

Highway Contractor

the rest of the country."

Minneapolis' Scharffbillig, who, like the rest of the presenters not only presented part of the program but helped to develop the certificate program, says, "Look at different outcomes from a removal and equipment perspective. We ultimately end up at the same place removing the white stuff from the road, making it safe for everyone to travel on. This training helps everyone from around the country have a better understanding of the 'whys' and 'hows.'"

DeVries says that while the program is still under development, it has been embraced by agencies.

Monitor Weather as You Drive In It

In Alaska, winter maintenance crews have to deal with changing conditions to say the least. And those changes add a measure of difficulty to fighting snow and ice on roads.

The development of mobile monitoring weather systems may help solve some of these problems.

Road Weather Information Systems, or RWIS as they are more commonly known, aren't new. The Federal Highway Administration (FHWA) has supported use of RWIS, systems composed of Environmental Sensor Stations (ESS) in the field, a communication system for data transfer, and central systems to collect field data from numerous ESS. The stations measure atmospheric, pavement and/or water level conditions, and central RWIS process observations to develop "nowcasts" or forecasts. They display or disseminate road weather information in a format that can be easily interpreted by a manager. RWIS data are used by road operators and maintainers to support decision making. But RWIS are fixed; they can only measure the conditions where they are installed.

Mobile monitoring weather systems are mounted on a truck and record pavement temperature, ambient tem-



An Alaska Department of Transportation and Public Facilities snowplow clears the roads northbound on the state's Glenn Highway.

perature, precipitation and other factors as the vehicle passes through the weather. It's in real time. Agencies can monitor current weather conditions directly from the maintenance vehicles.

"If it's raining and it all of a sudden becomes snow, you can push a button and give a line on a map where it changes from rain to snow," explains Mike Coffey, statewide maintenance and operations chief for Alaska Department of Transportation and Public Facilities' Office of the Commissioner. "This information gets fed back into the RWIS and then would be available to the agency and the public."

A bar graph would show the temperatures, and a GPS would show where the vehicle is, Coffey says. "The temperature differentials based on where the vehicle is and where it has been would be shown, and this information could then be fed back to a Maintenance Decision Support System (MDSS)," he says. "Predictions could then be based on the data coming in real time."

Coffey says Alaska has about 52 stationary RWIS stations scattered across the state. This summer, he says, Alaska plans to install mobile weather monitoring systems. It will test out the system in the Fairbanks area, where the equipment superintendent's vehicle and all four of the foremen's vehicles will be equipped with the mobile systems.

Having the more widespread data will be "extremely helpful," Coffey says, because the data will be continuous. "When performing a road inspection, we could easily be covering almost the whole valley," Coffey says. "If you're on

the road for two hours, you then get two hours of real-time data ... for the line in the sand, so to speak, where it goes from rain to freezing. It provides a much better opportunity to direct your trucks and sanders or plows to the right area."

Incorporating the mobile weather monitoring systems is starting out as a pilot program, but Coffey says it has great possibilities. "If it works, we'll certainly want to expand," he says.

There's a Toolkit for That

In this economy, spending money, even on something as vital as winter road maintenance programs, is a tough call for agencies because money is as hard to come by as it has ever been.

For the last 15 years, agencies have reduced budgets or have had budgets that remained flat, according to Clear Roads. Begun in early 2004, Clear Roads is a government-pooled fund project started in response to the need for real-world testing in the field of winter highway operations. Wisconsin DOT led this work from 2004 to 2009 under TPF-5(092). The Minnesota DOT now leads the project under TPF-5(218). The ongoing research program has 20 member states. Each of those states gives some of their research money to the Clear Roads project to help with ongoing research. In return, they reap the benefits of tools developed through research.



Cost-Benefit Toolkit

Phase 1:

1. Practices

- Anti-icing
- Deicing

2. Equipment

- Carbide blades
- Front plows
- Underbody plows
- Zero velocity spreaders

3. Operations

- Maintenance Decision Support Systems (MDSS)
- Automatic Vehicle Location and Geographic Positioning Systems (AVL/GPS)
- Road Weather Information Systems (RWIS)
- Mobile pavement temperature sensors
- Mobile air/pavement temperature sensors

Phase 2

(The final list won't be determined until the project is underway)

1. Comparing flexible blades to traditional blades
2. Pre-treating prior to the storm
3. Pre-wetting at the spreader
4. Slurries
5. Plow guards
6. Spreader calibration
7. Tow plows
8. Open vs. closed loop spreader controls
9. Laser guides
10. Abrasives (sand/aggregates in different types or weights/sizes)
11. Remote cameras for monitoring remote sites locations
12. Contracted truck (private or municipal) versus a state-owned truck
13. Tailgate vs. hopper spreaders

As a result of Phase One of the project that started last year [the "Cost-Benefit Analysis Toolkit" (Project Number: Clear Roads 08-02/WisDOT 0092-09-08)] state agencies are finding it easier to select and then to justify purchases and requests for services and purchases by having hard numbers to back them up.

This is critical in such tough economic times, says Paul Brown, director of snow and ice operations for Massachusetts and a project leader for the "Cost-Benefit Analysis Toolkit" research program. When the project began, the goal was to develop a practical tool, such as a spreadsheet or computer program, that could be used by Clear Roads states and other agencies to calculate the cost and benefits, and justify expenditures for specific new practices, equipment and operations.

The project team developed a user-



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friendly, web-based tool that provides support for a cost-benefit analysis (based on available research) for 10 practices, equipment and operations. The tool is expandable, so it can include additional areas for analysis as needed. A training guide is also included.

When a new purchase has to have a cost-benefit analysis to justify its dollar value, it's essential to determine an effective method for determining the cost-benefit of incorporating new products and methods into an agency's operations.

But sometimes it's difficult to come up with accurate, hard numbers.

"The challenge is having all the information you need to describe what you need to do," says Brown. "You always have bits and pieces, but it's hard to get everything you need compiled." The cost-benefit tool does just that. It gathers all the pieces, puts it all in one place and does a sophisticated analysis so an agency is able to determine whether a decision would be a good investment or a bad investment, and how much an agency would gain or lose by making the decision.

"It takes the emotion out of purchasing decisions in snow and ice operations," Brown notes. "We often say that we need to have a certain piece of equipment and why we need it. But the toolkit allows us to say, 'If we put this on our truck, the rate of return is 'X' or that,

Maintenance Decision Support Systems are used in the Cost-Benefit Analysis Toolkit.

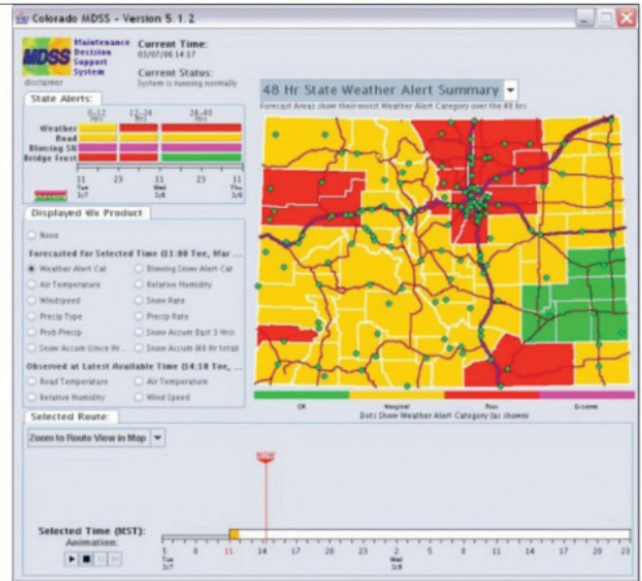
if we spend a dollar, we'll get \$3 back."

In essence, the cost-benefit tool allows an agency to "plug and play." A number is plugged in, crunched and an answer is provided. "The tool is outstanding," Brown says. (For a list of what factors are analyzed in Phase One of the Cost-Benefit Analysis Toolkit, see the sidebar, "Phase 1 of the Cost-Benefit Analysis Toolkit.")

Phase 2 has been approved for funding. What's more, the nation's top transportation leaders are on board, says Brown. In May, Brown talked to Transportation Secretary Ray LaHood and other transportation officials, and presented an argument why the toolkit is vital to state agencies, counties and municipalities.

"They agreed 100 percent with our proposal and understood that sometimes you have to spend money to save money," Brown explains. "You're not making up numbers and they are arranged in a way that makes sense. You have all the information, so you can justify budget, expenditures and the adjustments that go on your truck."

The "spend money to make money" premise is exactly what Annette Dunn, winter operations administrator for Iowa Department of Transportation's Office of Maintenance, used to get some needed equipment for her agency. By using the Clear Roads Cost-Benefit Analysis tool, Dunn was



able to justify an allocation for investment in an Automatic Vehicle Locator/Global Positioning System (AVL/GPS system).

"You need a baseline," says Dunn. "We need to be able to prove that we are cost-effective while improving safety and overall effectiveness of winter operations."

For downloadable PDFs of the Clear Roads research on cost-benefit analysis, go to <http://www.clearroads.org/research-projects/08-02costbenefitanalysis.html> or our shortened URL, <http://tinyurl.com/ClearRoadsCostBenefitAnalysis> ❖

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To get more in-depth information on the Clear Roads Cost-Benefit Analysis project, use your smartphone to scan this tag.

A Different Plow Blade

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Salt II: Treated salt and brine are concepts gaining ground because they make it easier on your environment and your budget. Check out our digital edition story on our website or just scan this tag to see the full report.