Comprehensive Road Safety Action Plan (CROSAP)

The Region of Halton has adopted a Comprehensive Road Safety Action Plan (CROSAP) to guide the implementation of a road safety management system for Regional Roads.

Phase 1

In Phase 1 of the Plan, an efficient screening process was developed to evaluate the actual safety performance of each Regional Road intersection and road section against an expected performance measure, derived from the aggregate performance of similar intersections and road sections throughout the Region.

Establishing an efficient network screening process is a crucial first step in implementing a comprehensive safety management system. Without an efficient process for identifying sites "with promise" (sites with potential for safety improvement) for safety investigation, resources may be wasted on sites that are incorrectly identified as being "less safe", while sites that are truly less safe may go untreated, should the process fail to identify them.

Conventional techniques utilizing collision counts and/or rates, often in a statistical quality control framework, are now known to have difficulties in identifying sites with promise. These difficulties are due to the potential for bias, attributable to the regression-to-the-mean phenomenon, in which sites with a randomly high collision co9unt may be wrongly identified as being hazardous, and those with a randomly low collision count may be falsely assumed to be relatively safe.

To overcome the difficulties with the convention techniques, an approach based on safety performance functions (*SPFs*) has been developed. The technique essentially aims to smooth out the random fluctuation in collision data by specifying the safety of a site as an estimate of its long term mean (m) or average, rather than its short-term count. The estimate of m is obtained from an Empirical Bayesian technique that combines the collision count (P) of a specific site in the most recent n years with an estimate of its expected safety performance (SP) based on an operational performance function. The data assembled is prepared for the development of SPFs.

Statistical models (SPFs), were developed for the Region of Halton using 1995-1999 data, and were subsequently used in screening the safety performance of the Regional road network. The potential for safety improvement (PSI) for rural, urban and suburban road segments, and 3- and 4-legged signalised and unsignalized intersections, were used in the calculation of a ranking index.

Potential for Safety Improvement (PSI) indices take into account the difference between a location's long-term safety performance and the expected safety performance for a comparison group with similar traffic, design, and control characteristics. They also incorporate the potential savings in societal costs by accident type if the safety record at the location can be improved to the nominal level. The PSI index can range from 0 to over 30 in the case of Halton's Regional Road System.

Put in layman's term, if a location has a PSI of 20, it means that if the proper safety measures were introduced to bring the accident history at that location to what is considered a nominal level in the road network, the potential savings in societal costs would be the equivalent of 20 property-damage-only (PDO) accidents annually.

Phase 2

Phase 2 of CROSAP consisted of carrying out a roadway operational safety assessment for each location. **Figure 1** illustrates the CROSAP process.

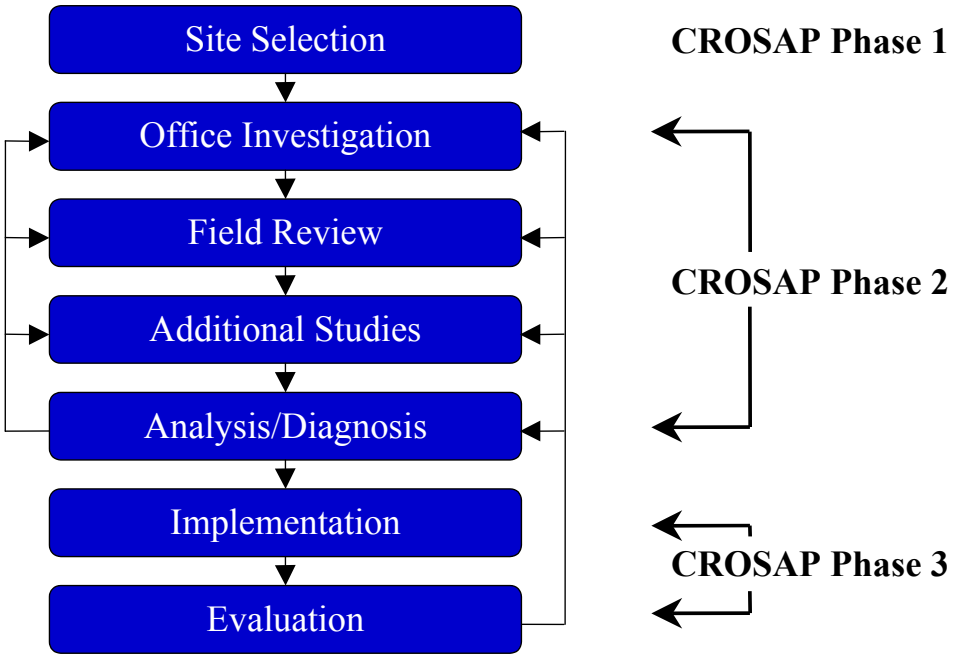

Figure 1: Structure of the Comprehensive Road Safety Action Plan

The major objectives of Phase 2 are:

- Review the relevant information;
- Determine the causal factors associated with the collision experience at each site;
- Prescribe appropriate countermeasures; and
- Formulate an implementation plan.

The major activities associated with these assessments included the following:

- Assess the existing traffic operations;
- Identify and address capacity/operational deficiencies, if any;
- Review and analyze the collision history at the study location;
- Review and analyze the speed profile of the study location;

- Undertake a field investigation including a positive guidance review, conflict studies and conformance checks at the study location;
- Identify potential operational or safety hazards at the study location, if any;
- As necessary, establish remedial measures to address the identified hazards and suggest a follow-up plan to effect these measures;
- Identify areas for safety improvement relating to one or more dominant collision types, as necessary;
- Establish and evaluate countermeasures to address the identified areas for safety improvement; and
- Outline a monitoring program to assess the benefits and impacts of the recommended countermeasures, as required.

Collision experience at each location was analyzed in detail for collision severity, type, frequency, temporal characteristics, and environmental conditions. Findings are compared to regional averages. Elements of road operation and collision statistics that deviate off the regional benchmark point to a potential safety hazard unique to analyzed location.

After the development of a problem statement, countermeasures were selected to develop remedial treatments that address the specific areas for safety improvement identified through the preceding stages. Once a listing of potential remedial treatments has been developed, it was necessary to evaluate the countermeasures to improve safety.

The potential countermeasures were evaluated for overall feasibility, installation cost, maintenance cost, reduction in collision frequency and severity, impact on traffic operations, and policy implications.

Final selection of countermeasures is based on a determination of the benefit/cost (B/C) ratio for the recommended countermeasures. The end product of the Roadway Operational Safety Assessment is a list of recommended countermeasures and their anticipated benefits/impacts.

The benefit/cost calculation is an economic tool and does not determine or predict the level of "safety" of any road section, intersection or road section or other road element. It is a technique that is used to help make decisions about infrastructure investments and the allocation of scarce funds.

Phase 3

CROSAP is an on-going continuous-improvement program with the overall objective of a safer Regional Road System and safety-related improvements that are justified by favourable benefit-to-cost ratios. CROSAP is one piece of an overall road safety strategy to minimize collision risk. Police enforcement and public education are an integral component of the overall strategy.