

The FHWA Maintenance Decision Support System (MDSS) Prototype

The Road Weather Management Program of the Federal Highway Administration (FHWA) invests in high risk research in order to develop new and innovative techniques for highway operations. The target audience of these solutions are the owners, operators, maintainers and users of the highway system, to ultimately improve mobility, enhance productivity, and create a safer environment on the nation's roads. To reach this target audience, the research results are made available to an equally critical audience, the private sector service providers, in order to reduce the risk of incorporating these solutions into their product lines. The Maintenance Decision Support System (MDSS) for winter operations is one such technology, developed to be used by state and local winter road maintainers.



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What is the MDSS?

The MDSS is a guidance tool that provides winter maintenance professionals with route specific weather forecast information and treatment recommendations.

Why is this an innovation?

The MDSS utilizes new techniques in weather prediction and applies its forecasts to fully customized and computerized winter maintenance rules of practice. In other words, it goes beyond current capabilities by turning weather forecasts into specific winter road maintenance recommendations.

What will it do for the seasoned DOT maintenance supervisor?

A MDSS can:

- ◆ Provide route-specific weather and road condition forecasts at hourly intervals
- ◆ Offer optimized recommendations for application times and chemical types and amounts
- ◆ Generate “what-if” scenarios to experiment with changes to the recommended treatment strategy
- ◆ Train new maintenance supervisors using the customized rules of practice and historical playback capabilities

How will MDSS functionality make it into DOT garages?

Most MDSS capabilities are being made freely available to the private sector with the expectation that they will embrace the new technologies, incorporate them into their product lines and offer even better services to state DOTs. This win-win situation can grow the market and allow DOTs to maintain higher mobility and safety on roads.

Where can one obtain MDSS documents and software?

The National Center for Atmospheric Research (NCAR) maintains a Web site (www.rap.ucar.edu/projects/rdw_mdss/) with all presentations, technical documents and tutorials. MDSS software can also be obtained from this site through a registration process. Some technology transfer assistance is also available from NCAR.

MDSS as an Investment in Road Weather Information Systems (RWIS)

To date, State DOTs have invested in RWIS by deploying more than 2,500 Environmental Sensor Stations (ESS) on the nation's roads. As presently used, each ESS only provides details to conditions at only one location. MDSS maximizes the use of ESS data through their use as input into high resolution weather models and verification points that can be used to check on the accuracy of the forecasts.

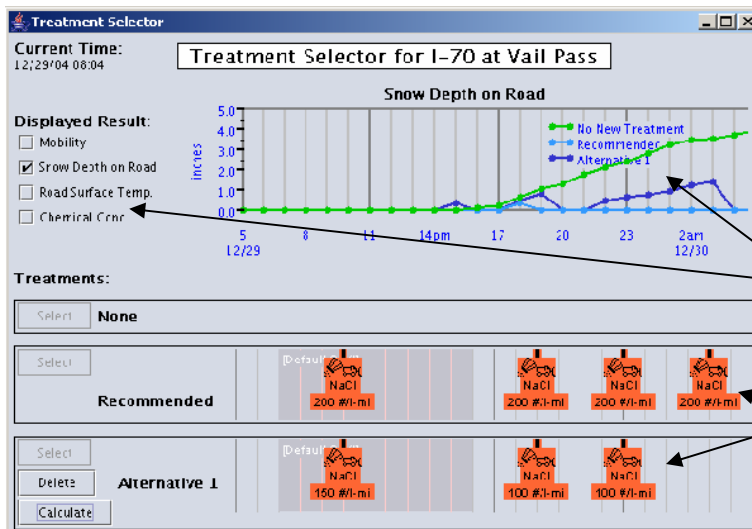
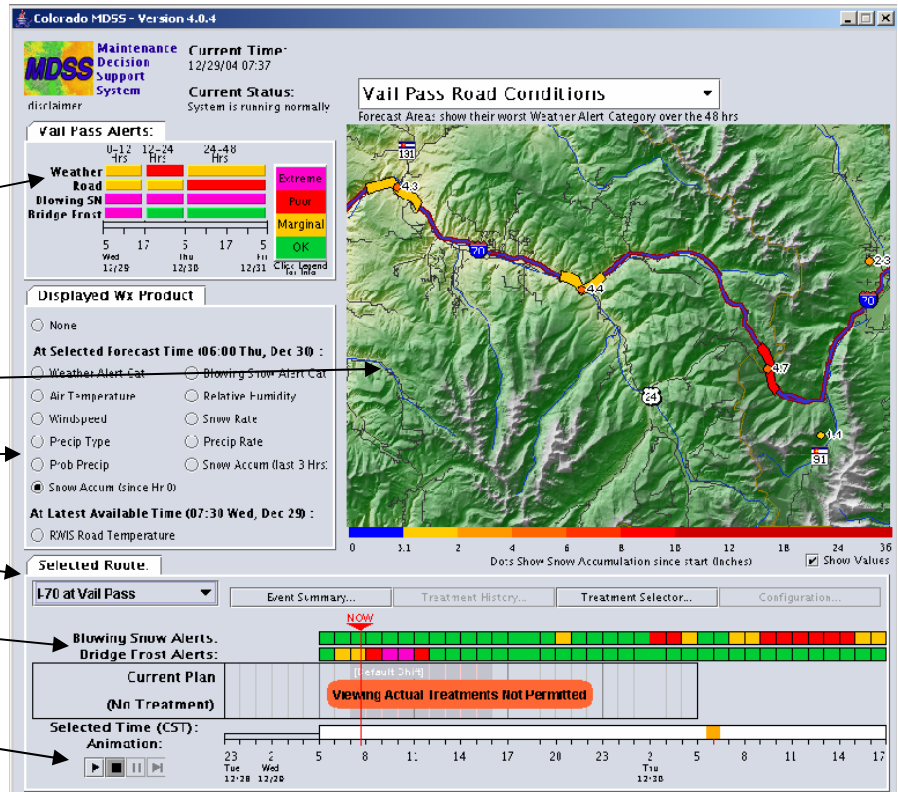
Advantages to using MDSS Technologies

- ◆ Route-specific road weather forecasts (air temperature, humidity, road surface temperature, frost deposition, precipitation type and amount, wind speed, blowing snow, etc.)
- ◆ Treatment recommendations for designated routes
- ◆ "What-If" scenarios provide the capability to explore how changing some input parameters, such as chemical type or amount, could affect road mobility and chemical concentration in the treatment recommendation

The Prototype MDSS Main Display

MDSS displays will vary depending on mission requirements and vendor preference. The federal prototype is provided here as just one display solution.

- ◆ Color-coded alerts within 48 hours for weather, road condition, blowing snow and bridge frost
- ◆ High resolution topographic route maps
- ◆ User selectable weather parameters and observations
- ◆ Route selection, event summary, treatment history and treatment selection are all available
- ◆ Hourly projections of blowing snow and bridge frost alerts
- ◆ Time selection and animation controls



Tour of the Treatment Selector

Operators can change chemical type, application rates and plow timing, creating several alternate treatment recommendations. Changes to any of the treatment parameters may result in predicted changes in mobility, snow depth on the road, road surface temperature and chemical concentration. The chart to the left shows predicted "Snow Depth on Road" for three alternatives.

Recommended and alternative treatments are presented as icons, placed at route start time and include the chemical type and application rate.