

SAVING PUBLIC ROADS II

Capital planning tool pays off for municipalities.

By Michael Maher

A recent Canada-wide survey of municipal road maintenance practices found that while 98 per cent of respondents perceive preventive maintenance as an important and cost-effective approach to extend the service life of their pavements, a majority of the municipalities do not apply preventive maintenance treatments, and have no clear understanding of when these treatments should be applied.

Infrastructure Canada is providing grants through the Federation of Canadian Municipalities to assist Canadian municipalities in improving their asset management expertise and process. It is a much-needed program. Municipalities have limited sources of revenue to work with, and need to build strategies around attaining the highest return on investment. In the Nov./Dec. edition of ReNew Canada, I wrote an article on the long-term consequence of ignoring road network preventive maintenance, the pervasive practice of 'worst first' roadway rehabilitation, and the need for better capital planning tools based on sound engineering and the latest in decision optimization technology. Providing an implementable, defensible road network capital plan can stretch dollars, removes politics from the equation, and maximizes the level of service to the community.

As a social entrepreneurial project to help municipalities build road network capital plans, Golder Associates Ltd. and Infrastructure Solutions Inc. (ISI) formed a strategic partnership to develop a capital planning tool, built on a depth of engineering research and analysis. The resulting road deterioration models, life cycle gains and inventory of available road maintenance

treatments are weighted in favour of preventive maintenance. A major component of the challenge of building a better road capital planning tool was to incorporate the latest research in optimization algorithms that could quickly determine the best spend from a financial and community benefit perspective. The result is the creation of DOT (Decision Optimization Technology) Roads. DOT Roads was built with the support of 50 Canadian municipal beta clients, Natural Sciences and Engineering Research Council of Canada (NSERC), and Ontario Centres of Excellence grants.

The DOT Roads software can maximize the overall performance of a road network in terms of physical condition (or any other criteria) over a multi-year analysis horizon, and provides municipalities with the best possible course of action in terms of timing and selection of different maintenance, rehabilitation, or reconstruction treatments considering all municipal goals and constraints. The improvements achieved can be translated into substantial savings or increased socio-economic benefit or both.

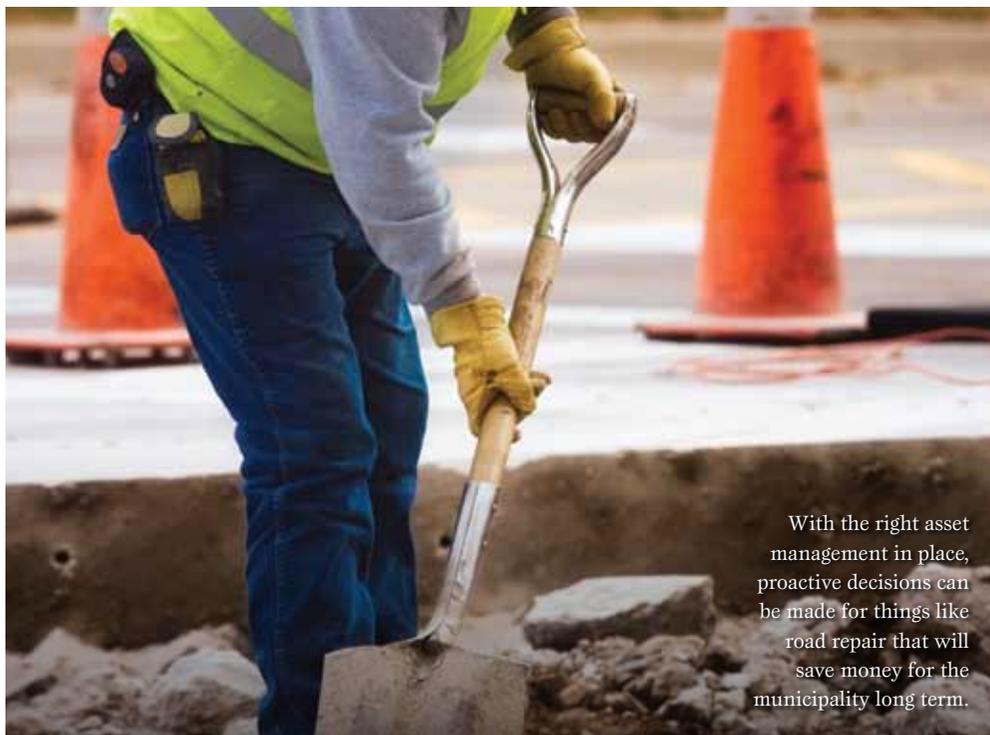
Tillsonburg

"The town was looking for a technology solution that would aid in the selection of asset management best practices for road renewal," explains Anthony Tomlin, asset management technologist for the Town of Tillsonburg, a two-hour drive southwest of Toronto. "In the past, road segments were selected by the municipalities' institutional knowledge or fueled by concerns from the public. This method resulted in some segments being selected for maintenance that did not fully maximize a cost-benefit ratio. As a municipality that adheres to

asset management best practices, we were intrigued by the idea of a software program that removed a large portion of the subjective nature of selecting the right treatment method for the right road segment at the right time in its lifecycle.

It is known that during the lifecycle of a roadway, there are certain trigger points that call for preventative and/or routine maintenance to help extend and fully maximize the lifecycle of the road. This is what asset management is all about: managing your municipality's assets in the most cost-effective way, to fully maximize their lifecycles and maintain a level of service designated by the municipality. Using the DOT software, municipalities can run multiple optimization cases with different objectives and policy settings to perform a detailed 'what-if' scenario analysis. For example, a municipality can use the software to determine the minimum cost required to maintain the current level of service or to achieve a certain performance level based on long-term community objectives. At the same time, a user can define multiple constraints, such as minimum serviceability criteria or annual budget limits to run an optimization analysis with the objective of maximizing network overall performance. This enables municipalities to run multiple scenarios and perform a detailed comparison using various visual outputs to arrive at the best possible solution that satisfies their objectives and policy considerations.

Utilizing this software has helped the town achieve its road asset management goals. Decisions made are now optimized and we are confident that the road segments selected and the applied treatment methods have the greatest cost-benefit to the town and its residents.



With the right asset management in place, proactive decisions can be made for things like road repair that will save money for the municipality long term.

“We still look at our own data spreadsheets regarding the condition of our roadways and cross-reference our data with the software. More often than not, many of the roads we’ve selected for maintenance are also selected by the software. This is valuable evidence that the software is working by looking at the same factors that we, and most municipalities look for when determining which roads should be prioritized for maintenance. Having software to determine which preventive maintenance method to use on which roadway really maximizes the cost-benefit of allocating funds to these segments.”

Tillsonburg has been using the software for about two years, during which they have witnessed its evolution, including the addition of the GIS road segment visualization capability. “We have experienced the strength and versatility of this tool,” said Tomlin. “The software really helps stretch the dollar to keep a good level of service or Pavement Condition Index (PCI) which is used to rate the condition of a paved road surface. Tillsonburg likes to maintain a PCI of 75 or above. We can give the software parameters, such as how much money we have to spend this year, and run the scenario. The software identifies the best places to

allocate these funds to maximize the road lifecycle and the value. The software really helps us make sound decisions.”

Sarnia's solution

“The challenge has always been to determine what rehabilitation strategy do we need to apply to fix the road,” explains Lydia Fisher, municipal engineering specialist for the City of Sarnia.

“One person can look at a road and might think we can patch it, others say it’s best to crack seal it, another point of view says completely replace it. However, when it comes to important infrastructure decisions, only science can truly tell us the best approach for the safety and cost-benefit.”

The software provides something that has never been available before: a system that considers all of the factors a municipality has to work with, plus the road asset management science. Based on user input, the software models a scenario for each point in a road’s life and tells what needs to be done in five years, 10 years, and so on. It can take into consideration factors including soil conditions, road conditions, traffic, etc., and generate a highly specific action plan based on science plus a municipality’s unique needs and budget.

“I really appreciate that it provides an accurate cost-per-meter for the suggested maintenance activities,” said Fisher. “It’s [...] saving Sarnia time and money, while pointing us in the right direction for road asset management. Being able to identify different kinds of technology solution that we can apply to our roads that are cheaper or last longer, is extremely beneficial.”

“All municipalities want to know how much money is needed to keep roads at a certain quality level. We can run those scenarios through the software and quickly get the answers we’re looking for.”

Thanks to technological developments such as the solution we have helped to create, municipalities across Canada are afforded better opportunities to spend their limited resources on the right maintenance for the right projects at the right time. 🍁



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