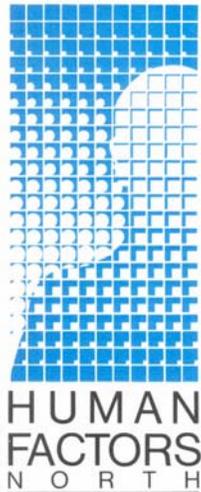




APPENDIX 2A – Assessment of Investment Decision and Evaluation Processes Used for the Road Safety and Loss Management Programs of ICBC (FERENCE WEICKER & COMPANY, HUMAN FACTORS NORTH INC.)

**ASSESSMENT OF INVESTMENT DECISION AND EVALUATION
PROCESSES USED FOR THE ROAD SAFETY AND LOSS
MANAGEMENT PROGRAMS OF ICBC**



HUMAN FACTORS NORTH INC.

June 15, 2004

Ference Weicker & Company

Management Consultants

EXECUTIVE SUMMARY

Purpose of Assignment

ICBC commissioned this report in response to item 2.4.4 in the BC Utilities Commission's 2004 decision on ICBC's revenue requirements, which reads as follows: "ICBC has provided some evidence concerning its Road Safety and Loss Management Programs. The Commission would like to see additional evidence on ICBC's process to determine the effectiveness of these programs. For example, criteria for investment, monitoring programs for effectiveness, etc." This report reviews ICBC's investment decision and evaluation processes for its Road Safety and Loss Management Programs.

Method of Study

To undertake the assignment, we conducted a review of ICBC's existing process for selecting and investing in effective road safety and loss management programs. We also reviewed previous assessments and evaluations of ICBC's road safety and loss management programs, including the results of a previous assignment whereby Ference Weicker & Company in consortium with Human Factors North conducted an independent examination of all evaluations of ICBC road safety programs. In addition, we conducted a comparison of ICBC's process for selecting and evaluating road safety and loss management programs with eight other jurisdictions in North America.

The body of the report identifies challenges in selecting and evaluating effective road safety and loss management programs, lists the strengths and weaknesses of ICBC's processes in this regard, and provides suggestions for improvements that would help ICBC to better meet those challenges.

Conclusions

Our key conclusions are as follows:

Selection and Investment Decisions

Overall, ICBC employs more comprehensive and rigorous processes for selecting and investing in effective road safety and loss management programs than most other jurisdictions.

1. Compared to other jurisdictions, ICBC has a more comprehensive database of collisions because it is based on claims, which are almost fully reported for all crash-involved drivers living in B.C., whereas other jurisdictions rely on reports only for collisions attended by the police.
2. Police attend fatal and serious injury collisions in B.C., but do not attend most minor injury and property damage collisions. Innovative work has allowed ICBC to use claims in program selection and evaluation and evaluation processes. However, this ability is restricted by limited data on crash causation and crash type.

3. Overall, ICBC uses excellent problem identification practices. In comparison to many provincial and state jurisdictions, ICBC is hampered by the lack of crash causation data, but offsets this problem to some degree through the use of its comprehensive claims database.
4. ICBC employs best practices by bringing together key agencies in committees to identify and implement road safety strategies.
5. ICBC uses more rigorous and conservative investment decision methodologies than all other jurisdictions investigated for its safety engineering programs. Only about one half of the other jurisdictions investigated routinely estimate the benefit and costs before the decision is made to proceed with an engineering project. For those jurisdictions that do determine the benefit cost ratio of specific projects, the minimum benefit cost ratio to justify investment ranges from 1 to 2 which is considerably less than the minimum benefit cost ratio of 3 used by ICBC for road improvement projects.
6. ICBC also uses more rigorous decision processes for its enforcement programs than the other jurisdictions contacted. All large projects/programs require a minimum estimated benefit cost ratio of 2. Most other jurisdictions do not estimate both the benefits and costs (i.e. rely primarily on estimated reduction in crashes) and have not established a minimum benefit/cost ratio for their enforcement road safety programs and projects.
7. Compared to the jurisdictions contacted, ICBC uses similar decision processes for its education programs.

Evaluation of Road Safety and Loss Management Programs

ICBC is a trendsetter in evaluating road safety and loss management programmes. Some specific examples where ICBC's evaluation practices comply with best practices and are superior to typical evaluation practices of most other jurisdictions are the use of the state of the art empirical Bayes methodology for doing before–after evaluations of road safety programs and the innovative use of claims data for the evaluation. ICBC also conducts more evaluations and devotes significantly more resources to conducting evaluations of its programs than most other jurisdictions.

Investment in Road Safety and Loss Management Programs

The amount invested per capita (i.e. Canadian dollars per person) in road safety and loss management programs in BC is about the same as the average amount invested per capita at the provincial/state level in the other eight jurisdictions investigated for which comparable data was available.

1. The amount invested in road safety programs per capita in BC in 2003 was \$8.59, which is slightly less than the average of \$9.46 per capita invested by the other jurisdictions that were able to provide comparable data.
2. With respect to different types of road safety programs, BC has invested more in enhanced enforcement programs, and less in education and awareness programs as

well as engineering safety programs than the average per capita investment by the other jurisdictions investigated.

3. The per capita annual expenditures of \$1.82 by ICBC on fraud prevention programs (excluding auto crime) is slightly higher than the average of \$1.54 spent per capita by the three public automobile insurance corporations investigated in Saskatchewan, Manitoba and Quebec.

TABLE OF CONTENTS

1	BACKGROUND	1
2	OVERVIEW OF ROAD SAFETY AND LOSS MANAGEMENT PROGRAMS	2
3	COMPARISON OF INVESTMENT LEVELS.....	3
4.	PROGRAM SELECTION AND APPROVAL PROCESS	8
5	PROGRAM EVALUATION	25
6	SUMMARY	32

1 BACKGROUND

ICBC commissioned this report in response to item 2.4.4 in the BC Utilities Commission's 2004 decision on ICBC's revenue requirements, which reads as follows: "ICBC has provided some evidence concerning its Road Safety and Loss Management Programs. The Commission would like to see additional evidence on ICBC's process to determine the effectiveness of these programs. For example, criteria for investment, monitoring programs for effectiveness, etc.". This report reviews ICBC's investment decision and evaluation processes regarding its Road Safety and Loss Management Programs. The key steps employed to undertake the assignment included the following:

1. Review ICBC's existing process for selecting and investing in effective road safety and loss management programs.
2. Review previous assessments and evaluations of ICBC's road safety and loss management programs and processes.
3. Examine ICBC's governance process as it relates to road safety and loss management programs.
4. Compare ICBC's process for selecting and evaluating road safety and loss management programs with the following eight other leading jurisdictions in North America: Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Florida, Maryland and California.
5. Compare ICBC's process for selecting and evaluating road safety and loss management programs with known practices of other jurisdictions based on the experience and previous studies of the project team.
6. Assess the challenges of measuring road safety and loss management programs in general and in British Columbia specifically.
7. Develop conclusions regarding ICBC's process for selecting and investing in road safety and loss management programs.

The assignment was conducted by Ference Weicker & Company in consortium with Human Factors North. A related assignment was previously undertaken by Ference Weicker & Company in consortium with Human Factors North to assess the evaluations of all major ICBC road safety programs in BC on behalf of ICBC.

The next chapter of the report provides a brief overview of ICBC's road safety and loss management programs. Chapter 3 compares ICBC's investment levels in road safety and loss management programs with other jurisdictions. Chapter 4 contains an assessment of ICBC's selection and investment decision processes while Chapter 5 assesses ICBC's evaluation procedures. The last chapter summarizes ICBC's strengths and areas for improvement with regard to the selection and evaluation of road safety and loss management programs.

2 OVERVIEW OF ICBC ROAD SAFETY AND LOSS MANAGEMENT PROGRAMS

ICBC's road safety, auto crime prevention and fraud prevention programs share a common objective of reducing claim costs.

2.1 Road Safety Programs

ICBC's road safety programs are categorized as follows:

1. Enforcement – support for enhanced traffic law enforcement (e.g. CounterAttack Roadchecks, Intersection Safety Cameras) and regulatory programs (e.g. Graduated Licensing).
2. Engineering – sharing the costs of safety-related road improvements and providing engineering tools to improve the safety of new road design.
3. Education – providing curricular materials for schools and supporting community involvement programs to raise awareness of road safety issues.

2.2 Auto Crime Prevention Programs

ICBC's auto crime prevention programs provide funding for enhanced auto crime law enforcement and educate motorists on how to protect themselves from becoming victims of auto crime.

2.3 Fraud Prevention Programs

ICBC's fraud prevention programs target bodily injury and material damage claims fraud, insurance premium fraud, and driver licensing fraud.

3 COMPARISON OF INVESTMENT LEVELS

This chapter compares ICBC's investment levels in road safety and loss management programs with other jurisdictions.

3.1 ICBC Program Costs

ICBC's recent investment in road safety and loss management programs has ranged from \$30 million to \$60 million annually. ICBC's 2003 investment was compared with the investments made by other jurisdictions. As indicated in Table 3.1, the 2003 investment in road safety and loss management programs by ICBC was \$38 million.

**Table 3.1
ICBC Road Safety & Loss Management Expenses in 2003**

Programs	Expenses (\$000's)
Enforcement Support	\$8,923
Road Improvement Strategies	9,879
Education and Awareness Strategies	5,101
Auto Crime Prevention Strategies	3,945
Fraud Prevention Strategies	7,570
Research and Administration	2,668
Total	\$38,086

In addition to ICBC, the BC Ministry of Transportation (MoT) invests approximately \$5 million per year in highway improvements specifically focused on improving road safety.

3.2 Comparison of Programs and Investment with Other Jurisdictions

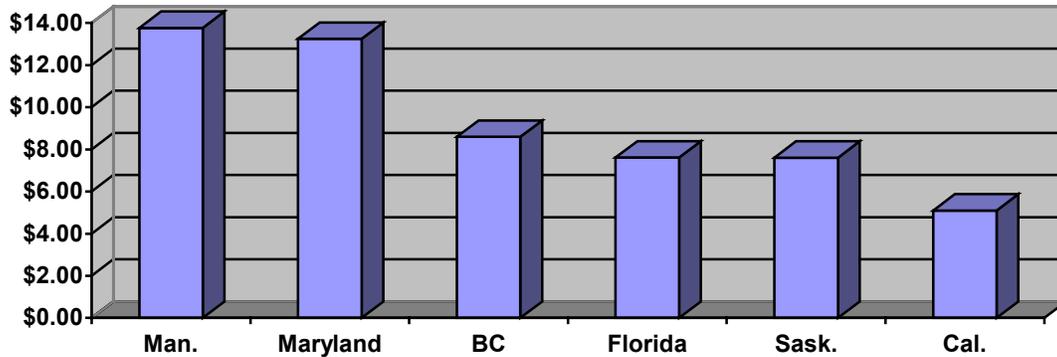
To compare the types of road safety and loss management programs undertaken in BC and investment in these programs, we selected the following eight provinces and US states for a comparative analysis: Alberta, Saskatchewan, Manitoba, Ontario, Quebec, California, Maryland and Florida. The criterion for selecting these jurisdictions is that they consist of some of the leading jurisdictions (i.e. undertake the most comprehensive and extensive activities) in North America with regard to the implementation of road safety and loss management programs. Ference Weicker & Company conducted telephone interviews with representatives in each of the eight jurisdictions to determine the types of road safety and loss management programs undertaken and the level of investment in these programs at the state/provincial level. The following paragraphs summarize the results of the inter-jurisdictional survey with regard to road safety and loss management programs undertaken in each jurisdiction.

3.2.1 Comparison of Road Safety Programs and Investments in Other Jurisdictions

Overall, the amount invested per capita (Canadian dollars per person) in road safety programs in BC is about the same as the average amount invested at the provincial/state level in the other jurisdictions investigated for which comparable data was available. As indicated in Table 3.2, the amount invested in road safety programs per capita in BC in 2003 was \$8.59 compared to

the average of \$9.46 per capita invested by the five other jurisdictions that were able to provide comparable data. The median investment by the other jurisdictions is \$8.10.

**Table 3.2
Inter-jurisdictional Comparison of Investment in Road Safety Programs in 2003**

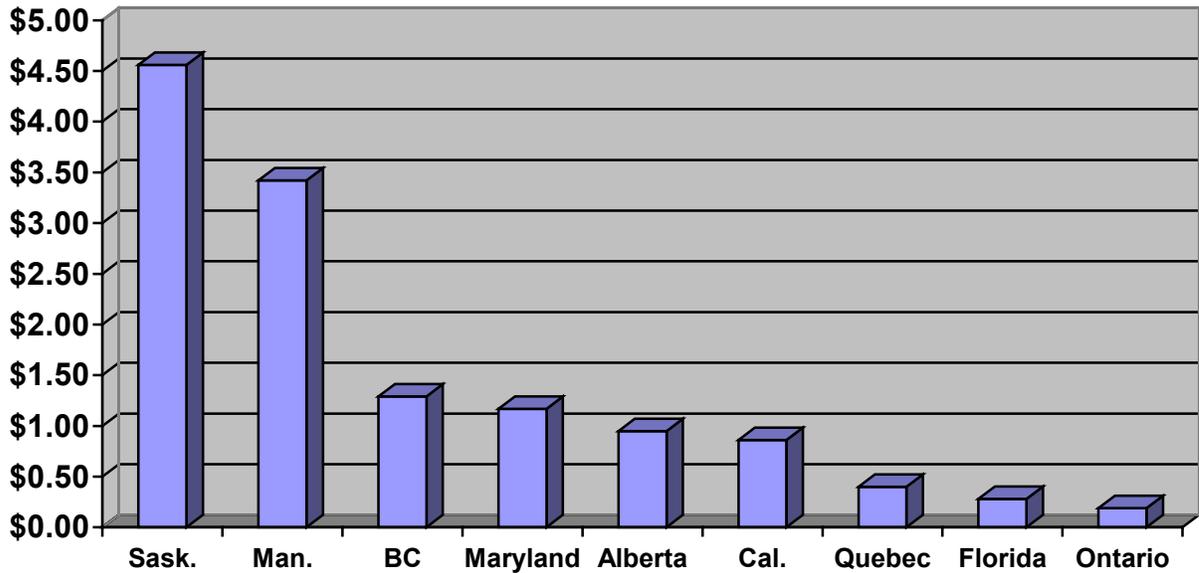


The investments indicated in Table 3.2 consist of enforcement, engineering and education and awareness programs including programs dealing with auto theft. The investments in Table 3.2 include primarily the investments made at the state/province wide by provincial/state government transportation departments and public insurance corporations, if applicable. Table 3.2 does not include investments made by licensing authorities in any jurisdiction, including BC, for activities such as graduated licensing programs or driver sanctions because it is difficult to separate out the costs for these initiatives from the regular licensing activities of these organizations. Table 3.2 also does not include investments by municipal or regional organizations such as funding of police forces for regular traffic safety enforcement or intersection safety cameras. Therefore, the comparisons provided in Table 3.2 should be viewed only as indicative of the approximate level of investment by some key agencies and should not be viewed as an exhaustive analysis of the total investment devoted to road safety programs in each jurisdiction.

3.2.1.1 Road Safety Education and Awareness Programs

As indicated in Table 3.3, the amount invested per capita in education and awareness programs regarding road safety in BC is \$1.29, which is slightly less than the average of \$1.64 per capita invested at the state/provincial level by the other eight jurisdictions investigated. The median investment by the other jurisdictions is \$0.95.

**Table 3.3
Inter-jurisdictional Comparison of Investment in Education and Awareness Programs**



As indicated in Table 3.4, there exists considerable similarity between the target groups and types of education and awareness activities undertaken by ICBC and the other jurisdictions investigated. The most prevalent types of education and awareness activities undertaken by the jurisdictions investigated included programs focussing on child safety, youth, impaired driving, seat belts and driver education.

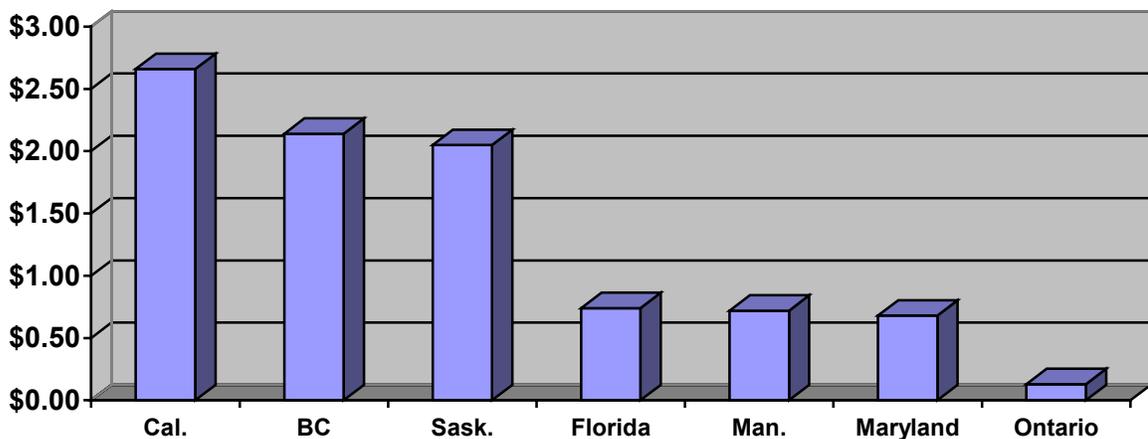
**Table 3.4
Inter-jurisdictional Comparison of Education and Awareness Activities**

Location	Child Safety	Youth	Impaired Driving	Designated Driver	Auto Theft	Mature Driver	Seat Belts	Driver Education
BC	✓	✓	✓	✓	✓	✓	✓	✓
Sask.	✓	✓	✓	✓	✓		✓	
Man.	✓	✓	✓	✓	✓	✓	✓	✓
Quebec	✓	✓	✓	✓				✓
Alberta	✓	✓	✓		✓		✓	✓
Ontario	✓	✓	✓	✓			✓	✓
Florida	✓	✓	✓		✓	✓	✓	✓
Maryland	✓	✓	✓		✓	✓	✓	✓
California	✓	✓	✓	✓		✓	✓	✓

3.2.1.2 Enforcement and Regulatory Programs

As indicated in Table 3.5, the amount invested per capita in enforcement-related and regulatory programs regarding road safety in BC is \$2.14, which is considerably more than the average of \$1.30 per capita invested at the state/provincial level by the other eight jurisdictions investigated. The median investment by the other jurisdictions is \$0.74.

**Table 3.5
Inter-jurisdictional Comparison of Investment in Enforcement Programs in 2003**



As indicated in Table 3.6, the enforcement activities undertaken in BC are similar to that conducted in other jurisdictions. Most jurisdictions have enhanced enforcement programs to supplement the regular police force activities devoted to traffic enforcement. The most prevalent form of enhanced enforcement in these jurisdictions consists of impaired driving enforcement programs. As indicated in Table 3.6, all jurisdictions except BC have an ignition interlock program and a mandatory rehabilitation program for impaired drivers.

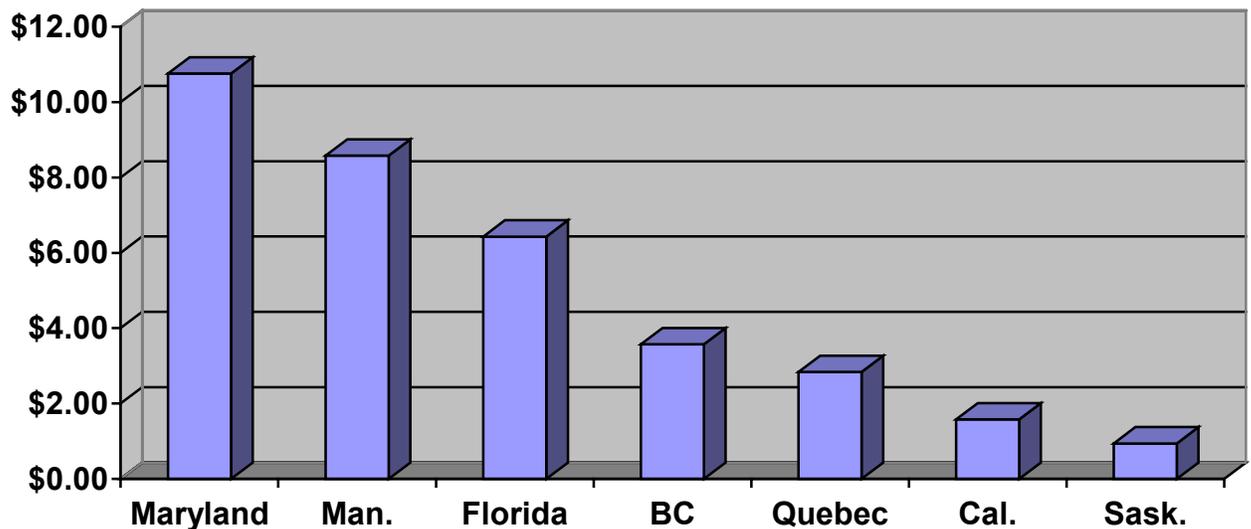
**Table 3.6
Inter-jurisdictional Comparison of Enforcement and Regulatory Programs**

Jurisdiction	Enhanced police enforcement	Photo radar	Red light cameras	Rehab program	Ignition interlock	Graduated licensing
BC	✓		✓			✓
Sask	✓		✓	✓	✓	
Man	✓	✓	✓	✓	✓	✓
Quebec				✓	✓	✓
Alberta		✓	✓	✓	✓	✓
Ontario	✓		✓	✓	✓	✓
Florida	✓		✓	✓	✓	✓
Maryland	✓		✓	✓	✓	✓
California	✓	✓	✓	✓	✓	✓

3.2.1.3 Engineering Programs

As indicated in Table 3.7 the amount invested per capita in engineering programs focused on road safety in BC is \$3.57 including ICBC funding and the BC Ministry of Transportation funding devoted specifically to safety projects. This is considerably less than the average of \$5.19 per capita invested at the state/provincial level by the other jurisdictions investigated for which comparable data was available. The median investment by the other jurisdictions is \$3.57. It is difficult to compare safety engineering investments, as most jurisdictions do not isolate the costs of the safety components of large road rehabilitation projects.

**Table 3.7
Inter-jurisdictional Comparison of Investment in Engineering Programs in 2003**



Most of the jurisdictions investigated devote the majority of their funding to specific road improvements that enhance road safety. Some jurisdictions also provide a limited amount of funding for traffic planning, management and traffic monitoring activities.

3.2.2 Comparison of Fraud Prevention Programs and Investments in Other Jurisdictions

A very limited comparative analysis was undertaken of fraud prevention programs because only three other jurisdictions have public automobile insurance corporations: Saskatchewan, Manitoba and Quebec. The type of fraud prevention programs undertaken by ICBC are similar to or more extensive than the other jurisdictions investigated. In addition, the per capita annual expenditures of \$1.82 by ICBC on fraud prevention programs (excluding auto crime) is only slightly higher than the average of \$1.54 spent per capita by the three public automobile insurance corporations investigated.

4 PROGRAM SELECTION AND APPROVAL PROCESS

4.1 ICBC Selection and Approval Process

ICBC staff analyze claim data to identify specific problem areas. This includes a review of when and where incidents are occurring, demographics of individuals involved in the incidents, and available causal factor data. Potential solutions are then identified.

Ideas for new road safety and loss management programs come from many sources. Programs that have been implemented successfully in other jurisdictions are identified through literature reviews, conference proceedings, and networking with professionals around the world. Ideas are also received from ICBC's staff, community groups, and individuals.

ICBC staff conduct a preliminary review to determine if there appears to be merit in pursuing a potential solution. ICBC staff then prepare business cases. A formal business case is required for new programs with estimated costs of \$500,000 or greater. These business cases are reviewed by ICBC's Measuring and Monitoring Committee, then forwarded to ICBC's Executive for review and approval.

4.2 Comparison of Road Safety Selection and Investment Process with Best Practice and Other Jurisdictions

An effective road safety management selection and investment process requires a number of steps:

- Assembly and linking of comprehensive driver record, vehicle, crash, traffic volume and highway geometric databases for a number of years
- Problem identification using these databases
- Strategy identification based on the problems identified, consultation with key partners and review of successful programs implemented in other jurisdictions
- Scientifically-based program development
- Estimation of anticipated cost-benefits and target claims/crash reductions
- Scientifically-based selection of target groups and locations

Best practice, typical practice in other Canadian and U.S. jurisdictions, and how ICBC practice compares in each of these areas is further discussed below.

4.2.1 Databases

Best Practice

Ideally, an agency with the responsibility of managing road safety would have access to key data bases which could be linked in order to allow identification of problem areas and selection of project sites. The databases needed for road safety programs are:

- Accurate, consistent, crash reports on all property damage, injury and fatal crashes
- Vehicle registration data, including registered owner crash history

- Licensed driver data, including crash and conviction history that is linkable to the vehicles involved.

The additional databases needed for engineering programs are:

- Traffic volume counts at intersections and along road sections
- Regularly updated and comprehensive road geometric descriptions of all the locations in the network

The crash record database provides information on the attributes (e.g. driver demographics, driver action, driver condition, vehicle, road, manoeuvre etc) of a crash. The other four databases provide the information that allows agencies to determine the degree of risk relative to the exposed population, and to determine whether a high number of crashes is associated with particular attributes simply because these are frequently present (e.g. sober drivers, dry roads, high volume intersections, passenger cars,) or because there is a higher than average degree of risk associated with that attribute (e.g. no seatbelt, wet roads, sharp curves, motorcycles, teen-age drivers). Once exposure is considered, it is found for example that drunk drivers and inexperienced drivers have a higher likelihood than sober or experienced drivers of being in a crash. Similarly, per vehicle-km driven, crashes are more likely to occur on wet roads and at sharp curves than on dry straight roads. Countermeasures are more likely to be effective for high-risk drivers, environments and crash locations.

Typical Practice

Typically, U.S. states and Canadian provinces have all five types of database. However, their comprehensiveness varies widely, as does the ability to link them in order to carry out problem identification. Many jurisdictions are experiencing a decline in police reporting, and a reduction in resources allocated to traffic volume counts. A number of municipal jurisdictions (e.g. in Ontario) have moved to self-reporting of property damage crashes, with a consequent decline in information on crash causes and location.

Like B.C., other jurisdictions have better information on location in urban as opposed to rural areas. Often accidents will be indicated as occurring at an intersection or interchange because that is the nearest convenient identifiable feature. Location information is being improved through the use of a geographic information system in police cars. Several U.S. states are currently using this and Ontario is considering it. The City of Toronto, Region of Durham, and City of Winnipeg, like ICBC with its claims data, are using geo-coding based on addresses for their crash records.

Traffic volume counts needed for problem identification and selection of engineering project sites are often outdated, incomplete and very often not systematically stored in a centralized database but found in various project files within the agencies. Road geometric descriptions are often lacking in key elements such as attributes of intersections (e.g. signalization) and interchanges (type, ramp configuration, etc.), cross-section (e.g. median presence) and alignment (horizontal curves,).

A major problem with linking databases, for the purpose of determining locations with higher numbers of crash than expected, is that a uniform reference identifier is almost unheard of. Due

to recent changes this is now available in some jurisdictions (e.g., Ontario, in the City of Toronto, Iowa State DOT, Regional municipalities of York, Durham and Halton).

How ICBC Practice Compares

A particular strength is that ICBC knows about almost every crash that happens in BC, unlike other jurisdictions. However, because of the low level of police reporting of crashes (overall about 15%), ICBC can make only limited use of the police reported collision database (TAS). To supplement TAS, ICBC has completed a process of modifying its claims reporting, in particular with regard to obtaining a count of crashes and identifying their location, using geo-coding of addresses, to provide a better basis for cost-benefit analysis of road safety countermeasures. The current goal for the RCMP is to report all injury and fatal crashes. This is not the case for local police forces however, who vary greatly in the percent of crashes reported.

ICBC maintains the driver licensing and the vehicle identification databases, while the BC Ministry of Transportation (MoT) maintains the road geometric database. Traffic volume counts are not available in a single database. Different jurisdictions have their own traffic volume counts and some have hard copies rather than an electronic database.

Compared to other jurisdictions, ICBC has a more comprehensive database of collisions, because it is based on claims, which are fully reported for all drivers living in B.C., involved in crashes. Police reporting is low; nonetheless innovative work has allowed ICBC to use claims to locate crash black spots. Data on crash causation are more limited.

4.2.2 Problem Identification

Best Practice

Comprehensive information about crashes is needed to identify the priority problems. This includes information on the people involved in crashes, their driving behaviours, and where and when crashes are occurring. Best practice is to link all the required databases. A number of US states have centralized, linked databases which they use for problem identification.

Typical Practice

Problem identification using the crash record database alone is typically done. For example, Transport Canada uses TRAIID (Traffic Accident Information Database) to produce reports such as Road Safety in Canada – 2000. The database is an amalgamation of police reports from across Canada. The report makes problem identification statements such as “40 percent of Canadians killed had not buckled up” and “two-thirds of fatal collisions occurred on rural roads”. The limitation, of course, with statements such as the last one is that it does not account for exposure. Thus, for example, it is not possible to know if many crashes occur on rural roads simply because so much driving is done there, or because rural roads are riskier to drive on.

At the provincial level, Ontario, for example, produces the Ontario Road Safety Annual Report, which uses the provincial database of police crash reports to make statements similar to the ones made on the basis of TRAIID. In the U.S., a problem identification program called IMPACT is now used in a number of U.S. states.

Traffic volume databases and highway geometry databases are less likely to be used at this stage. Even Transport Canada in its development of Vision 2010, with targets for crash

reductions, has not used exposure to determine the degree to which risk is related to exposure. Exposure is important for determining which drivers, vehicles and road sections are at highest risk. For example, studies of driver age show higher risks per kilometre travelled for younger and older drivers. This has led to programs, such as graduated licensing, targeted to these drivers. Similarly, good problem identification practice requires a comparison of crash frequencies for a given traffic volume for roads with specific design features and traffic control devices. Without exposure information one would conclude that the most important crashes to treat would be those that happen to middle-aged drivers in clear weather on roads with high design standards, since these are the most frequent.

How ICBC Practice Compares

ICBC uses both police attended crash records (TAS) and ICBC crash records to identify problem areas for the province, within each region and within communities. ICBC has excellent data on the drivers and vehicles involved in crashes. Causes of crashes and crash types (e.g. run-off-road, rear-end) are not available in claims data, restricting the ability to identify these problem areas.

The police only attend the most serious crashes and these crashes are not representative of all crashes; therefore, the crash causes assigned by the police cannot be extrapolated to all crashes. ICBC is currently conducting a research project to predict major collision causes on the basis of claims data, but this will only model two major causes (speeding and impaired driving) and will only provide a portion of the collision information required for effective diagnosis. It will not, for example, provide guidance on crucial pieces of information for diagnosis such as impact type and apparent driver action.

ICBC crash records can identify the specific location of approximately 49% of crashes on highways and 74% of crashes on all other roads. As many motorists are unaware of their exact location on highways, particularly in rural areas, specific location data are often not available. The lack of specific location data makes it difficult to screen the high crash locations.

ICBC staff use both police crash data and ICBC data to analyze problems that can be addressed with public education programs. Overall, ICBC's problem identification processes compare favourably with processes used other jurisdictions. ICBC offsets the police reporting issue to some degree through the use of its comprehensive claims database. In addition, ICBC supplements the available data with survey information (e.g. Nighttime Drinking Driving Survey; local seat belt use surveys) to assist with problem identification.

4.2.3 Identification of Strategies in Consultation with Key Agencies

Best Practice

Ideally the agency leading the road safety program in the jurisdiction (province, state, city, region) would bring together key agencies (Solicitor General, Ministry of Transportation, Attorney General, Office of Superintendent of Motor Vehicles and Health) in a road safety committee. Jurisdictional boundaries are usually such that the Ministry of Transportation has control over the design and operations of provincial highways, the Ministry of the Attorney General has control over enforcement, and the Ministry of Health, control over the provision of emergency services, treatment and rehabilitation of injuries. While each of these partners has

somewhat different goals with respect to traffic safety, their efforts are much more fruitful if co-ordinated by a high-level committee.

This committee would determine strategies involving education, enforcement, engineering and emergency services approaches to address the identified problems. For example, impaired driving which results in serious run-off-road crashes in rural areas can be addressed by a combination of drinking-driving enforcement, shoulder-edge rumble strips, public and bar server education and provision of better emergency care in rural areas at times these crashes are most likely to happen. A full time co-ordinator for the committee is needed. Task teams should be created to focus on emphasis areas, develop a quantifiable objective, an action plan, and an evaluation plan. Task team leaders for each strategy need to feed managers with information supporting the programs. Communication and marketing should involve the media, politicians and the public as well as the related lobby groups.

Typical Practice

In Canada, no provinces to our knowledge have high-level co-ordinating committees, which bring together the various agencies involved in road safety. Enforcement, licensing and education programs tend to be adopted based on what other provinces and states are doing, rather than based on an assessment of problem areas within the province. Within road engineering, there is no comprehensive formalized process for safety problem identification or reviewing the locations of all crashes to identify the best opportunities for road improvements. Ontario funded development of such a process but it was not implemented. Instead parts of the process are in use and there is site-by-site identification of problems, mostly in a reactive manner(i.e. when there is a widening or resurfacing project).

Many road improvements are implemented when a site is targeted for improvement because of capacity or maintenance issues. In other words projects are not typically safety motivated. There is little or no interaction between those responsible for enforcement, licensing and engineering with regard to improvements in road safety.

In the U.S., most states have a Governor's Safety Office, which uses crash databases for problem identification. These agencies have been leading these efforts for over 10 years in most states. There are a number of traffic safety programs, such as seatbelt enforcement and graduated licensing, that are funded by federal agencies, in particular National Highway Traffic and Safety Administration, Federal Highway Administration and the Bureau of Motor Carrier Safety. To access federal funds and to put appropriate legislation in place, a comprehensive plan must be presented, with a target crash reduction goal, effectiveness measures, and a detailed implementation plan. Some of the Governor's Safety Offices work closely with the state highway department and with the state motor vehicle registration and licensing department to put these programs in place. There are other state DOT federally funded programs that are also safety motivated; these are called "Highway Safety Improvement Programs (HSIP)" and their focus is to identify sites based on their crash history and the strategies for their improvement are mostly based on engineering measures. Most HSIP do not seek other strategies than engineering.

There is a movement in the U.S. towards the development of integrated safety management plans. There are some 15 states developing these comprehensive highway safety program plans, which involve agencies integrating programs and working together.

How ICBC Practice Compares

ICBC is clearly the leading player in road safety in B.C. and has established or participated in both provincial and municipal committees to address road safety concerns. These committees are actively involved in program design. ICBC is a member of the Inter-Agency Impaired Driving Review Project, which consists of all key agencies including Office of Superintendent of Motor Vehicles, Health, Solicitor General and Attorney General. The goal of the project is to develop and implement a comprehensive strategy to reduce impaired driving in BC. ICBC has also supported the Traffic Safety Committee of the BC Association of Chiefs of Police, which has 100 members and meets two times a year to discuss existing and new road safety initiatives. ICBC representatives sit on municipal traffic safety committees to identify local problems and develop solutions. BC does not have a single inter-ministerial committee responsible for road safety. However, ICBC is currently working with the Ministry of Public Safety and Solicitor General to bring together a high-level committee of interested agencies charged with developing co-ordinated strategies based on a comprehensive assessment of road safety in B.C.

ICBC recently introduced the Safer Cities program, modelled on a successful initiative in Gloucester, England. Representatives from municipal police, engineering, City Council and community agencies develop an integrated road safety plan for the municipality. ICBC provides data, tools and expertise to facilitate the planning process. An example of a multiple strategy approach in the Fraser Valley Region involved a sequence of signalized intersections where both enforcement and engineering solutions were used to try to reduce crashes.

In summary, ICBC's practices in bringing together key agencies in committees to identify and implement road safety strategies are superior to most other jurisdictions.

4.2.4 Development of Programs

Best Practice

Once a strategy is identified, such as increased drinking and driving enforcement or a graduated licensing program, literature reviews should be carried out to determine how programs in other jurisdictions have worked. Lessons learned from other jurisdictions should be applied in the design of the programs. Where there is insufficient information, a pilot study should be undertaken. It is also important that the road safety goals adopted by the jurisdiction are supported by the strategies selected so that the sum of safety effectiveness of all strategies will equal the goal.

Typical Practice

In general typical practice is to do what other jurisdictions are doing. Jurisdictions also tend to make use of systematic reviews, such as those sponsored recently in the US by the Federal Highway Administration, for road improvement programs, and generally for interventions to reduce deaths and injuries to motor vehicle occupants by the Centres for Disease Control and Prevention. Pilot studies are occasionally undertaken but are quite rare in the road safety area because of legal issues, however, in the U.S.A. there is at the moment a greater acceptance and support by the Federal Highway Administration with respect to performing pilot studies to determine the effect of new or untested strategies. Ontario is currently piloting an intersection safety camera program. Policy initiatives often begin as a result of a high level of media attention to serious crashes. The expenditure of effort can be quite disproportionate to the size

of the problem relative to other problems that might be addressed (e.g. several crashes in Ontario involving flying truck wheels generated a series of legislative initiatives, yet this type of crash represents less than 1% of truck crashes).

How ICBC Practice Compares

With respect to identification of road safety programs, particularly those related to engineering, licensing and enforcement, literature reviews and networking with other road safety professionals are typically carried out for major programs to determine how programs in other jurisdictions have worked. In most cases lessons learned from other jurisdictions are applied in the design of the programs. (One exception was allowing a reduction in the time required to complete the learner stage for drivers in the graduated licensing program who took formal driver education. This time discount was known to be associated with higher crash risks in other jurisdictions (e.g. Ontario), and was subsequently demonstrated to result in higher crash rates in B.C. as well.)

Education programs developed centrally (e.g., the curriculum for the approved driver education program, advertising campaigns) have been based on theory or the experience in other jurisdictions. ICBC's Regional Loss Prevention staff work collaboratively with community partners to develop programs that address specific local problems.

Where the benefits are uncertain after reviewing experience elsewhere, ICBC is willing to undertake pilot studies. The Intersection Safety Camera program is an example of this. Some examples of pilot studies in the Road Improvements program are highly reflective paint markings and in-ground crosswalk lighting systems.

In summary, ICBC uses similar processes (such as literature reviews and pilot studies) as other jurisdictions to develop road safety programs.

4.2.5 Estimation of Benefits and Costs

Best Practice

Before a program is selected for implementation, best practice would involve estimating cost and benefits. Since budgets are limited, it would be ideal if an optimization process were used to select that best combination of programs and projects to return safety benefits, and reduce fraud and theft claims.

Typical Practice

In Canada many provinces do not have an engineering budget earmarked for safety projects and no cost-benefits with respect to safety are calculated. With respect to major education and licensing programs in Ontario, a business case is developed, but there is no cost-benefit calculated nor is there a threshold value guiding investment decisions. In the U.S., there is an allocation of federal funds for safety-motivated programs under the HSIP process. Each state prepares the justification reports and requests the funds in accordance with the allocation, which is proportional to the state population and miles travelled.

In the US, the Federal Highway Administration has developed a software package for prioritizing road improvements, which is used by a number of jurisdictions. Wisconsin recently prioritized safety programs using ratings based on their importance in improving safety and stakeholder

ability to influence the problem. The factors were rated by representatives from various stakeholders.

How ICBC Practice Compares

ICBC's investment in enhanced enforcement projects requires a 2:1 in two years benefit-cost ratio. Education programs are not subjected to benefit cost analysis; instead a number of quantitative and qualitative criteria are used to assess the potential benefits of the program.

With respect to road engineering safety projects, all projects are evaluated using consistent funding criteria, namely a 3:1 benefit to cost ratio to be achieved in two years. A full business case must be presented in which costs and benefits are estimated for the proposed safety treatments. An exception in the requirement for a full business case is made in the case of "proven countermeasures", which have already been established as being cost-beneficial and are being promoted by ICBC.

This funding criterion allows for a very high rate of return for ICBC's road improvement investments, but in doing so, curtails or restricts the level of contribution made by ICBC. Due to the high rate of return requirement (high rate over a short return period) and the corresponding low level of ICBC contribution, some road authorities may elect to not proceed with the safety project or exclude ICBC since the contribution level is marginal in the overall project value.

As a result of the aggressive funding criteria, it is sometimes a challenge to achieve the annual budget that is allocated for road improvement projects. This also means there are not a wide variety of alternative projects from which a selection can be made and thus no opportunity to use an optimization process which considers a variety of projects. A related issue is that the investment must be paid off within 2 years, which means that more expensive but longer lasting improvements, which may be more cost-effective, cannot be implemented.

As indicated in Table 4.1, ICBC uses more rigorous and conservative investment decision methodologies than the other jurisdictions investigated for safety engineering programs. Only about one half of the other jurisdictions investigated routinely estimate the benefit and costs before the decision is made to proceed with an engineering project. For those jurisdictions that do determine the benefit cost ratio of specific projects, the minimum benefit cost ratio to justify investment ranges from 1 to 2 which is considerably less than the minimum benefit cost ratio used by ICBC for road improvement projects. ICBC uses similar decision processes to other jurisdictions for its education programs.

ICBC also employs more rigorous investment decision techniques for its support for enforcement programs where all large programs require a minimum estimated 2:1 benefit cost ratio. As indicated in Table 4.1, most other jurisdictions do not estimate both the benefits and costs and have not established a minimum benefit/cost ratio for their non-engineering road safety programs/projects. ICBC is similar to other jurisdictions in not estimating specific crash reduction benefits of education programs.

**Table 4.1
Decision Criteria for Road Safety Programs and Projects**

Jurisdiction	Engineering Programs		Enforcement and Education Programs	
	Key Decision Criteria	Minimum Benefit Cost Ratio	Decision Criteria	Minimum Benefit Cost Ratio
ICBC	Benefit cost ratio	3	Benefit cost ratio for large enforcement programs, reduction in crashes/claims, other criteria	2
Other Jurisdictions				
Saskatchewan	Benefit cost ratio, Internal rate of return	1	Benefit cost ratio, reduction in crashes/claims	1 – 2
Manitoba	Benefit cost ratio for large projects only	4, due to budget limitations	No formal criteria	None
Quebec	No formal criteria	None	No formal criteria	None
Alberta	Benefit cost ratio, Internal rate of return and Payback	None	Reduction in crashes	None
Ontario	Reduction in crashes and Benefit cost ratio sometimes	None	Reduction in crashes	None
California	Benefit cost ratio	2	Reduction in crashes, Benefit cost ratio sometimes	None
Maryland	Benefit cost ratio	1	Reduction in collisions, increase in awareness	None
Florida	Benefit cost ratio	1.5 – 2	Reduction in crashes	None

ICBC uses only its contribution to projects as the cost, and the cost of claims reduced as the benefit. Other agencies that assess cost-benefits for traffic safety countermeasures use societal benefits (i.e. includes all benefits including reduced compensation for factors such as grief and suffering and is sometimes based on willingness to pay rather than actual cost avoidance) of injuries and fatalities, even when those agencies do not realize the benefits themselves. Table 4.2 indicates the different values assigned to different types of accidents to determine the benefits of road safety programs, particularly engineering programs, in the different jurisdictions investigated. On the other side of the equation, for road improvements, other jurisdictions are using the total cost of the improvement, rather than a partial contribution, as is the case for ICBC.

Table 4.2

**Cost Savings for Different Types of Accidents
Used to Calculate Benefits of Road Safety Programs**

	Type of Unit Cost	Cost Savings Resulting from Reduction in:		
		Fatality	Injury	Property Damage Only (PDO)
ICBC	Per incident	\$281,000	\$24,000	\$1,400
Other Jurisdictions				
Saskatchewan	Per crash	\$1,400,000	\$180,000	\$3,600
Manitoba	Per crash	\$4,000,000	\$100,000	\$2,714
Alberta	Per crash	\$1,345,068	\$100,000	\$12,000
Ontario	Per crash	\$6,300,000	\$27,000	\$6,000
California*	Unit costs are on a per-person basis for all injury levels. Costs are on a per damaged vehicle basis.	\$5,071,960	\$80,465	\$5,483
Maryland*	Per person for injury and per vehicle for PDO	\$4,614,644	\$20,585 - \$3,294,028	\$3,470
Florida*	Per crash	\$4,112,400	\$30,029 - \$284,756	\$4,113

* Shown in Canadian dollars

4.2.6 Selection Issues: Target Locations and Groups

Once a program is selected, the process of selecting target locations and groups is central to optimizing the safety impact. The following sections discuss best practice, typical practice and how ICBC compares with respect to the selection of target locations and groups with respect to road improvement, enforcement and licensing and education programs.

4.2.6.1 Road Improvement Program

Best Practice

Apart from State Farm, insurance companies in the other jurisdictions that were studied do not provide funding for road improvements. Therefore, this section compares ICBC's practices with those of government transportation departments in other jurisdictions. Best practice requires a systematic approach to project selection that includes four fundamental steps:

1. Reviewing crash data for the entire road network to identify potentially hazardous locations and rank them for further investigation
2. Diagnosis of high priority sites to identify potentially correctible safety deficiencies
3. Development of countermeasures aimed at treating the deficiencies identified
4. Selection of projects that provide the most benefits for the available investment dollar

Typical Practice

In Canada, many jurisdictions at the provincial and municipal level have some type of four-step safety management process in place. For example, the Ministry of Transportation of Ontario (MTO) has invested in the “Science of Highway Safety” initiative that developed state of the art tools, procedures and methodologies for use in the various aspects of the safety management process. Although the tools are not as yet fully applied, many parts of the MTO are using various aspects of the tools. And several Ontario urban and regional municipalities have followed the MTO’s lead and have developed tools for application in their specific jurisdictions.

In the US, the Federal Highway Administration is developing SafetyAnalyst, a set of software tools for identifying problem locations, diagnosing safety issues, and for selecting and evaluating site-specific engineering treatments. In the meantime, most U.S. jurisdictions have a formal system in place, although the specific tools applied may be somewhat behind the state of the art.

How ICBC Practice Compares

Network Screening and Project Selection

ICBC implements road safety engineering improvements, either through a targeted safety program or on an individual safety project basis. Safety programs are developed by targeting a specific safety issue and/or treatment, including the preparation of a business case to estimate the cost-benefits of the program, which is then used to promote the program to road authority partners. In addition local road authorities request ICBC contributions to individual safety projects.

Best practice requires road authorities to develop a road improvement program based on screening the entire road network to identify locations that are prime targets for safety improvement based on the history of collisions. ICBC produces information on the high-crash locations in cities and shares this information (including traffic volume and crash configuration data) with local road authorities. Due to the fact that the location can be identified for only 49% of the collisions on highways, ICBC is less able to proactively identify high-risk locations on highways. At the moment, we understand that screening for high-risk locations on highways has been suspended by BC MoT for several years due to funding constraints. Because of the low reporting of collisions it is unclear how efficient the screening would be.

Diagnosis to identify potentially correctible safety deficiencies

Once the data analysis identifies potential projects, a safety study is done in which the opportunity for improving safety is carefully investigated using diagnostic procedures that are in accord with best practice. However, this task is becoming increasingly more difficult because of the low number of police-attended collisions. For example, it is now rarely possible to construct meaningful collision diagrams that are essential in applying best practices. Because the claims database does not include crash configuration data (e.g. rear-end, head-on, right-angle), intended manoeuvre (e.g. straight ahead, left turn, right turn) and lane location (e.g. curb lane, passing lane) necessary to create collision diagrams alternative techniques are used to diagnose problems. The diagnosis is not as sophisticated as what would be possible with a more comprehensive database.

Development of road improvement solutions to treat the deficiencies

Best practice requires the application of the best available knowledge on the most cost-effective treatment for an identified deficiency. ICBC, as part of the safety study, investigates whether a treatment put forward by the road authority for funding is likely to be cost-effective. ICBC also supports proven road safety engineering solutions and have invested in ISECR (an Information System to Estimate Crash Reduction). The system looks at engineering studies that identify the safety benefits of specific road engineering solutions and evaluates the quality and relevance of the study. Such a tool requires substantial maintenance to be effective and it is our understanding that this tool was last updated quite recently, in June 2003. ICBC is now making the tool available to road engineers in BC to assist with identification of the safest engineering solutions.

Consistent with the dictates of best practice, other sources of information on treatment effectiveness have also been used such as the Transportation Association of Canada's Geometric Design Guide and the Interactive Highway Safety Design Model developed by the U.S. Federal Highway Administration. Also consistent with best practice, and therefore commendable, is the "proven countermeasures" programs under which business cases for selected, cost-effective engineering solutions (countermeasures) are developed based on a literature review of experience elsewhere and encouragement is provided to road authorities to implement them. Roundabouts and centre line rumble strips are example of treatments for which business cases have been developed as a promotional tool with good effect.

Selection of projects to provide the most benefits for the available investment dollar

The proven countermeasures program, the requirement of a benefit-cost ratio of at least 3:1 to materialize over a two-year period, and the use of a high discount rate all serve to ensure that ICBC will obtain a high rate of return on their investment. This can be taken as a positive along with the fact that a rational method is systematically applied to assess whether the project would yield the desired return and to establish the required level of investment to produce that return. Nevertheless, best practice would require the use of optimization techniques that would select a combination of projects that would provide the most benefits for the investment dollar. In addition, we anticipate that ICBC will experience difficulties in attracting projects with the required 3:1 return in the near future. This situation could be addressed with more systematic screening of all crashes occurring on the road network by road authorities.

4.2.6.2 Enforcement and Regulatory Programs

INTERSECTION SAFETY CAMERA (ISC) PROGRAM

Best Practice

Best practice requires that intersections with a history of related light running or red light running related collisions (usually angle collisions) be identified as candidates for intersection safety cameras. Best practice requires that other proven remedies for red light running such as optimizing the signal change interval or the provision of exclusive left turn lights be considered as alternatives to intersection safety cameras. Best practice also seeks to optimize the investment by rotating cameras among several intersections.

Typical Practice

There are quite a variety of criteria used to select locations for cameras in actual practice. In the Ontario program that has been piloted in several cities, intersections with a high incidence of red light running collisions have been selected but stepped up enforcement has been used to complement the ISC program. US jurisdictions typically select intersections with a high incidence of red light running related collisions and several have adjusted the signal change interval to complement their ISC program.

How ICBC Practice Compares

Camera equipment has been installed at 120 intersections. Individual police departments selected the sites taking into account data from police-attended collisions, anecdotal police knowledge of high-risk locations, and a list of high crash locations provided to them by ICBC. For that list a formal selection process was developed based on numbers of crashes, by impact type and severity, that are likely to be affected by intersection safety cameras. The list of sites at which ISC was actually deployed by the police was somewhat different from the original list. It is commendable, and certainly consistent with best practices, that ICBC sought to develop and use a formal and rational selection process. That this process was not followed in selecting all of the actual deployment sites may have resulted in smaller safety benefits than may have been achievable.

PHOTO RADAR

Best Practice

Best practice requires that photo radar be deployed at sites with a high incidence of speed related collisions and that the units be mobile to optimize cost-effectiveness.

Typical Practice

Typical practice appears to be fairly consistent with best practice although several jurisdictions have fixed installations.

How ICBC Practice Compares

The photo radar program in BC was terminated in mid 2001. Therefore, this report does not comment on this program.

ENHANCED ENFORCEMENT PROGRAM

Best Practice

Best practice requires a level of traffic enforcement that is sufficient to provide a general perception that if you break the traffic law, you will be apprehended. The success of the Selective Traffic Enforcement Programs (STEP) in Ottawa and elsewhere to increase seat belt wearing rates is a good example. Although this does not address crash rates, it does affect the risk of death and injury when crashes occur, and these are among the most expensive consequences of crashes. Best practice also requires identification of priority enforcement locations, based on causal factor data identified by the police.

The effect of police presence on the speed of vehicles in a recently increased speed-limit zone in Michigan was evaluated including possible "halo" effects (Sisiopiku and Patel, 1999). It was found that the average speed just upstream of the police car's location was reduced, but as soon as vehicles passed the patrol car, drivers accelerated to their normal speeds or more. No "halo" effects were observed.

On the other hand, a study by Hauer and Cooper (1977) found that locations that received increased enforcement showed consistently fewer than the expected number of accidents, a finding that the authors used to conclude that enforcement of traffic laws in general has the potential to reduce accidents and to recommend that it is important to deploy available enforcement resources to maximize their effect.

Typical Practice

Most jurisdictions have experienced a decline in police traffic law enforcement resources in recent years. Many police agencies develop targeted deployment plans based on crash data.

How ICBC Practice Compares

ICBC has supported the police in recent years by providing funding for enhanced enforcement levels. The funds have been used to support enforcement of specific behaviours (impaired driving, unsafe speed, aggressive driving) at specific road corridors identified by the police. ICBC's support for enhanced enforcement levels has been more comprehensive than other public insurance companies.

GRADUATED LICENSING PROGRAM

Best Practice

Graduated Licensing Programs are regulatory programs with enforcement and education elements. Based on recent evaluations and surveys of graduated driver licensing programs in Canada and the United States, the ideal system consists of three stages of licensing for new drivers with decreasing restrictions at each stage. The minimum entry age for the first stage should be 16 years, with a minimum of 6 months in the beginner stage, with driving supervised by a licensed driver, and a minimum of 18 years of age for a full license. There should be restrictions on alcohol use, night driving and young passenger presence.

Typical Practice

The first graduated licensing program was put in place in New Zealand in 1987, and in Canada, in Ontario in 1994. Many Canadian and U.S. jurisdictions now have various forms of these programs.

How ICBC Practice Compares

ICBC developed a Graduated Licensing Program (GLP) after many other jurisdictions had pioneered. They reviewed the experience in other jurisdictions and based many aspects of their program on their experience. For example, the GLP applies to all new drivers, not just young new drivers, because it seems to be experience more than age that contributes to risk. They have conducted extensive evaluations, the results of which have been used by the BC government to develop an enhanced program (GLPE). Evaluations of this new program are underway and further revisions are anticipated.

Best Practice

Education is aimed at the public but needs to have a specific targeted audience. Some obvious targets are drivers perceived to be at high risk of crashing or drivers on a road segment or in a community with a high incidence of speeding or speed-related crashes. Best practice would require that such driver groups or road segments or communities be identified using crash data. Programs can be targeted at certain road classes or to drivers with certain characteristics to meet their needs and the driving risks they face. The selection of programs should be based, not just on the nature of the target group but also on the role and likelihood of success of education, either alone or in combination with engineering and enforcement strategies. For example, education programs to teach parents how to install child safety seats are more likely to succeed in conveying that knowledge and changing parental behaviour than are education programs to persuade problem drinkers not to drive, or teenage drivers not to speed.

Best practice means using education programs for those areas in which previous research indicates that they are likely to be effective. Education to change attitudes (e.g. towards seat-belt wearing, towards safer driving (as in driver education)), in the absence of enforcement, has not been demonstrated by carefully controlled studies to change behaviour. Consequently education, in absence of enforcement, to reduce aggressive driving behaviour, for example, is unlikely to have any impact on related crashes.

Typical Practice

In general, the reasons for the selection and development of road safety education programs in other jurisdictions is not well documented.

How ICBC Practice Compares

ICBC has a combination of education programs designed both to convey knowledge (e.g. child seat inspection clinics, school curriculum programs) and improve attitudes and behaviour (e.g. impaired driving information campaigns, SpeedWatch)). ICBC's program development staff have significant expertise in the development of educational materials. ICBC's practices for targeting public information campaigns compare favourably with practices in other jurisdictions. The demographics of groups exhibiting unsafe driving behaviours are analysed. Psychologists within ICBC's research department and experts from external advertising agencies assist in designing effective messages for target groups. Most, although not all, ICBC programs either provide education to improve knowledge (e.g. child seat inspection clinics) or to change attitudes about behaviours that are targeted by enforcement (e.g. speeding, drunk driving). Some, like 55 Alive, and novice driver education, based on well-controlled studies in other jurisdictions, are unlikely to succeed in changing crash rates.

4.3 Comparison of Auto Crime Prevention Program Selection and Investment Process in Other Jurisdictions

Best Practice

Auto crime includes vehicle theft, vehicle break-ins and vandalism. A comprehensive auto crime prevention program includes strategies to:

1. Encourage motorists to protect themselves (e.g. by using immobilizers);
2. Increase targeted enforcement;
3. Ensure effective sanctions are provided through the criminal justice system; and

4. Address the underlying causes of criminal behavior.

Best practice is to bring agencies such as the police, Ministry of Attorney General, insurance companies and crime prevention agencies together to develop a comprehensive and integrated plan to combat auto crime. This approach has been implemented in Texas and other U.S. states are forming similar authorities.

Typical Practice

Most jurisdictions do not have an authority that coordinates all auto crime prevention strategies. Insurance companies in Manitoba and Saskatchewan conduct educational activities, and police agencies in most jurisdictions have units to address property crime, including auto crime.

How ICBC Practice Compares

ICBC's auto crime prevention programs are more comprehensive than other Canadian jurisdictions. Auto crime statistics are used by both provincial and regional teams to develop countermeasures. ICBC's financial support for a special auto crime enforcement unit (IMPACT) is unique as is ICBC's support for a Lower Mainland wide Bait Car program. ICBC also conducts many community-based auto crime prevention programs to encourage motorists to protect themselves from becoming victims of auto crime.

4.4 Comparison of Fraud Prevention Program Selection and Investment Process in Other Jurisdictions

Best Practice

There is much concern expressed about the prevalence of fraud and its cost to the insurance industry and, inevitably, to honest clients. For fraud prevention generally there are a number of 'best practices' that have been developed which may apply to many aspects of automobile insurance. A comprehensive fraud prevention and control program involves a range of strategies from prevention and deterrence through identification of specific attempts at fraud to legal actions against those accused. All of these strategies, either directly or indirectly, may have a deterrent effect on people tempted to commit fraud. Ideally, every claim made to an insurance company should be capable of validation, from the police report of a traffic crash or car theft and from the observations of trusted providers of automobile repairs and medical care. When drivers and other potential claimants, including health care professionals and others, become aware that their claims can be validated, the number of false or exaggerated claims should be reduced. This requires accurate reporting and databases of crash and claims information that can be linked to health care databases and related resources, as well as publicizing the fact that fraud prevention programs are in place to detect and investigate fraudulent claims.

Typical Practice

There is little published in the public domain about methods used to discover fraudulent claims or to discourage them. Therefore, this report cannot comment on typical practices used to select fraud prevention programs. There are, however, agencies that cooperate in combating fraud, such as the International Association of Insurance Fraud Agencies which has held meetings in Canada twice, most recently in 1990.

ICBC Practice

ICBC developed methods of identifying and investigating suspicious claims initially based on recommendations from a consulting firm, and has continued to improve and develop new fraud prevention programs. ICBC has an extensive program to train adjusting staff to recognize fraudulent claims and a sophisticated investigation program. ICBC also has a public education program to raise awareness of ICBC's extensive fraud prevention program, and publicizes the results of specific cases of fraud. ICBC has conducted, and continues to conduct, benefit cost analyses of fraud investigations. Given that a person defrauding ICBC may also be making claims against other insurance companies, it may be worthwhile to explore opportunities to work collaboratively.

5 PROGRAM EVALUATION

5.1 Brief Description of ICBC Program Evaluation Process

Individual program evaluations are conducted according to the evaluation plans set out when the programs are initially designed. Where the relevant sub-population of drivers, locations, or vehicles can be uniquely defined, the effects are measured and translated into dollar benefits. Large-scale programs such as Graduated licensing, Road Improvement, and Intersection Safety Cameras have been assessed in this manner and all have been shown to produce good benefit/cost ratios.

ICBC's Measuring and Monitoring Committee reviews individual program evaluations assessing the estimates of actual savings to ICBC. The review includes an assessment of whether key performance indicators have changed, and to what extent the change resulted from the program. Program results, once confirmed by the M&M Committee, can then be quoted publicly and considered in reviewing claims forecasts.

ICBC has also conducted an assessment on the combined impact of all of its road safety programs. This assessment of the effectiveness and benefit of the road safety initiatives brought together all the individual evaluation studies and subsequent monitoring of driver behaviour measures. The assessment also included the construction and analysis of a complex model containing claim counts, safety program resource levels, weather, economic factors and vehicle/driver growth patterns. The total impact calculated from summing the estimated individual program effects was then compared with the difference between expected and actual claim counts obtained from the model for each year from 1997 to 2000.

5.2 Comparison of Evaluation Process with Best Practice and Other Jurisdictions

5.2.1 Summary Assessment of ICBC's Evaluation Process

As indicated in the following paragraphs, ICBC is a leader in evaluating safety programmes and fraud deterrence savings. Some specific examples where ICBC's evaluation practices comply with best practices and are superior to the typical evaluation practices of most other jurisdictions are the use of the state of the art empirical Bayes methodology for doing before-after evaluations of road safety programs and the innovative use of claims data for the evaluation, recognizing the difficulties caused by the low levels of police attendance at collisions. ICBC also conducts more evaluations and devotes significantly more resources to conducting evaluations of its programs than most other jurisdictions.

5.2.2 Road Improvement Program

Best Practice

In best practice, evaluation is not only intended to measure the effects of treatments in place but also to provide feedback to make adjustments to the program to maximize the future application of the program. Key elements of best evaluation practice include the following aspects of analysis:

- The analysis of the differential impacts on different crash types in addition to an overall assessment

- The assessment of effects at specific applications (e.g., specific intersections or projects or road segments) as well as the effect of specific countermeasures
- The analysis of secondary effects at untreated locations (i.e., spillover or general deterrent effects)
- The use of state of the art before-after analysis methodology such as the empirical Bayes procedure
- The assessment of the benefits in relation to the investment costs considering the societal benefits that directly relate to the investment and using the most accurate information on crash costs.

Typical Practice

Typical practice leaves a lot to be desired. Evaluations of road improvement projects are rarely done due to resource constraints and a fear of perhaps finding negative effects that may lead to harsh penalties for those responsible for implementing road improvement projects. When they are done, they tend not to be done properly because of the unavailability of personnel trained in the use of the state of the art methodology and of data quality issues. It is expected that practice will improve with the availability of *SafetyAnalyst*, a set of software tools for use in developing and evaluating site-specific treatments (www.safetyanalyst.org). In the meantime, properly done evaluations are few and far between and no one North American jurisdiction stands out.

How ICBC Practice Compares

ICBC practice compares favourably in the following aspects:

- The use of empirical Bayes methodology for doing before-after evaluations of effects at individual site applications
- The use of claims data for evaluations
- The use of surrogate safety measures to supplement evaluations and provide program feedback in cases where insufficient claims and collision data are available for more formal evaluations.

Elements of practice for which ICBC could look to improve upon are:

- The number of sites evaluated, in particular road segments, is insufficient to determine if specific engineering countermeasures would result in claim reductions. Improvements in the claim location data and in accessing claim data for individual locations would be necessary to facilitate this.
- The analysis of the differential impacts on specific crash types or for different types of projects (e.g., for rural curves, or urban signalized intersections) is not typically done. Additional data would be necessary to facilitate this.
- The assessment of benefit-cost ratios does not consider actual project life and life cycle costs and societal benefits of collision reduction as ICBC's focus is to measure the direct benefit to its policyholders. Assessing the total project costs and benefits, not just ICBC costs and benefits, would provide useful feedback to road authorities and assist them in the selection of the most cost-effective projects, which, in turn, would improve the return to ICBC on their investment.

For the most part, ICBC staff recognizes these needs but appreciates that data and resource constraints can often hamper their ability to strive for the ideal of best practices in their evaluations.

5.2.3 Enforcement Programs

INTERSECTION SAFETY CAMERA PROGRAM

Best Practice

As for the evaluation of the road improvement program best evaluation practice is not only intended to measure the effects of the program in place but also to provide feedback to make adjustments to the existing program and to future applications. Similar to the case for the evaluation of the road improvement program key elements of best evaluation practice for ISCs include the following aspects of analysis:

- The analysis of the differential impacts on different crash types, specifically angle and rear-end crashes, in addition to an overall assessment
- A tradeoff of the positive (e.g. reduced angle crashes) and negative consequences (e.g. increased rear-end crashes) considering collision severity or a surrogate such as collision cost
- The assessment of effects at specific intersections
- The analysis of secondary effects at untreated locations (i.e., spillover or general deterrent effects)
- The use of the empirical Bayes procedure
- The separation of the effects of other treatments or programs simultaneously applied, e.g., enforcement of adjustments to signal change intervals
- The assessment of the benefits in relation to the investment costs

Typical Practice

There have been few sound evaluations of ISCs. This is due largely to data issues, the difficulty of defining proper reference/comparison sites in the light of likely general deterrent effects, and a lack of analysts trained in the state of the art evaluation techniques. Ontario has just completed an evaluation of a pilot program in which the combined effects of stepped up enforcement and ISCs are being evaluated. This evaluation will not cast light on the effect of ISC alone, because the effects of increased enforcement and ISC are combined. A national study of ISC implementations sponsored by the US Federal Highway Administration is using state of the art evaluation techniques, including a consideration of the differential costs of the different collision impact types and severities. Results are expected in the summer of 2004 and adjustments to the program should be considered in the light of those results.

How ICBC Practice Compares

Among the positives in the ICBC evaluation practice are the use of empirical Bayes methodology and the innovative use of claims data for the evaluation. In addition, follow-up studies have been done to determine the characteristics of the more successful sites.

Key elements of best practice which ICBC can look to improve upon are:

- The differential impacts on rear-end and right angle crashes have not been evaluated. Improvements to the claims data are needed to facilitate this.
- Spillover or general deterrent effects at signalized intersections surrounding the ISC sites have not been evaluated.

5.2.4 Education Programs

Education in traffic safety can involve transmission of knowledge (e.g. how to drive, how to use a child seat properly, impacts of alcohol on risk of an accident). Such education programs are generally successful in teaching skills and knowledge. On the other hand, education in traffic safety is often an effort to change attitudes, a notoriously difficult and long-term task. Such education covers a wide range of initiatives, from advertising campaigns to promote safe driving, a Speed Watch program that provides Speed Display Boards in a community to encourage lower speeds, and formal training programs for high-risk drivers to encourage less risk-taking. The methods used to evaluate these initiatives can rely heavily on observations made by volunteers rather than experimentation, although the latter is possible in many circumstances.

Best Practice

The best practice for the evaluation of a road safety intervention like education is usually a randomized controlled trial; i.e., one group of drivers, road sites or communities receives the educational intervention and a comparable group does not. Both groups are monitored to see whether the targeted individuals received the message, and whether the initiative has resulted in a greater change in behaviour – more seat belt users, slower speeds, fewer crashes etc. in the treated group. Ideally, where target crashes can be identified and where sample sizes are sufficient, one would like to measure changes in behaviour and changes in crash frequency. The decision about membership in the treated and control groups is random, so that chance alone determines which of the two groups receives the intervention.

Randomized controlled trials have been used in various studies of education programs. Some years ago, Ontario tested two different interventions of drivers with high demerit points using random assignment to see which was more effective in reducing subsequent traffic violations and traffic crashes. In the past California has also used this technique in comparing treatments for drivers which high numbers of demerit points. A randomized trial of the impact of driver education in schools (the DeKalb study) showed that it encouraged earlier licensing and was not associated with reduced accidents amongst learner drivers. As a result such programs were terminated in most U.S. high schools.

The Insurance Bureau for Highway Safety compared the impact of seatbelt commercials on seatbelt wearing (in absence of changes in enforcement, the commercials had no effect.) NHSTA evaluated the impact of a children's safer crossing campaign by making before-and-after-campaign measurements of changes in crossing behaviour and in child pedestrian accidents. They also surveyed children to determine if they had heard of the campaign. Most children had heard of it, and there was a modest increase in safe crossing behaviour and decrease in mid-block child pedestrian accidents.

Typical Practice

Typical practice is not to evaluate or to conduct “feel-good” evaluations, in which public assessment as to whether or not the “program is working” are used as indicators of effectiveness. If an evaluation is done it is more likely to be of process (e.g. number of children taught, program awareness), not of outcome (i.e. change in road-crossing behaviour or reduction in number of crashes). If outcomes are evaluated, it is done using simple before-and-after studies that look at changes in attitudes or knowledge gained. The assumption is made that these changes relate to crash reductions. Unfortunately, professed attitudes are not good indicators of actual behaviour or crash impacts.

Simple before-and-after studies are not ideal because they may be compromised by other changes over the same time interval that confound the effects of the education program. Such studies often concentrate on high-risk subjects; i.e., with a higher than average crash experience. Such subjects may have a decrease in crash experience just because their previous rate was so extreme. If so, the size of the apparent effects is likely over-estimated. Random allocation of the treatment or control monitoring is a simple way to make the two groups of subjects comparable with respect to past experience and many other factors. Where before-and-after evaluations are conducted, there is often insufficient time after the education has been received to evaluate whether the behavioural change is sustained.

In the U.S., as in Canada, there are many varieties of road safety education programs. Recently there has been a request in the U.S. for the National Cooperative Highway Research Program to fund a study to quantify the effects of road safety education and enforcement, in much the same way as the quantification of engineering improvements has developed over the last 10 years.

How ICBC Practice Compares

ICBC practice is the same as or better than other jurisdictions depending on the program. ICBC, like Ontario, evaluated the driver education component of its graduated licensing program. Many other jurisdictions did not evaluate this component of their programs. ICBC has carried out a pilot evaluation of the Speed Watch program and of the 55 Alive program (see below). ICBC, like most jurisdictions, does not evaluate the specific crash reduction benefits of regional educational programs or school road safety programs. Instead, ICBC staff monitor indicators such as levels of program awareness, volunteer hours, and self-reported behaviour change. These results are reviewed by program developers to make improvements to programs.

1. Example: Speed Watch

With respect to Speed Watch, a pilot evaluation was carried out to determine the impact of SpeedWatch on speeding behaviour and the impact of SpeedWatch when combined with police enforcement. The evaluation methodology was sound.

2. Example: 55 Alive Driver Training

An evaluation was carried out of a driver training course for seniors. The evaluation methodology was sound. Nonetheless, the results were inconclusive. ICBC demonstrates excellent evaluation processes by following up on evaluations with inconclusive results.

5.2.5 Fraud Deterrence

Best Practice

Fraud deterrence requires different methods of evaluation from most safety programs. However, traditional experimental studies are still appropriate. An example is a study of two urban communities in California to assess the effectiveness of publicity about the legal consequences of auto repair fraud on the honesty of randomly selected repair shops. Customers brought working car batteries into the shops to be tested on two occasions. It was noted in each case whether the shop recommended the purchase of a new battery, before and after the publicity campaign in the experimental community relative to the control community. Measuring deterrence should involve not only the rate of claims, but also the cost of claims. Fraud can arise not only from claiming damages that do not exist, but also from exaggerating the damages that result from a genuine crash. Benefit cost analyses have been conducted in Australia of fraud investigations conducted by the police (predominantly tax evasion and social security fraud, but the methods described are adaptable to other forms of fraud).

Typical Practice

Comparison with other jurisdictions is difficult. In this area, unlike others, there was little information on evaluating insurance fraud programs. Saskatchewan's public insurance company does not evaluate their fraud prevention programs. Manitoba's public insurance company calculates benefits by taking the future reserves established for bodily injury claims that were denied, and subtracting the amount actually paid. Material on the value of deterrence, the relative value of regulation vs. criminal sanctions in the control of fraud and other 'white collar' crime was available in the jurisdictions investigated.

How ICBC Practice Compares

ICBC's evaluations of fraud deterrence are quite sophisticated (i.e., using regression models to estimate outcomes, including and comparing a variety of people affected by claims investigations, as well as a group of control claimants who have not been subject to investigation). ICBC has adopted and improved methods, initially developed by a consulting firm in California. The studies ICBC has conducted, both on a case-by-case basis and in studying changes in claims rates and costs in groups of ICBC clients making suspicious claims, are able to document considerable benefit. There are many conditions that are changing over time, and so far the analyses reviewed looked primarily at reductions in claims rates, and have not accounted for changing claims costs and differing proportions of material damage and bodily injury claims. Comparison with claims and claims costs in a control group (which has been included, but not explicitly used in comparison) and analyses which adjust for changes in confounding variables, may be helpful.

The savings estimated on the analyses that have been conducted so far, however, clearly suggest the value of this effort. The outcome examined has been the change in claims rate, used to estimate savings when applied to calculated average claim cost. However, the size of the average claim also changed, related to whether it was material damage or bodily injury, inflation in claim costs over time. Sometimes the changes in average claim costs are substantial, and any difference will affect the estimated savings associated with fraud prevention.

Communication would enable ICBC to share and compare their methodologies with what is done elsewhere, and also develop their methods to meet new challenges. Staff involved in this

area at ICBC appear to have little contact with other insurance companies and agencies in other jurisdictions, either public (e.g., SAAQ, SGI, MPI) non-profit (IBC in Canada or IIHS in the USA) or private. There is considerable interest in the criminology literature in both the causes and prevention of white-collar crime, of which fraud is a common example. ICBC and its customers could benefit from establishing how well different strategies work and contributing to what is known about 'best' practices for fraud prevention and deterrence.

6 SUMMARY

Our findings are summarized below in terms of our assessment of ICBC strengths and areas for improvement in the selection and evaluation of road safety and loss management programs.

6.1 Strengths

In terms of investment and evaluation of road safety initiatives, ICBC is certainly a leader in Canada and the U.S. Major strengths are enumerated below:

- Significant investment in road safety and loss management programs
- Depth of programs
- The use of crash data as a starting point for selecting engineering, enforcement and licensing and education programs, both at the provincial and regional levels
- Creative modification of claims reporting to compensate for the decline in police reporting. The claims data are effective for evaluation of countermeasures. Claim cost is a good surrogate for severity.
- The availability of a comprehensive claims database.
- Participation at the provincial level in stakeholder committees (e.g. auto crime advisory committee, Inter-Agency Impaired Driving Review Project)
- Initiation of and participation in municipal traffic safety committees which includes police, city council representatives, municipal engineering staff and representatives of other stakeholder groups to address problem areas (example Abbotsford corridor with a number of intersections). The Safer City Program emphasizes co-ordinated efforts of education and enforcement.
- The setting of a goal for crash and auto crime rates each year in concert with measurement of progress in relation to the goal
- The use of literature reviews and jurisdictional surveys in the development of new programs
- The requirement to estimate benefits and costs before any significant investment in a program is implemented, and the use of thresholds to determine whether investments in road-improvement and enforcement programs will be made
- Networking with road safety experts around the world
- Regular surveys of speed, impaired driving and seatbelt use to track current safety conditions

- Extensive use of volunteer effort at the regional level to make safety and auto-crime related observations and implement community programs
- Staff with high level data base and statistical skills which allows sophisticated estimation of cost-benefits and program evaluation
- The evaluation of enforcement and engineering programs to ensure that they are producing crash reductions and the modification of programs based on these findings. ICBC is a leader in this area. No jurisdictions do as thorough a job in evaluating the effectiveness of their safety programs.
- The development of a database of accident modification values, based on sound statistical analysis
- The development of CD based planning tools for municipal engineering staff as part of the Safer Cities program
- The development of a proven countermeasures program, so that business cases do not need to be developed for each site for an engineering improvement, and wider implementation can be encouraged.
- The engagement of outside consultants to provide independent assessments or program selection and evaluation

6.2 Areas for Improvement

- At the provincial level there are stakeholder committees around specific programs but not for road safety as a whole. A stakeholder committee might assist with systemic problems, for example, the inconsistent police reporting of crashes from one jurisdiction to another, better cooperation from hospital personnel with regard to obtaining evidence of impaired driving from injured drivers, and development of a comprehensive database of traffic volume data.
- If engineering improvements are only done if costs can be recovered in 2 years, more expensive counter-measures that are effective but take longer to pay off can not be pursued.
- ICBC may experience difficulties in attracting projects with the required 3:1 return in the near future. This situation would change with more systematic network screening programs by road authorities for which ICBC should continue to provide encouragement and assistance, perhaps as a funded part of the road improvement programme.
- The application of available tools to select sites for engineering improvements could be improved. There is currently no systematic process in place for screening the road network to identify sites with potential for engineering improvements.
- Not all public awareness projects are based on an extensive literature review, since they are developed in collaboration with community partners to respond to particular needs (e.g. fatigue education)

- More education projects should be evaluated. Considerable volunteer effort goes into these programs and this effort should be used to the greatest effect possible. It is recognized that the total cost of the program may be small; nonetheless a portion of the cost of the program could be used for evaluation.
- While speed and impaired driving surveys are carried out fairly regularly they are done at very few sites due to the costs involved, and consequently results may not be representative.
- In the evaluation of fraud deterrence activities, staff should look at both frequency and cost of claims, and make more use of the data from the claims of control drivers who are not suspected of fraud.
- Undertake fraud prevention programs in cooperation with other insurance agencies, either in BC or in other jurisdictions. The same person defrauding ICBC may also be making claims against other members, and co-operation may be very useful.

REFERENCES

Hauer, E. and Cooper, P.J. Effectiveness of Selective Enforcement in Reducing Accidents in Metropolitan Toronto. *Transportation Research Record 643*, pps. 18-22. 1977.

Sisiopiku, V.P. and Patel, H. Study of the Impact of Police Enforcement on Motorists' Speeds. *Transportation Research Record 1693*, pps. 31-36. 1999.