Online Tool Calculates Benefits and Costs of Winter Maintenance Investments

Winter maintenance departments, like all public agencies, must be careful stewards of taxpayer dollars. That mandate holds in every economy, but during tough financial times in particular, questions surrounding capital expenditures become even more pointed. (Is the latest carbide snow plow blade—or zero velocity spreader or road weather information system—worth the cost?) Contractors and private operators too face similar questions about capital expenditures. All winter maintenance managers need to invest in improvements, but making informed spending decisions is absolutely critical.

Need for Research
Winter maintenance technologies are becoming more sophisticated, ranging from improved on-vehicle hardware and controllers to decision support systems that track fleet vehicles or weather in real time. Depending on the technology and the size and scope of a maintenance operation, an investment in these items can start at hundreds or thousands of dollars and go well into the millions.

And while these tools promise savings through more efficient use of resources and improved levels of service, winter maintenance personnel and financial officers alike require compelling numbers to justify investing in these items. A well-established economics approach for weighing capital investments like these is cost-benefit analysis. Attaching a dollar value to the costs and benefits of a capital expenditure for winter maintenance fosters understanding of the bottom-line throughout a road agency and provides a solid foundation for spending decisions. The results of cost-benefit analysis, however, are only as valid as the data driving the calculations.

Objectives and Methodology
Clear Roads undertook a project to create an interactive toolkit that would help users calculate the benefit-to-cost ratio of selected winter maintenance technologies. The effort was conducted in two phases.

First, investigators reviewed literature and surveyed winter maintenance practitioners nationwide to capture and quantify the various costs and benefits associated with specific winter maintenance equipment and systems. Moreover, since the toolkit would not be able to accommodate every new winter maintenance technology, the practitioner surveys also served as a means for investigators to zero in on technologies of greatest interest to practitioners.

The next step was developing the toolkit itself using real-world user data and principles of engineering economics. It needed to allow flexibility of user inputs while providing reasonable guidance and values for costs and benefits. From an interface standpoint, the toolkit had to be user-friendly and accessible on a wide variety of operating systems.

Results
Investigators decided that a Web-based interface best fit the project criteria, and they built a cost-benefit calculator for online use. Based on feedback from practitioners and the Clear Roads Technical Advisory Committee, the toolkit included these winter maintenance items:

**Equipment:** Carbide blades, front plows, underbody plows, zero velocity spreader

**Practices:** Anti-icing and deicing

**Operations:** Maintenance decision support systems, automatic vehicle location and geographic positioning systems, road weather information systems, mobile pavement temperature sensors, mobile air/pavement temperature sensors
This brief summarizes project 0092-09-08/CR08-02, “Development of a Toolkit for Cost-Benefit Analysis of Specific Winter Maintenance Practices, Equipment and Operations,” produced through the Clear Roads winter maintenance pooled fund project, #TPF-5(092). Clear Roads’ lead state for this research project is Wisconsin DOT, 4802 Sheboygan Ave., Madison, WI 53707. (In early 2010, Minnesota DOT took over as the lead state for Clear Roads winter maintenance pooled fund project under TPF-5(218).) Paul Brown of Massachusetts Highway Department is the Clear Roads Technical Advisory Committee Chair (paul.brown@state.ma.us).

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