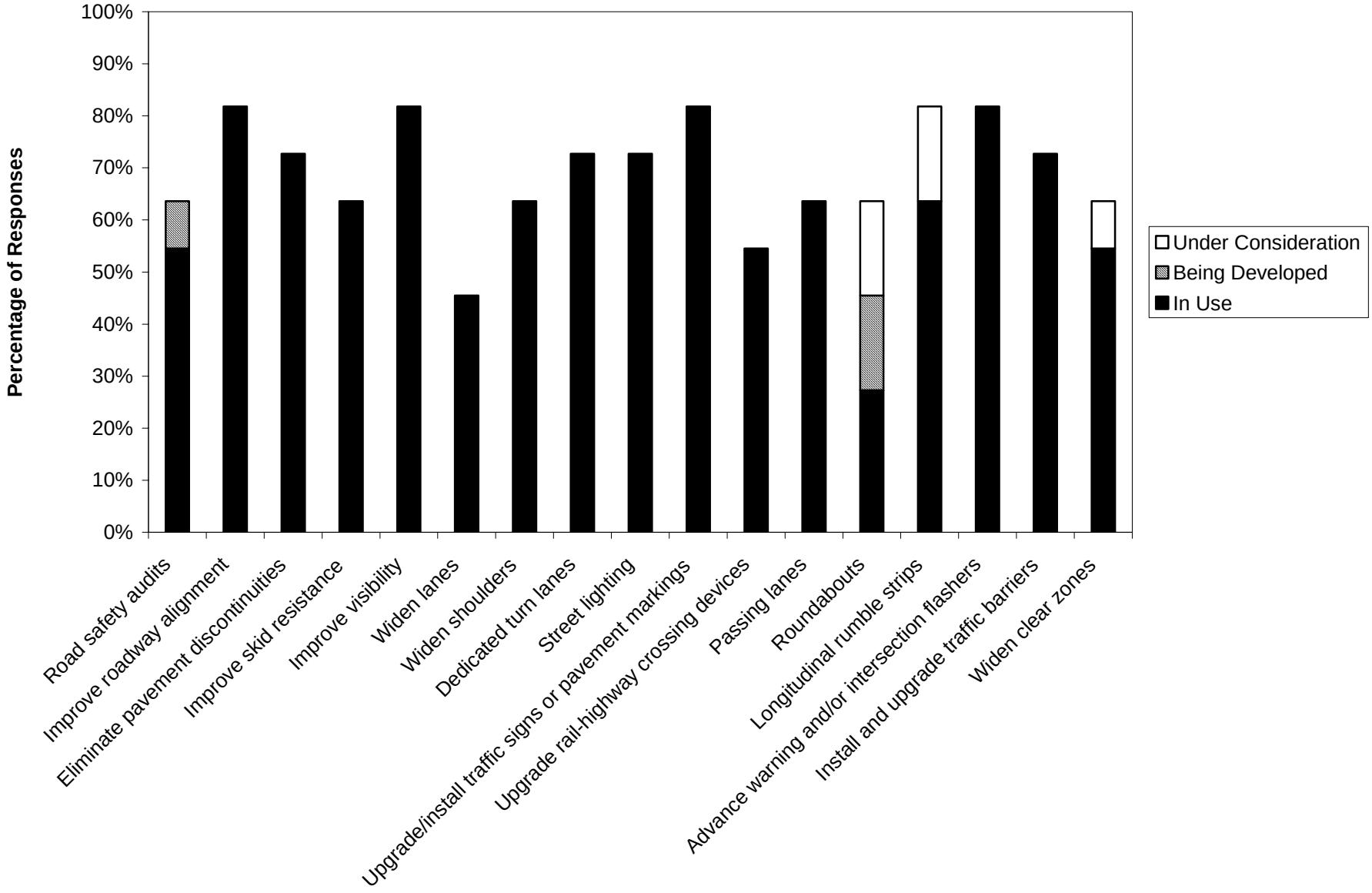
3.6 Speed management programs

Speed management is a responsibility that is shared among education, engineering, and enforcement agencies, so questions were posed to each of these groups.

The education respondents primarily employ media campaigns for speed management, with eight of the 11 respondents (73%) currently using media campaigns, one respondent developing a media campaign, and one respondent considering its use. Other education measures employed to manage speed are citizen-based speed watch programs (55%), presentations in schools and with community groups (55%), and ghost-outs at area schools (36%).

The engineering community does not have a strong tendency to employ speed management measures. The most often used measure is routine speed limit reviews by seven of the 11 respondents (64%). However, only six of the responding jurisdictions (55%) have formal procedures on setting speed limits. Variable speed limits, speed prediction models, radar message boards, and traffic calming in rural settlements are each used by three or four jurisdictions (27% to 36%). The relatively poor use of radar message boards and rural traffic calming is probably a reflection of the lack of response from the municipal engineering community where these measures are more prevalent.

[9] This finding is for survey respondents only and may not be representative of all of Canada. For example, the use of cellular telephones while driving has been prohibited in Newfoundland & Labrador since 2002.


Percentage of Responses
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Under Consideration
Being Developed
In Use
Road safety audits
Improve roadway alignment
Eliminate pavement discontinuities
Improve skid resistance
Improve visibility
Widen lanes
Widen shoulders
Dedicated turn lanes
Street lighting
Upgrade/install traffic signs or pavement markings
Upgrade rail-highway crossing devices
Passing lanes
Roundabouts
Longitudinal rumble strips
Advance warning and/or intersection flashers
Install and upgrade traffic barriers
Widen clear zones

With respect to enforcement of speed, selective traffic enforcement programs are the most widely used activity with 15 of 17 respondents (88%). Radar message boards are second most popular, being used in 11 of the 17 responding jurisdictions (65%). Zero tolerance on speeding, and escalating fines for repeat speeding offenses are used by four (24%) and three (18%) of respondents, respectively. Automated enforcement is being used in three of 17 jurisdictions (18%), with two others considering its use. However, the three respondents that use automated enforcement are Ontario municipalities and are therefore using red light cameras (and not speed cameras), as photo enforcement of speed violations is not permitted in Ontario at this time.

3.7 Intelligent transport systems (ITS)

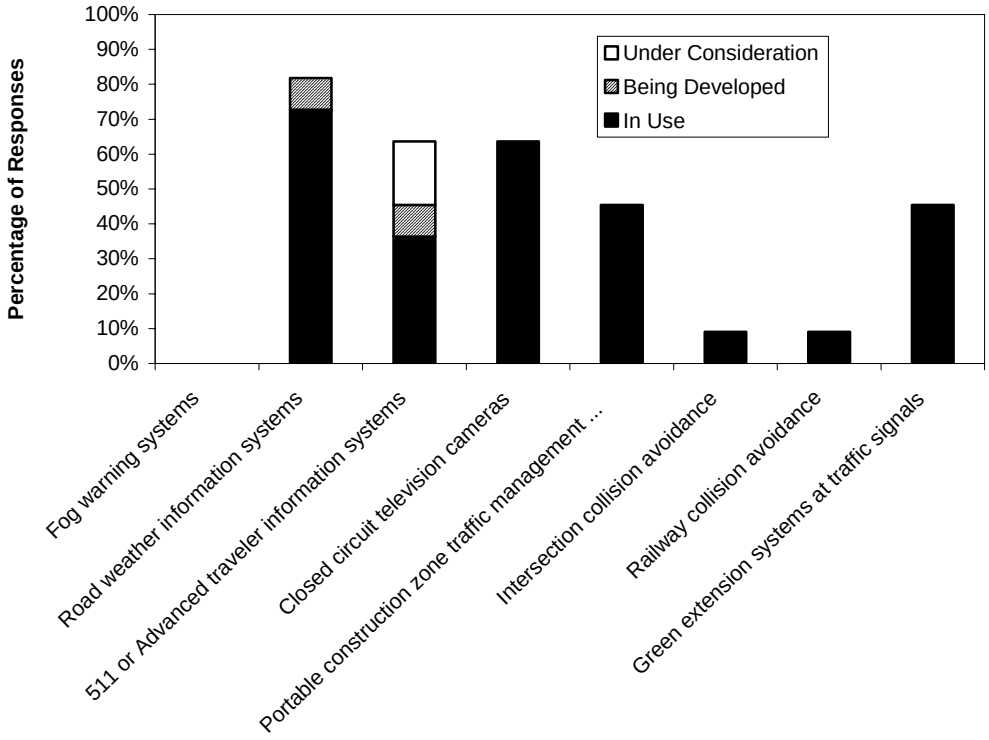
The ITS questions were only directed to the engineering community. The summary of responses is shown in Figure 3.3. Overall, ITS for rural roadways are not in widespread use, with only road-weather information systems and closed circuit television cameras being used by more than 50% of the respondents (73% and 64%, respectively). Advance traveler information systems and 511 programs exhibit the greatest potential for adoption with one respondent in the process of adopting this technology, and two others considering this technology. Fog warning systems are not used by any of the responding jurisdictions – which may be more of an indication that fog-present collisions are not a significant issue on Canadian rural roads, rather than a lack of use.

3.8 Trauma management systems

Trauma management questions were directed to the enforcement community only.

All of the respondents indicated that 911 service is available in their communities, and 12 of the 17 respondents (71%) require “first on scene” care training for all emergency service providers (i.e., police, fire, ambulance). None of the respondents have by stander care training programs.

Future activity in rural road safety for the enforcement community appears to be centred upon better technology, with GPS-equipped emergency response vehicles, improving the communication network to eliminate/minimize dead spots, and locating emergency callers through cell phone carriers or GPS-locators all receiving “being developed”, or “under consideration” in at least one jurisdiction.



3.9 "Other" Respondent Activities

Four responses were received from entities that were involved in rural road safety, but were classified as "Other" respondents as they were not neatly classified as engineering, education, or enforcement agencies that were directly responsible for delivering road safety programs. Two of the responses were from Standing Committees of the Transportation Association of Canada (a professional association), one from the University of New Brunswick (academic institution), and one from an international consultancy.

The rural road safety activities of TAC consist of developing guidelines, manuals, practices, and reports for engineering practitioners. Additionally, TAC has created an achievement award for road safety engineering and infrastructure to raise awareness of road safety engineering and promote good practice in this field. It is noted that the Road Safety Standing Committee of TAC is in the process of developing a Canadian Road Safety Engineering Handbook that will include a chapter on rural road safety.

The University of New Brunswick is active in road safety audits, rail-highway crossing safety, and work zone construction safety. The focus of their efforts tends to be on research associated developing or improving activities, and evaluation of activities.

The international response to the survey was from a UK-based consultancy and listed the activities that the firm actively pursues with clients. This response was not useful for the purposes of this project because:

- This consultancy did not comment on *Canadian* rural road safety activities; and
- Activities listed by a private sector consultant would already be reported by public sector clients, as consultants do not generally pursue activities or create programs except in response to client needs.

There is certainly a stream of activity concerning rural road safety that resides in academia, professional associations, advocacy groups, and other Canadian entities. The 2007 survey did not specifically target these groups, and consideration should be given to including them in future surveys.

4.0 Safety Effects of Rural Road Safety Activities

The secondary purpose of this survey is to identify successful strategies and activities for improving rural road safety, and record them as a point of reference for rural road stakeholders. Survey respondents were requested to provide information on effectiveness/evaluations of their rural road safety activities, however none of the respondents provided quantitative information in this regard. As a result, it was not possible to identify the successful Canadian strategies from survey responses. Therefore, it was decided that the success of the strategies be estimated from published research on similar activities.

This section lists the activities reported by respondents to the survey, and (where available) uses the conventional wisdom to estimate the effectiveness of the activity on reducing collision risk. Where activities have not been formally evaluated, and/or are not documented in the literature, this is noted as "NR" – not reported. In addition, "NR" is used to denote activities that have been studied, but where the studies have shown conflicting results, or where the study methods are not sufficiently robust to inspire confidence in the reported findings.

It is also noted that some of the rural road safety activities that were listed by respondents do not have a direct and measurable impact on collision risk. For example, "electronic data capture of collision data", and "network screening" are not intended to reduce collision risk on their own. These activities are precursors or decision-support activities that lead to selecting and implementing a strategy that is intended to minimize collision risk. Activities that are supporting activities are noted as "SA" – supporting activity. To this end, in all three surveys, the recipients were asked to comment on activities concerning "Collision and ancillary data". All of the activities in this category are supporting activities and are therefore not shown in the above-mentioned tables. This is also applicable to trauma management systems that are primarily post-collision activities intended to reduce collision severity by providing faster care to involved individuals.

The effects of the education, engineering, and enforcement activities on collision risk are shown in Tables 4.1, 4.2, and 4.3, respectively. The listed values are "Collision Reduction Factors" or CRFs, which denote the percentage reduction in collisions should the activity be

carried out. A negative CRF indicates an increase in collisions should the activity be carried out.

The collision reduction factors are extracted from generally reliable research reports and documents and present the best available evidence at this time. The practitioner should use the CRFs with caution and using "evidence-based road safety"[10] ensure that the CRF is applicable to their particular situation.

Education and enforcement activities are subject to a wide variation in treatment (i.e., target road users, levels of effort, etc.) and it is challenging to assess the direct impact of these activities on collision risk. Much of the research in these areas focuses on changes in driver behaviour, performance, citations, and other safety surrogates. As a result of the foregoing, many of the education and some of the enforcement activities are listed as "NR" in Tables 4.1 and 4.3. In the absence of specific studies for education programs such as mock collisions, and fatal vision goggles, the following CRFs from meta-analyses conducted by Elvik and Vaa (2004) may be used to estimate the effectiveness of these programs:

- *Road safety education on school children (age 5 to 12) reduces injury collisions from 11% to 20% for children crossing the road.*
- *Education/information campaigns concerning drink-driving, seat-belt use, following too closely, and running-off-road yield collision savings of 49%, 23%, 9%, and 3%, for each target collision type, respectively. General campaigns concerning road safety produced no reduction in collision risk.*
- *Sanctions against driver's consisting of a combination of fines, license withdrawal, and imprisonment can reduce all collisions by 10%.*

It is recognized that the Elvik and Vaa (2004) material is liberally referenced in establishing CRFs. Therefore, it is beneficial to include a brief description of the work. Elvik and Vaa report on the safety effects of a variety of road safety measures by using a meta-analysis technique applied to various published research results. The research studies that are

[10] Evidence-based road safety (EBRS) is "the conscientious and judicious use of current best evidence in providing road safety for individuals, facilities, and transportation systems". The practice of EBRS is the integration of the best available information on global safety research with the experience and knowledge of the individual practitioner respecting community values and local policy. For more on EBRS the reader is referred to Forbes (2003) "Synthesis of Safety for Traffic Operations", Final Report, Transport Canada, Ottawa, ON (http://www.tc.gc.ca/roadsafety/tp/tp14224/pdf/tp14224e.pdf).

considered in the analysis are from many jurisdictions (including Canada where data is available), and all report on the effect of a particular road safety measure on collision occurrence. The meta-analysis is a quantified synthesis of the results from several studies on a particular road safety measure stated in the form of a weighted mean estimate of effect. The meta-analysis is an accepted statistical analysis technique for reconciling the results from numerous studies. Given this, and that the countries of origin for the evaluated studies are widely dispersed and include North American research, it is believed that the Elvik and Vaa results are generally applicable to Canadian initiatives.

TABLE 4.1: Safety Effects of Education Activities on Rural Roads

	CRF (%)	SOURCE
Identification of safety concerns		
Multi-disciplinary traffic safety committees	*NR*	
Reviews of collision *data to develop education priorities*	*SA*	
Reviews of citation *data to develop education priorities*	*SA*	
Speed management		
Media campaigns	*NR*	*Hunter et al (2001) evaluated the effects of a prolonged media campaign on travel speeds and found a moderate decrease in speed.*
Presentations in schools or with community groups	*NR*	
Ghost-outs at area schools	*NR*	
Citizen-based speed watch	*15%*	*Elvik and Vaa (2004) – Citizen complaint systems usually result in a warning letter being sent to recorded drivers. The effect of warning letters on safety is reported here.*
Education and public awareness activities		
Mock collisions and/or trials in schools	*NR*	*Transport Canada (2003) reports that a mock train collision had positive impacts on student attitudes towards highway-rail crossings, which is likely to yield safety benefits.*
Fatal vision goggle demonstrations	*NR*	*Hennessy et al (2006) reports that Fatal Vision Goggles can be an effective tool in altering drinking and driving attitudes among drivers with specific attitudinal and personal characteristics*
Permanent community displays on road safety	*NR*	
Temporary community displays on road safety (e.g., local fairs, and events)	*NR*	

	CRF (%)	SOURCE
Gateway signs to rural settlements	*NR*	
Partnerships with community groups and/or businesses	*NR*	
Safe routes to schools for rural areas	*NR*	*No evaluation of effects of safe route to schools programs on collision risk to date.*
Public service announcements	*22%*	*Whittam et al (2006) – Impact of multimedia campaign on crashes in young drivers.*

References:

Hennessy, DA, Lanni-Manley E, Maiorana N (2006) "The Effects of Fatal Vision Goggles on Drinking and Driving Intentions in College Students", Journal of Drug Education, Volume 36(1), 59-72.

Hunter WW, Thomas LJ, and Stewart JR (2001) "Kill Your Speed: An Evaluation of a Rural Speed Enforcement Program", University of North Carolina Highway Safety Research Center, unpublished.

Transport Canada (2003) "Evaluation of Transport Canada's Contribution to Operation Lifesaver", Final Report, Departmental Evaluation Services, Transport Canada, Ottawa, ON. http://www.tc.gc.ca/programevaluation/reports/operationlifesaver /OL%20Final%20Report%20(English).pdf (accessed on June 22, 2007).

Whittam KP, Dwyer WO, Simpson PW, and Leeming FC (2006) "Effectiveness of a Media Campaign to Reduce. Traffic Crashes Involving Young Drivers", Journal of Applied Social Psychology, Volume 36(3), 614–628.

TABLE 4.2: Safety Effects of Engineering Activities on Rural Roads

	CRF (%)	SOURCE
Identification of safety concerns		
Network screening	*NR*	*Network screening does nothing in and of itself to reduce collision risk. It is a precursor to an in-service road safety review. Therefore, see results below.*
In-service road safety reviews	*30% (All)* *41% (Injury)*	*Datta and Schattler (2003) – Only urban intersections in sample*
Identification of systemic safety concerns (e.g., utility pole collisions, horizontal curve collisions).	*NR*	
Road design and operations		
Road safety audits	*56%*	*Surrey County Council (1994)*
Improving roadway alignment (e.g., curve flattening)	*Variable*	*Harwood et al (2000) – The collision reduction depends on length of curve and curve radius*
Eliminating pavement discontinuities	*-3% to -10%*	*Elvik and Vaa (2004) – This activity tends to increase collision risk. Results tend to be weak (not statistically significant)*
Improving skid resistance	*15% to 40%*	*Elvik and Vaa (2004) - Reductions apply only to collisions on wet pavement. Greater reductions are experienced on roads with lower coefficients of friction.*
Improving visibility	*15% - 50%*	*TAC (2003)*
Lane widening	*13% - 23%*	*TAC (1999) - Reductions apply to single vehicle and opposite direction collisions (ADT > 2000). CRF range applies to widening from 3.05m to 3.35metre or 3.65metre.*
Shoulder widening	*23% - 41%*	*TAC (1999) - Reductions apply to run-off-road and opposite direction*

	CRF (%)	SOURCE
		collisions (ADT > 2000). CRF range applies to widening from 0.61m to 1.83 metre or 3.05 metre.
Providing dedicated turn lanes	*14% right turn lanes* *28% - 44% for left-turn lanes*	*Harwood et al (2002) – Effectiveness depends on intersection control, and intersection geometry*
Providing street lighting	*64% (Fatal)* *28% (Injury)* *17% (PDO)*	*Elvik and Vaa (2004) – Reductions apply only to collisions during darkness*
Upgrading or installing traffic signs or pavement markings	*15% (Injury)* *7% (PDO)*	*Lyles et al (1986) – Upgrading signs to conform to the MUTCD*
Upgrading rail-highway crossing devices	*25% - 67%*	*Elvik and Vaa (2004) – Level of reduction depends on the type of upgrade (e.g., flashing lights, barriers, improved visibility)*
Providing passing lanes	*25% - 35%*	*Harwood et al (2000) – Applies to collisions within the passing lane section only.*
Implementing roundabouts	*58% (All)* *82% (Injury)*	*NCHRP (2005) - Convert from stop-control to single lane roundabout*
Shoulder and/or centerline rumble strips	*Centreline rumble strips – 15% (All)*	*NCHRP (2005) - Shoulder rumble strips not evaluated on two-lane roads but 21% reduction in run-off-road collisions on rural freeways.*
Advance warning and/or intersection flashers	*10% - 60%*	*TAC (2003) – Intersection flashers at unsignalized intersections 50% - 60%; advance warning of signals 10% - 25%*
Installing and upgrading traffic barriers	*44% (Fatal)* *47% (Injury)*	*Elvik and Vaa (2004)*
Clear zone widening	*22% - 44%*	*Elvik and Vaa (2004) – Level of reduction depends on the original and improved clear zone widths.*

	CRF (%)	SOURCE
Speed management		
Formal policy/procedure on setting speed limits	*SA*	*See "Routine speed limit reviews" below.*
Routine speed limit reviews	*15% (Fatal)* *14% (Injury)* *5% (PDO)*	*Elvik and Vaa (2004) – Results of meta-analysis on introducing or reducing speed limits.*
Variable speed limits	*NR*	
Speed prediction models	*SA*	
Radar message boards	*NR*	*Casey and Lund (1993) Roadside speedometers in **urban** areas reduced average traffic speeds by about 10% at the message board and about 7% at short distances downstream. The proportion of drivers exceeding the speed limit by at least 10 mph fell from 15% to 20%. The effect is limited to the times when the message board is actually deployed.*
Traffic calming in rural settlements and villages	*22%*	*Forbes (2006) – Reduction is dependent on the types of measures employed - 22% is a "most likely" reduction.*
Intelligent transport systems		
Fog warning systems	*NR*	*No reported effects on collision risk, but Martin et al (2003) report that fog warning systems reduce speed variability in the traffic stream.*
Road weather information systems	*60% to 80% reduction in adverse weather conditions*	*Stowe (2001) estimates the safety benefits as shown*
511 or Advanced traveler information systems	*NR*	
Closed circuit television cameras	*NR*	*In limited use on two-lane rural roads.*

	CRF (%)	SOURCE
Portable construction zone traffic management system	*NR*	*Garber and Srinivasan (1998) report a reduction in vehicles exceeding the speed limit through the use of radio-controlled dynamic message signing in work zones.*
Intersection collision avoidance	*NR*	*New technology still under evaluation*
Railway collision avoidance	*NR*	
Green extension systems at traffic signals	*54 % (All)* *75% (rear-end collisions)*	*Zeeger and Deen (1978)*

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Zeeger CV and Deen RC (1978) “Green-Extension Systems at High-Speed Intersections”, ITE Journal 48(11), Institute of Transportation Engineers, Washington DC.

TABLE 4.3: Safety Effects of Enforcement Activities on Rural Roads

	CRF (%)	SOURCE
Identification of safety concerns		
Community traffic safety liaison	*NR*	
Reviews of collision *data to determine times or locations for enforcement*	*SA*	
Reviews of citation *data to determine times or locations for enforcement*	*SA*	
Speed management		
Automatic enforcement (i.e., speed cameras)	*5% - 69% (All)* *12% - 65% (Injury)* *17% - 71% (Fatal)*	*Pilkington and Kinra (2005) - Results from speed cameras. Applicable to area in immediate vicinity of cameras*
Selective traffic enforcement programs	*14% (Fatal)* *6 % (Injury)* *-1% (PDO)*	*Elvik and Vaa (2004) – Effects of stationary enforcement. The effect on PDO collisions was statistically insignificant.*
Zero tolerance on speeding	*NR*	
Radar message boards	*NR*	*Casey and Lund (1993) Roadside speedometers in **urban** areas reduced average traffic speeds by about 10% at the message board and about 7% at short distances downstream. The proportion of drivers exceeding the speed limit by at least 10 mph fell from 15% to 20%. The effect is limited to the times when the message board is actually deployed.*
Escalating fines for repeat offenders	*6%*	*Masten and Peck (2004) – Measured effectiveness of different driver improvement and driver control actions, including penalty levels and types.*

	CRF (%)	SOURCE
Education activities		
Rollover simulators	*NR*	
Mock collisions	*NR*	
Presentations to schools and/or community groups	*NR*	*Insufficient evidence to determine*
Community displays/advertisements	*NR*	
Media campaigns for safe driving	*13%*	*Elder et al (2004) – Well developed, mass media campaigns aimed at drinking-driving.*
Enforcement and education activities		
Automatic license suspension for BAC test failure	*13%*	*Wagenaar et al (2000)*
Escalating penalties for severe BAC levels	*NR*	
Lower BAC standards for repeat offenders	*25 % (Fatal)*	*Hingson et al (1998) - 25% reduction in the proportion of repeat offenders in fatal crashes.*
Open container laws	*NR*	*Stuster et al (2002) – Studied these laws in 4 states and found reduced drinking-driving collisions in 3 of the States, but not statistically significant.*
Passive alcohol sensors	*NR*	
Sobriety check points	*20%*	*Elder et al (2002)*
Saturation patrols or "wolf pack" enforcement	*NR*	
Zero tolerance programs	*21% - 45%*	*Jones and Lacey (2001) – Zero tolerance program as it applies to drinking-driving collisions in under 21 year olds.*
Citizen complaint systems (e.g., Road Watch)	*15%*	*Elvik and Vaa (2004) – Citizen complaint systems usually result in a warning letter being sent to recorded drivers. The effect of warning letters on safety is reported here.*

	CRF (%)	SOURCE
Incentive programs for "safe" drivers	*NR*	*Incentive programs have been used to increase seat-belt use, and found to have positive results.*
Ban on cellular telephone use while driving	*NR*	*McCartt et al (2006) – There is a fourfold increase in the risk of a collision associated with phone use, but no clear evidence on the effectiveness of cell phone bans.*

References:

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5.0 Analysis

5.1 Appropriate Benchmarks

The primary purpose of the survey was to *benchmark* rural road safety activities in Canada. Taken literally this purpose requires the collection of data on the number and category (i.e., education, engineering, enforcement) of rural road safety activities in Canada to serve as a baseline measurement against which future measurements on rural road safety activity will be compared. However, given that this survey ultimately supports RSV 2010, which purports a broader goal of reducing casualty collision risk on rural roads, there is some question as to whether benchmarking "activity" is the appropriate metric.

If the RSV 2010 objective of reducing rural road casualties is considered, the appropriate baseline would include whether the in-service activities are effectively reducing rural road collision risk. This requires more than simply citing the number of activities, as the effectiveness of the different rural road safety activities are varied (see Section 4.0). Moreover, in some cases the identified activities have no direct impact on collision risk, and are considered supporting activities. In the end, the number of activities is a poor measure of rural road collision risk. So if the objectives of RSV 2010 guide the benchmarking effort then the best measure of performance is whether the Provinces/Territories are employing measures that are effective in reducing rural road collisions (i.e., "effective activity").

Before replacing "activities" with "effective activities" as the baseline, it should be noted that despite the measured effectiveness (or lack thereof) for each individual activity, there is an unmeasured benefit to every program in promoting and sustaining a culture of road safety in Canada. Advancing the Canadian road safety culture is certainly congruent with the goals of RSV 2010, and the level of activity in rural road safety education, engineering, or enforcement measures the commitment to a rural road safety culture. While it is certainly hopeful that all of the activities have a direct impact on collision risk, this will not always be the case and the indirect/immeasurable benefits should not be ignored. After all, "a variety of intervention approaches using multiple tactics at multiple levels of influence"[11] is required to realize a change in the rural road safety culture.

[11] McNeely CL, and Gifford JL (2007) "Effecting a traffic safety culture: Lessons from cultural change initiatives", AAA Foundation for Traffic Safety, Washington, DC. http://www.aaafoundation.org/pdf/McNeelyGifford.pdf, accessed on July 10, 2007.

There are at least two other concerns with using "effective activities" as the baseline measurement for this effort. Firstly, in reviewing the effectiveness of the different rural road safety activities reported in the literature, it is immediately apparent that engineering/infrastructure-based activities are the most effective in reducing rural road collision risk. This is, at least in part, because infrastructure-based measures are continually present, whereas education and enforcement measures are (necessarily) applied discontinuously and/or are aimed at specific populations or locations. However, infrastructure changes are typically more expensive than education and enforcement measures. By focusing on effectiveness without considering the cost of the activity, it may cause undue focus on engineering activities.

The second concern with "effective activities" as the baseline measurement is that not all activities target all collision types, populations, or locations. For example, roundabouts are effective in reducing intersection collision risk, but are not suitable for reducing run-off-road collisions.

Mindful of the above discussion, and in keeping with the original intent of the project to benchmark rural road safety activities in Canada, the baseline measurement is the number of activities in each of the areas of education, engineering, and enforcement. This benchmark is a measure of the rural road safety culture in each Province/Territory and may be used to compare with future surveys to determine if the rural road safety culture in Canada is advancing. However, the concept of directing resources to activities that are effective in reducing rural road collision risk is not lost. It is recognized that the practice of evidence-based road safety dictates that interventions be effective in addressing the problems. To that end, it is also appropriate for the survey analysis to provide some indication of which activities within education, engineering, and enforcement are effective in addressing prominent rural collision types, and how many respondents are employing these measures.

5.2 Benchmarks for 2007

All of the respondents are active in rural road safety with multiple measures in-service, being developed, or under consideration. On average Provinces/Territories currently employ 18, 25, and 25 measures in the education, engineering, and enforcement categories, respectively.

The number of education and engineering-related rural road safety activities that are currently being employed at the Provincial/Territorial level are shown in Figure 3.1.

British Columbia employs the greatest number of education activities (31); while Nova Scotia and the Yukon employ the least number of education activities (12). The Province employing the greatest number of engineering activities is Quebec (40); the Province employing the least number of engineering activities is Nova Scotia (5). The range for the number of activities in the three Provincial responses is 20 to 32 activities.

Additional rural road safety activities are "being developed" or are "under consideration" in all of the responding Provinces/Territories. In the safety education community, all of the respondents except British Columbia and Quebec noted that they are developing or considering new activities with an average of one measure being developed, and one measure under consideration in each Province/Territory. The results are similar in the engineering community where all of the respondents except Quebec noted that they are developing or considering new activities with an average of two measures being developed, and two measures under consideration in each Province/Territory.

5.3 Analysis of Activity Effectiveness

Further analysis of the surveys was conducted to determine if the survey respondents are employing rural road safety activities that are (according to the reviewed literature) the most effective in crash reduction. To that end the following conclusions are drawn:

Education

1. There is a tremendous gap in the knowledge-base concerning the effect of education programs on collision occurrence. This is generally because these types of studies are difficult to design and require significant financial resources, and technical/statistical skill. The majority of the research in the area of education has been to evaluate the effect of the program on road user attitude and behaviour (which do not necessarily correlate with collision risk).

2. The Canadian Education community has an excellent basis for developing safety programs with all responding jurisdictions managing a collision database, and using the data to develop or evaluate their safety programs.

3. The four most-used education activities are fatal vision goggles, temporary community displays on road safety, community partnerships, and public service announcements. The literature does not provide any effectiveness estimates for these activities, except for multimedia campaigns (public service announcements) which may reduce collisions by up to 22 percent.

Engineering

1. The knowledge-based concerning the effects of engineering measures on collision risk is well developed and growing. There is a current gap in the knowledge on the effects of ITS measures on collision risk; likely because these types of activities are relatively new to the industry.

2. The four most-used engineering activities are improving roadway alignment, improving visibility, upgrading/installing traffic control devices, and advance warning or intersection flashers. While upgrading traffic control devices is expected to reduce collisions by seven percent for property damage only collisions, and 15 percent for casualty collisions, the remaining activities have variable results that are dependent on the original condition and the extent of the change. The typical range of effectiveness is a 10 to 60 percent reduction in collisions. It should be noted that the advance warning and intersection flashers are applicable only to road-rail crossing locations, and intersections; as opposed to upgrading traffic control devices and improving visibility which are activities applicable to any part of the road system.

3. In-service road safety reviews and road safety audits are very effective in reducing collisions (30 to 56 percent reductions), but are used by only 55 percent of the survey respondents.

4. Roundabouts are effective in reducing intersection collisions, but because they are relatively new devices for the Canadian engineering community, they are only being used by 3 responding jurisdictions (27%).

Enforcement

1. There is a gap in the knowledge-base concerning the effect of enforcement programs on collision occurrence. Again, much of the research in the area of enforcement/legislation has been to evaluate the effect of the program on road user attitude and behaviour (which do not necessarily correlate with collision risk).

2. With the exception of automated enforcement, which can provide collision reductions of up to 71 percent, enforcement activities generally reduce collisions from six to 25 percent.

3. The four most-used rural road safety activities in the Canadian enforcement community are 911 service (which is a supporting activity), media campaigns for safe driving, automatic license suspensions for BAC test failures, and sobriety check points. The estimated effectiveness of the latter three activities is 13 to 20 percent.

5.4 Caveat

Despite the above analysis on activity effectiveness, it should be noted that the best measure of an activities "worth" to the rural road safety effort is likely the benefit-cost ratio (BCR), or some similar economic indicator. While the ultimate goal is to reduce casualty collisions on rural roads, achieving the goal cannot focus on crash reduction effectiveness as the sole factor in planning and implementing a rural road safety strategy. Safety activities require resources (i.e., costs), and generally affect performance (i.e., operations). These impacts need to be accounted for in the overall planning process, and that is typically done using the BCR. The BCR provides an additional layer of information for decision-making, and can indicate which activities provide the best return on investment or "bang-for-the-buck".

Assembling costs for each rural road safety activity was beyond the scope of this assignment.

6.0 Recommendations for Future Surveys

The lessons learned from this initial benchmarking effort are:

1. The response rate for the municipal engineering sector was extremely low. There are two issues here: some Provinces/Territories do not have municipalities with "rural roads", and those that do are not engaged. Again, since regular benchmarking is the main purpose of the survey, then it is important to gain long-term commitment from a sample of municipalities across Canada. It is recommended that contact be made with a selected number of municipalities in this regard.

2. Similarly, the response from the Provincial/Territorial enforcement community was relatively low, even with the assistance of the Canadian Association of Chiefs of Police (CACP). It is recommended that these agencies be engaged by the CCMTA/CACP to improve the response rate.

3. Nunavut does not currently have any rural roads as defined in RSV 2010. They should not be included in future surveys until such time that their road system includes rural roads.

4. Some organizations thought that another section had already responded to the survey, when in fact each section has received a different survey. There was some confusion over the different surveys (engineering, enforcement, and education) when different sections of the same organization received different surveys. This should be explained in the survey instructions, and the survey type could be made more prominent on cover page.

5. The first question in the Collision and ancillary data section of the survey (which appeared on the education, engineering, and enforcement surveys) was intended to sort out which agency in which jurisdiction had the responsibility of managing the collision data. This was not successful, and a better approach to uncovering the collision database managers should be sought.

6. Many of the respondents completed the "List of Activities" but did not submit any "Project Description Forms". The typical reason provided for this action is that the Project Description Forms would take too long to complete. If the survey is to be completed annually as a benchmarking exercise, then the project description forms could be removed from the survey (at least for the activities that are explicitly included in the List of Activities).

7. Organizations such as academic institutions and professional associations that also share a stake in rural road safety are not given an opportunity to provide input under the 2007 sampling frame. Consideration should be given to including them in future surveys.

8. Due to the time required to decide upon, develop, and initiate rural road safety programs and campaigns it is recommended that the Rural Road Safety Survey be repeated a minimum of once every two years, but desirably once every three years. More frequent surveys would likely irritate respondents, and not provide any meaningful data from the previous survey.

9. Vehicle-animal collisions are a type of collision that may be prevalent on rural roads in Canada, and future surveys should specifically ask about safety initiatives aimed at vehicle-animal collisions.

10. Many of the initiatives that are being undertaken by Canadian jurisdictions are likely systemic programs that are applicable to rural roads, as opposed to activities that are unique to rural roads. In order to understand that true allocation of resources on rural road safety, future surveys may ask respondents to clarify which initiatives are unqiue to rural roads.

Appendix A

Engineering Survey Instrument

TRANSPORT CANADA
Project No. T8056-060100/A

SURVEY OF CANADIAN RURAL ROAD SAFETY STRATEGIES IN SUPPORT OF ROAD SAFETY VISION 2010 TARGETS

Transport Canada has commissioned *Intus Road Safety Engineering Inc.* to identify strategies that Canadian road authorities have implemented, or are planning to implement on rural roads. This survey was initiated by the Canadian Council of Motor Transport Administrators' Rural Road Safety Task Force, and is a part of Canada's commitment to Road Safety Vision 2010, which promotes a 40% decrease in fatalities and serious injuries on undivided, rural roads with 80-90 km/h speed limits. The purpose of this survey is to establish a national list of rural road safety strategies, and to provide baseline information for benchmarking rural road safety activities in the engineering and infrastructure communities. Completing the survey may also assist your organization in assessing its current level of activity in rural road safety.

We would appreciate your participation in this survey. This survey should be completed by the person(s) in your jurisdiction that is(are) most familiar with strategies as they apply to rural road safety, in the following categories:

- Collision and ancillary data;
- Identification of safety concerns;
- Road design and operation;
- Speed management; and
- Intelligent transport systems.

All responses will be included in a final study report, including the names of the responding agencies, and the name of the primary respondent. However, personal contact information will not be shared with anyone except the study team.

Please return the completed survey and any supporting documentation by **April 27, 2007** to:

Gerry Forbes
Intus Road Safety Engineering Inc.
4261 Price Court, Burlington, ON L7M 4X3
Fax: 905-332-9777
e-mail: gerry@intus.ca

If you have any questions about this study, please contact Mr. Gerry Forbes, President & Chief Engineer, Intus Road Safety Engineering Inc., (gerry@intus.ca or 905-332-9470) – or – Ms. Deborah de Grasse, Chief of Road Systems, Transport Canada (degrasd@tc.gc.ca or 613-998-1975).

Thank you for your time.

PART I: LIST OF ACTIVITIES

*The following list is not exhaustive and we request that you add any of your rural road safety activities not included on the list in the space provided under "**Activities not included above"** or on a separate sheet of paper.*

Which of the following activities does your organization regularly perform on your rural roads *[One check per row*]…

	Yes	No	Being Developed	Under Consideration
Collision and ancillary data				
Does your organization manage the collision database?	☐	☐	☐	☐
Electronic data capture of collision data	☐	☐	☐	☐
Do your collision data use GIS technology?	☐	☐	☐	☐
Are your collision data linked to other types of data (e.g., traffic volumes, physical features inventory, etc.)	☐	☐	☐	☐
Do you validate or perform any quality control checks on your collision data?	☐	☐	☐	☐
Are your data compliant with the National Collision Database?	☐	☐	☐	☐
Are your collision data linked to any software that conducts safety analysis (e.g., network screening)?	☐	☐	☐	☐
Do you use your collision data to develop or evaluate safety programs?	☐	☐	☐	☐
Do you track police citations such as drinking-driving, and speeding, and non-use of seatbelts for use in developing or evaluating safety programs?	☐	☐	☐	☐
Is your collision database or road safety analysis software developed "in house"?	☐	☐	☐	☐
Identification of safety concerns				
Network screening[1]	☐	☐	☐	☐
In-service road safety reviews	☐	☐	☐	☐
Identification of systemic safety concerns (e.g., utility pole collisions, horizontal curve collisions).	☐	☐	☐	☐
Road design and operations				
Road safety audits	☐	☐	☐	☐
Improving roadway alignment (e.g., curve flattening)	☐	☐	☐	☐
Eliminating wheel rutting, potholes, and/or pavement discontinuities	☐	☐	☐	☐
Improving skid resistance	☐	☐	☐	☐

[1] *Network screening, blackspot programs, dangerous locations lists/rankings, and identification of hazardous locations are all different names denoting the proactive identification of locations that are collision-prone, or that have a high collision risk. For the purposes of this survey "network screening" will be used, and is meant to include all such programs.*

	Yes	No	Being Developed	Under Consideration
Improving visibility	☐	☐	☐	☐
Lane widening	☐	☐	☐	☐
Shoulder widening	☐	☐	☐	☐
Providing dedicated turn lanes	☐	☐	☐	☐
Providing street lighting	☐	☐	☐	☐
Upgrading or installing traffic signs or pavement markings	☐	☐	☐	☐
Upgrading rail-highway crossing devices	☐	☐	☐	☐
Providing passing lanes	☐	☐	☐	☐
Implementing roundabouts	☐	☐	☐	☐
Shoulder and/or centerline rumble strips	☐	☐	☐	☐
Advance warning and/or intersection flashers	☐	☐	☐	☐
Installing and upgrading traffic barriers	☐	☐	☐	☐
Clear zone widening	☐	☐	☐	☐
Speed management				
Formal policy or procedure on setting speed limits	☐	☐	☐	☐
Routine speed limit reviews	☐	☐	☐	☐
Variable speed limits	☐	☐	☐	☐
Speed prediction models	☐	☐	☐	☐
Radar message boards	☐	☐	☐	☐
Traffic calming in rural settlements and villages	☐	☐	☐	☐
Intelligent transport systems				
Fog warning systems	☐	☐	☐	☐
Road weather information systems	☐	☐	☐	☐
511 or Advanced traveler information systems	☐	☐	☐	☐
Closed circuit television cameras	☐	☐	☐	☐
Portable construction zone traffic management system	☐	☐	☐	☐
Intersection collision avoidance	☐	☐	☐	☐
Railway collision avoidance	☐	☐	☐	☐
Green extension systems at traffic signals	☐	☐	☐	☐
Activities not included above (please list below)				
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

PART II: ACTIVITY DESCRIPTIONS

For each of those items that received a “Yes” response, please complete the attached “Project Description” form. An example of a completed form is attached for your reference.

EXAMPLE

Name of the activity	**Road Safety Audits**
How often do you conduct this activity?	**Three projects per year or any project over $1M capital cost**
Was this activity evaluated for success/effectiveness in reducing collision occurrence or collision severity? *[Check one box only]*	☐ Yes → Please provide details: ☒ No → Why do you think this activity will be effective? **Reports from UK, and Australia**
Brief description	**A formal examination of a project from a safety perspective using a qualified and independent auditor. See TAC Guidelines.**
Collision configurations addressed *[Check all that apply]*	☒ All types ☐ Casualty collisions ☐ Side swipe ☐ Angle ☐ Single motor vehicle ☐ Rear-end ☐ Intersection ☐ Run off road ☐ Head on ☐ Other: _____
Other information	**None**

PROJECT DESCRIPTION FORM

Name of the activity	
How often do you conduct this activity?	
Was this activity evaluated for success/effectiveness in reducing collision occurrence or collision severity? *[Check one box only]*	☐ Yes → Please provide details: ☐ No → Why do you think this activity will be effective?
Brief description	
Collision configurations addressed *[Check all that apply]*	☐ All types ☐ Casualty collisions ☐ Side swipe ☐ Angle ☐ Single motor vehicle ☐ Rear-end ☐ Intersection ☐ Run off road ☐ Head on ☐ Other: _____
Other information	

PART III: RESPONDENT INFORMATION

Name of Primary Respondent _____

Job title _____

Agency/Organization_____

Email address (optional)_____

Telephone No. (optional)_____

Name of others who assisted in completing the survey *[Record "None" if no one assisted]*:

_____

_____

_____

What is the Primary area of expertise of your agency *[Check one only]*:

	Engineering	Education	Enforcement	Emergency Service
Federal	☐	☐	☐	☐
Provincial/Territorial	☐	☐	☐	☐
Municipal	☐	☐	☐	☐

☐ Other (Specify) _____

Thank you for your time.

Please return the completed survey by **April 27, 2007** to:

Gerry Forbes
Intus Road Safety Engineering Inc.
4261 Price Court, Burlington, ON L7M 4X3

Fax: 905-332-9777
e-mail: gerry@intus.ca

Appendix B

Education Survey Instrument

TRANSPORT CANADA
Project No. T8056-060100/A

SURVEY OF CANADIAN RURAL ROAD SAFETY STRATEGIES IN SUPPORT OF ROAD SAFETY VISION 2010 TARGETS

Transport Canada has commissioned *Intus Road Safety Engineering Inc.* to identify strategies that Canadian road authorities have implemented, or are planning to implement on rural roads. This survey was initiated by the Canadian Council of Motor Transport Administrators' Rural Road Safety Task Force, and is a part of Canada's commitment to Road Safety Vision 2010, which promotes a 40% decrease in fatalities and serious injuries on undivided, rural roads with 80-90 km/h speed limits. The purpose of this survey is to establish a national list of rural road safety strategies, and to provide baseline information for benchmarking rural road safety activities in the engineering and infrastructure communities. Completing the survey may also assist your organization in assessing its current level of activity in rural road safety.

We would appreciate your participation in this survey. This survey should be completed by the person(s) in your jurisdiction that is(are) most familiar with strategies as they apply to rural road safety, in the following categories:

- Collision and ancillary data;
- Identification of safety problems;
- Speed management; and
- Education and public awareness activities.

All responses will be included in a final study report, including the names of the responding agencies, and the name of the primary respondent. However, personal contact information will not be shared with anyone except the study team.

Please return the completed survey and any supporting documentation by **April 27, 2007** to:

Gerry Forbes
Intus Road Safety Engineering Inc.
4261 Price Court, Burlington, ON L7M 4X3
Fax: 905-332-9777
e-mail: gerry@intus.ca

If you have any questions about this study, please contact Mr. Gerry Forbes, President & Chief Engineer, Intus Road Safety Engineering Inc., (gerry@intus.ca or 905-332-9470) – or – Ms. Deborah de Grasse, Chief of Road Systems, Transport Canada (degrasd@tc.gc.ca or 613-998-1975).

Thank you for your time.

PART I: LIST OF ACTIVITIES

*The following list is not exhaustive and we request that you add any of your rural road safety activities not included on the list in the space provided under **"Activities not included above"** or on a separate sheet of paper.*

Which of the following activities does your organization regularly perform on your rural roads *[One check per row*]…

	Yes	No	Being Developed	Under Consideration
Collision and ancillary data				
Does your organization manage the collision database?	☐	☐	☐	☐
Electronic data capture of collision data	☐	☐	☐	☐
Do your collision data use GIS technology?	☐	☐	☐	☐
Are your collision data linked to other types of data (e.g., traffic volumes, physical features inventory, etc.)	☐	☐	☐	☐
Do you validate or perform any quality control checks on your collision data?	☐	☐	☐	☐
Are your data compliant with the National Collision Database?	☐	☐	☐	☐
Are your collision data linked to any software that conducts safety analysis (e.g., identifying categories of "high risk" drivers)?	☐	☐	☐	☐
Do you use your collision data to develop or evaluate safety programs?	☐	☐	☐	☐
Do you track police citations such as drinking-driving, and speeding, and non-use of seatbelts for use in developing or evaluating safety programs?	☐	☐	☐	☐
Is your collision database or road safety analysis software developed "in house"?	☐	☐	☐	☐
Identification of safety concerns				
Multi-disciplinary traffic safety committees	☐	☐	☐	☐
Reviews of ***collision*** data to develop education priorities	☐	☐	☐	☐
Reviews of ***citation*** data to develop education priorities	☐	☐	☐	☐
Speed management				
Media campaigns	☐	☐	☐	☐
Presentations in schools or with community groups	☐	☐	☐	☐
Ghost-outs at area schools	☐	☐	☐	☐
Citizen-based speed watch	☐	☐	☐	☐

	Yes	No	Being Developed	Under Consideration
Education and public awareness activities				
Mock collisions and/or trials in schools	☐	☐	☐	☐
Fatal vision goggle demonstrations	☐	☐	☐	☐
Permanent community displays on road safety	☐	☐	☐	☐
Temporary community displays on road safety (e.g., local fairs, and events)	☐	☐	☐	☐
Gateway signs to rural settlements	☐	☐	☐	☐
Partnerships with community groups and/or businesses	☐	☐	☐	☐
Safe routes to schools for rural areas	☐	☐	☐	☐
Public service announcements	☐	☐	☐	☐
Activities not included above (please list below)				
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

PART II: ACTIVITY DESCRIPTIONS

For each of those items that received a "Yes" response, please complete the attached "Project Description" form. An example of a completed form is attached for your reference.

EXAMPLE

Name of the activity	**Public service announcement - Its no fun if your dead!**
How often do you conduct this activity?	**continuous**
Was this activity evaluated for success/effectiveness in reducing collision occurrence or collision severity? *[Check one box only]*	☐ Yes → Please provide details: ☒ No → Why do you think this activity will be effective? **Program should appeal to youths**
Brief description	**Interactive web-site with messages concerning drinking and driving, speeding, seatbelt use, and aggressive driving. Program is aimed at teens and novice drivers using black-humour to put the message across. (http://nofunbeingdead.com)**
Collision configurations addressed *[Check all that apply]*	☒ All types ☐ Casualty collisions ☐ Side swipe ☐ Angle ☐ Single motor vehicle ☐ Rear-end ☐ Intersection ☐ Run off road ☐ Head on ☐ Other: _____
Other information	**none.**

PROJECT DESCRIPTION FORM

Name of the activity	
How often do you conduct this activity?	
Was this activity evaluated for success/effectiveness in reducing collision occurrence or collision severity? *[Check one box only]*	☐ Yes → Please provide details: ☐ No → Why do you think this activity will be effective?
Brief description	
Collision configurations addressed *[Check all that apply]*	☐ All types ☐ Casualty collisions ☐ Side swipe ☐ Angle ☐ Single motor vehicle ☐ Rear-end ☐ Intersection ☐ Run off road ☐ Head on ☐ Other: _____
Other information	

PART III: RESPONDENT INFORMATION

Name of Primary Respondent _____

Job title _____

Agency/Organization_____

Email address (optional)_____

Telephone No. (optional)_____

Name of others who assisted in completing the survey *[Record "None" if no one assisted]*:

_____

_____

_____

What is the Primary area of expertise of your agency *[Check one only]*:

	Engineering	Education	Enforcement	Emergency Service
Federal	☐	☐	☐	☐
Provincial/Territorial	☐	☐	☐	☐
Municipal	☐	☐	☐	☐

☐ Other (Specify) _____

Thank you for your time.

Please return the completed survey by **April 27, 2007** to:

Gerry Forbes
Intus Road Safety Engineering Inc.
4261 Price Court, Burlington, ON L7M 4X3

Fax: 905-332-9777
e-mail: gerry@intus.ca

Appendix C

Enforcement Survey Instrument

TRANSPORT CANADA
Project No. T8056-060100/A

SURVEY OF CANADIAN RURAL ROAD SAFETY STRATEGIES IN SUPPORT OF ROAD SAFETY VISION 2010 TARGETS

Transport Canada has commissioned *Intus Road Safety Engineering Inc.* to identify strategies that Canadian road authorities have implemented, or are planning to implement on rural roads. This survey was initiated by the Canadian Council of Motor Transport Administrators' Rural Road Safety Task Force, and is a part of Canada's commitment to Road Safety Vision 2010, which promotes a 40% decrease in fatalities and serious injuries on undivided, rural roads with 80-90 km/h speed limits. The purpose of this survey is to establish a national list of rural road safety strategies, and to provide baseline information for benchmarking rural road safety activities in the engineering and infrastructure communities. Completing the survey may also assist your organization in assessing its current level of activity in rural road safety.

We would appreciate your participation in this survey. This survey should be completed by the person(s) in your jurisdiction that is(are) most familiar with strategies as they apply to rural road safety, in the following categories:

- Collision and ancillary data;
- Identification of safety problems;
- Speed management; and
- Trauma management systems.

All responses will be included in a final study report, including the names of the responding agencies, and the name of the primary respondent. However, personal contact information will not be shared with anyone except the study team.

Please return the completed survey and any supporting documentation by **April 27, 2007** to:

Gerry Forbes
Intus Road Safety Engineering Inc.
4261 Price Court, Burlington, ON L7M 4X3
Fax: 905-332-9777
e-mail: gerry@intus.ca

If you have any questions about this study, please contact Mr. Gerry Forbes, President & Chief Engineer, Intus Road Safety Engineering Inc., (gerry@intus.ca or 905-332-9470) – or – Ms. Deborah de Grasse, Chief of Road Systems, Transport Canada (degrasd@tc.gc.ca or 613-998-1975).

Thank you for your time.

PART I: LIST OF ACTIVITIES

*The following list is not exhaustive and we request that you add any of your rural road safety activities not included on the list in the space provided under "**Activities not included above"** or on a separate sheet of paper.*

Which of the following activities does your organization regularly perform on your rural roads *[One check per row*]…

	Yes	No	Being Developed	Under Consideration
Collision and ancillary data				
Does your organization manage the collision database?	☐	☐	☐	☐
Electronic data capture of collision data	☐	☐	☐	☐
Do your collision data use GIS technology?	☐	☐	☐	☐
Are your collision data linked to other types of data (e.g., traffic volumes, physical features inventory, etc.)	☐	☐	☐	☐
Do you validate or perform any quality control checks on your collision data?	☐	☐	☐	☐
Are your data compliant with the National Collision Database?	☐	☐	☐	☐
Are your collision data linked to any software that conducts safety analysis (e.g., identifying high collision risk times-of-day)?	☐	☐	☐	☐
Do you use your collision data to develop or evaluate safety programs?	☐	☐	☐	☐
Do you track police citations such as drinking-driving, and speeding, and non-use of seatbelts for use in developing or evaluating safety programs?	☐	☐	☐	☐
Is your collision database or road safety analysis software developed "in house"?	☐	☐	☐	☐
Identification of safety concerns				
Community traffic safety liaison	☐	☐	☐	☐
Reviews of ***collision*** data to determine times or locations for enforcement	☐	☐	☐	☐
Reviews of ***citation*** data to determine times or locations for enforcement	☐	☐	☐	☐
Speed management				
Automatic enforcement (i.e., speed cameras)	☐	☐	☐	☐
Selective traffic enforcement programs	☐	☐	☐	☐

	Yes	No	Being Developed	Under Consideration
Zero tolerance on speeding	☐	☐	☐	☐
Radar message boards	☐	☐	☐	☐
Escalating fines for repeat offenders	☐	☐	☐	☐
Education activities				
Rollover simulators	☐	☐	☐	☐
Mock collisions	☐	☐	☐	☐
Presentations to schools and/or community groups	☐	☐	☐	☐
Community displays/advertisements	☐	☐	☐	☐
Media campaigns for safe driving	☐	☐	☐	☐
Enforcement and education activities				
Automatic license suspension for BAC test failure	☐	☐	☐	☐
Escalating penalties for severe BAC levels	☐	☐	☐	☐
Lower BAC standards for repeat offenders	☐	☐	☐	☐
Open container laws	☐	☐	☐	☐
Passive alcohol sensors	☐	☐	☐	☐
Sobriety check points	☐	☐	☐	☐
Saturation patrols or “wolf pack” enforcement	☐	☐	☐	☐
Zero tolerance programs	☐	☐	☐	☐
Citizen complaint systems (e.g., Road Watch)	☐	☐	☐	☐
Incentive programs for “safe” drivers	☐	☐	☐	☐
Ban on cellular telephone use while driving	☐	☐	☐	☐
Trauma management systems				
911 service	☐	☐	☐	☐
GPS-equipped emergency response vehicles	☐	☐	☐	☐
Improving the communication networks to eliminate/minimize “dead spots”	☐	☐	☐	☐
“By stander” care training programs for rural residents	☐	☐	☐	☐
Train personnel of non-traditional emergency services organizations (e.g., road maintenance workers)	☐	☐	☐	☐
Require “first on scene” care training for all emergency service providers (i.e., police, fire, ambulance)	☐	☐	☐	☐
Performance standards including maximum response times	☐	☐	☐	☐
Exchange programs with urban emergency response providers	☐	☐	☐	☐
Require cell phone carriers to provide the location of the antenna that received an emergency call or a phone location through a GPS-location model	☐	☐	☐	☐
Activities not included above (please list below)				
	☐	☐	☐	☐
	☐	☐	☐	☐

	Yes	No	Being Developed	Under Consideration
	☐	☐	☐	☐
	☐	☐	☐	☐
	☐	☐	☐	☐

PART II: ACTIVITY DESCRIPTIONS

For each of those items that received a "Yes" response, please complete the attached "Project Description" form. An example of a completed form is attached for your reference.

EXAMPLE

Name of the activity	Review of collision data to identify safety problems
How often do you conduct this activity?	- Review data Once per year - enforcement continuous thru year
Was this activity evaluated for success/effectiveness in reducing collision occurrence or collision severity? *[Check one box only]*	☐ Yes → Please provide details: ☒ No → Why do you think this activity will be effective? enforcement targets high collision locations +/or times
Brief description	Each year the collision database is analyzed to determine when and where different collision types are occurring. For example, when are drink-driving collisions occurring and on which roads, so that enforcement can be directed to the high incident roads and the appropriate times.
Collision configurations addressed *[Check all that apply]*	☒ All types ☐ Casualty collisions ☐ Side swipe ☐ Angle ☐ Single motor vehicle ☐ Rear-end ☐ Intersection ☐ Run off road ☐ Head on ☐ Other: _____
Other information	We examine speed, drink-driving, and seat belt non-use collision types.

PROJECT DESCRIPTION FORM

Name of the activity	
How often do you conduct this activity?	
Was this activity evaluated for success/effectiveness in reducing collision occurrence or collision severity? *[Check one box only]*	☐ Yes → Please provide details: ☐ No → Why do you think this activity will be effective?
Brief description	
Collision configurations addressed *[Check all that apply]*	☐ All types ☐ Casualty collisions ☐ Side swipe ☐ Angle ☐ Single motor vehicle ☐ Rear-end ☐ Intersection ☐ Run off road ☐ Head on ☐ Other: _____
Other information	

PART III: RESPONDENT INFORMATION

Name of Primary Respondent _____

Job title _____

Agency/Organization_____

Email address (optional)_____

Telephone No. (optional)_____

Name of others who assisted in completing the survey *[Record "None" if no one assisted]*:

_____

_____

_____

What is the Primary area of expertise of your agency *[Check one only]*:

	Engineering	Education	Enforcement	Emergency Service
Federal	☐	☐	☐	☐
Provincial/Territorial	☐	☐	☐	☐
Municipal	☐	☐	☐	☐

☐ Other (Specify) _____

Thank you for your time.

Please return the completed survey by **April 27, 2007** to:

Gerry Forbes
Intus Road Safety Engineering Inc.
4261 Price Court, Burlington, ON L7M 4X3

Fax: 905-332-9777
e-mail: gerry@intus.ca

Appendix D

Survey Respondents

Survey Respondents (Listed alphabetically within discipline)

ORGANIZATION	PRIMARY RESPONDENT
	Engineering
*Alberta Infrastructure & Transportation**	*Bill Kenny, Highway Geometric Standards Specialist*
*Manitoba Infrastructure & Transportation**	*Robert Kurylko, A/Director Traffic Engineering Branch*
*Ministere des transports du Quebec**	*Lise Fournier, ingenieure*
*New Brunswick Department of Transportation**	*Cathy O'Shea, Senior Traffic Engineer*
*Newfoundland and Labrador Department of Transportation & Works**	*Gary Gosse, Director of Highway Design & Construction*
*Nova Scotia Department of Transportation & Public Works**	*Kent Speiran, Manager – Road Safety*
*Ontario Ministry of Transportation**	*Mark Ayton, Senior Engineer – Highway Design*
*PEI Department of Transportation & Public Works**	*Stephen Yeo, Chief Engineer*
Regional Municipality of Durham, Department of Public Works	*Jeff Pammett, Data Management Coordinator*
*Saskatchewan Highways & Transportation**	*Paul Hunt, Operations Standards Engineer*
*Transport Canada, Road Safety & Motor Vehicle Regulation**	*Deborah de Grasse, Chief – Road Systems*
Transportation Association of Canada, Road Safety Standing Committee	*Gerry Forbes, Chair of Road Safety Standing Committee*
Transportation Association of Canada, Traffic Operations & Management Standing Committee	*Richard Chow, Chair of Traffic Operations & Management Standing Committee*
Transportation Planning (International) Ltd.	*Adam Oredecki, Regional Director Road Safety Centre of Excellence*
University of New Brunswick	*Eric Hildebrand, Professor*
*Yukon Department of Highways & Public Works**	*Gary Bonham, Project Control and Standards Technician*
	Education
*Alberta Infrastructure & Transportation, Office of Traffic Safety**	*Jeanette Espie, Executive Director*
*Insurance Corporation of British Columbia**	*Jean Wilson, Manager of Research & Evaluation*
*Manitoba Public Insurance**	*Clif Eden, Manager – Road Safety*
*Nova Scotia Department of Transportation & Public Works**	*Julie Stover, Road Safety Advisory Committee Coordinator*
*NWT Department of Transportation**	*Al Kaylo, Director – Road Licensing & Safety*
*Ontario Ministry of Transportation**	*John Lefebvre, Manager – Road Safety Marketing Office*
*PEI Department of Transportation & Public Works**	*Audrey Mayhew, Senior Safety Officer*
*SAAQ**	*Therese Marion*

ORGANIZATION	PRIMARY RESPONDENT
*Saskatchewan Government Insurance**	*Shannon Ell, Manager – Traffic Safety Promotion*
*Transport Canada, Road Safety & Motor Vehicle Regulation**	*Paul Boase, Chief – Road Users*
*Yukon Department of Highways & Public Works**	*Terry-Lynn Vold, Program and Research Officer*
	Enforcement
Amherstburg Police Services	*Sgt. Tim Berthiaume*
BarriePolice Services	*Sgt. Gene Hettinga*
Chatham-Kent Police Services	*Sgt. P. Ponajba, Traffic Management Supervisor*
CN Police	*Dan Ritchie, Inspector*
Halton Regional Police	*Sgt. Peter Hodgson, Staff Officer to the Deputy Chief*
Hamilton Police Services	*Sgt. Jack Langhorn*
La police Regionale BNPP	*Gerald Francoeur, Chef*
Niagara Regional Police	*Sgt. D. Todd McKinnon*
Ottawa Police Services	*Sgt. Mel Robertson*
*RCMP "" Division (Manitoba)**	*Sgt. Wayne Blackmore, Senior Collision Analyst*
*RCMP "" Division (Nova Scotia)**	*Sgt. Gerard MacDonald, Senior Traffic Analyst*
*RCMP "K"Division (Alberta)**	*Cpl. Greg Srogen, Traffic Safety Services Specialist*
*RCMP "V" Division (Nunavut)**	*Sue Coogan, EA to the Commanding Officer*
Services de police de la ville de Gatineau	*Mario Harel, Directeur adgaint*
Truro Police Services	*Cst. Graham Purvis*
Waterloo Regional Police	*Sgt. Scott Diefenbaker*
Windsor Police Services	*Sgt. Paul Bridgeman*
York Regional Police	*Sgt. Bradley Bulmer, Traffic Safety Strategy Supervisor*

* From the primary sampling frame