

## **TAC 2007 Road Safety Engineering Award**

### **Nomination of MTO for Advancements in Winter Road Safety.**

Totten Sims Hubicki Associates wishes to nominate the Ontario Ministry of Transportation (MTO) for the Transportation Association of Canada inaugural 2007 Road Safety Engineering Award.

This abstract will:

- Identify the organization or the individual being nominated;
- Outline what activity or initiative was undertaken to benefit road safety;
- Demonstrate innovation in the initiative; and
- Describe the overall applicability of the activity, technique or concept to transportation.

The Province of Ontario takes great pride in the quality of its transportation facilities. The movement of people and goods throughout Ontario is fundamental and essential to the province's economy. To support its mandate, the province and MTO make substantial investments in highway improvements and in operating its highways with a goal of providing the safest and most efficient facilities it can. Despite these investments, the fact remains that weather, and in particular adverse winter weather, continues to challenge both drivers and the operating authorities.

Although the most recent Ontario statistics are not immediately available to us, the FHWA has stated that "each year there are approximately 1.57 million weather related crashes" and that "about 25% of the non-recurring delays on freeways are due to weather; total system delay is 1 billion hours per year; weather affects about 1/3 of the national GDP and chemical anti-icing and de-icing accounts for roughly 1/3 of the expenditures for snow and ice control."

MTO has over last decade, successfully developed and implemented a broad portfolio of scalable countermeasures to deal with winter weather and the resulting driving conditions. The Ministry's approach has been to attack the problem on all levels, with a range of countermeasures addressing the network as a whole, specific corridors and finally at so-called hot spots or higher-risk locations.

The Ministry has been on the leading edge of the development and deployment of supporting technologies and in methods of procuring winter maintenance services.

#### **Network Wide Approach**

From the perspective of treating the network as a whole, the Ministry's basic maintenance practices have progressed significantly in the last decade. Their advanced winter maintenance approach employs technologies such as RWIS (Road Weather Information Systems) to detect and predict where, when and what adverse conditions will be affecting the highways. They have developed effective, efficient and environmentally sound

responses for each of the anticipated road conditions. A well trained work force of ministry staff and contractors employ state-of-the-art equipment using appropriate deicing/anti-icing chemicals and application procedures, all of which can be deployed based on the detection and automatic reporting from real-time in-situ sensing devices which provide the necessary inputs to customized decision support tools. The winter maintenance mantra “to get the right material in the right quantity in the right place at the right time” is universal. The Ministry is able to record the relevant condition data and their responses for risk management purposes; using this time-series information to do some data mining, MTO is able to make further enhancements to their processes.

Safe driving is also a function of how the drivers react (or don't react) to adverse pavement and visibility conditions. The province recognizes the importance of the role of the travelers and is making advancements in the provision of road condition information to the travelers to improve the planning, mobility and safety of their trips. Previously, it was primarily the domain of maintenance personnel to have this information; however, MTO have begun to provide drivers with better information on road conditions before and while they travel. Most recently, they have recognized the potential value in the information and infrastructure they have available and when conditions change abruptly, they have begun advising travelers while they are enroute with a view to influencing better driver decisions about potential hazards in advance and keeping out of harms way.

Winter related technology has advanced significantly in the last ten years and the Ministry has certainly not taken a wait-and-see approach. They don't rely exclusively on vendors to develop new technology and approaches, but also undertake some of their own research and development. Testing is undertaken at selected provincial test beds and for more widespread deployment, pilot studies are conducted throughout the province. The knowledge MTO staff develop has not only been consumed internally but the Ministry has been proactive in showcasing their advancements to other agencies, contractors and vendors at annual open-house information sessions. MTO continues to participate in a range of national and international learned societies to exchange the latest in best practices, guidelines and approaches.

The current portfolio of MTO network scale countermeasures has demonstrated to themselves and others the value of studying, selecting, deploying and operating advanced technologies and using knowledge-based decision support systems to improve winter maintenance practices.

### **Corridor Specific Approach**

As volumes increase on the highways and as our weather continues to change, we too-often experience catastrophic collision events, graphically illustrating how weather effects the traveling public and commercial transportation on the Province's highways.

Some specific highway segments have proven themselves to be more problematic than the norm for the overall provincial highway network. MTO regional offices have taken the initiative to study these problem corridors, which have historically been subject to high volumes of winter collisions. MTO's approach has been to undertake winter focused in-

service safety reviews and winter safety audits in these corridors. The study and design process involves following well-established TAC process but with paying specific attention to the natural, operational and geometric conditions which may be contributing to higher than normal winter collision statistics. They seek to identify and address the anomalous corridors which have proven to be too problematic to be dealt with by the normal network-wide approach to maintenance.

By combining the knowledge of local winter maintenance personnel and leveraging the roadway planners and designer's expertise, a combined integrated solution for winter maintenance issues can be developed. Statistics show that such solutions have been successful in reducing the number, frequency and severity of collisions.

This integrated approach to winter safety on problem corridors means that, in future, the responsibility for responding to winter safety issues will not be solely on the shoulders of the maintenance service providers but on the whole team. Using this integrated approach, the province's capital projects program can include a look at opportunities to make physical improvements to the highway infrastructure so as to reduce future winter driving risks and maintenance requirements. In doing this, they can make the hazards less severe, make the drivers aware of the risks and provide better tools to the maintenance crews allowing them to anticipate issues and initiate more appropriate and timely interventions.

### **Higher Risk Location Approach**

At specific site locations where the risk of winter collisions is considered higher than normal, the Province has been a North American leader in the development, deployment and operation of yet another important tool - fixed automated anti-icing spray technologies - FFAST. The Province first tested this technology at a location experiencing an unusually large number of high-speed collisions -14 in the first season of operation on a new single-lane bridge on a ramp within a high speed interchange. MTO took the initiative to deploy Canada's first FFAST system at the site. The gamble has paid off; there have been no winter collisions in the eight years subsequent to installation. Based on the lessons learned from the project, MTO has reviewed its network and identified other potential higher risk locations and set up a priority list for reviewing future FFAST installations. To-date eight systems have been deployed, reducing winter risks at specific locations not able to be addressed by network-wide or corridor-wide techniques. The MTO has further leveraged their investments at these locations by having the sites proactively report back when they have detected icing conditions and have sprayed, alerting maintenance staff to the potential for emerging similar conditions at other nearby locations and thereby enhancing patrolling and responding capabilities.

### **Summary**

The Provincial highway network has been assessed from a number of perspectives. Necessary instrumentation has been put in place to allow detection and prediction of critical winter driving pavement conditions and the automatic provision of key information to maintenance personnel in order to facilitate appropriate winter operational countermeasures.

A network-wide approach has allowed MTO to provide an effective baseline of maintenance practices and procedures and to cost-effectively and efficiently manage the network as a whole. On new corridors and corridors which have a history of winter operational problems, the Ministry has developed a program which provides a winter focused safety review and enables the development of mitigation strategies and methods customized to the particular corridor. Finally, technologies have been applied to help treat specific locations identified as being of higher risk during adverse winter weather.

MTO has an active program to advance winter maintenance technology and is continually evaluating and assessing new approaches, products and solutions. They participate extensively in North American organizations and learned societies, publishing their results and exchanging knowledge and experience with their peers.

Despite best efforts to improve safety, it literally all comes down to where the rubber meets the road. Significant documentation exists out there on best practices for the safe design of our facilities, however winter weather can negate our most basic design assumptions unless advanced approaches to winter maintenance are developed and deployed

The Ministry should be commended for their foresight, innovation, and willingness to explore new approaches to enhance winter driving safety. Their progress and successes are continuously monitored and should gain them all due acclaim.

Respectfully submitted,

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