

M

A

S

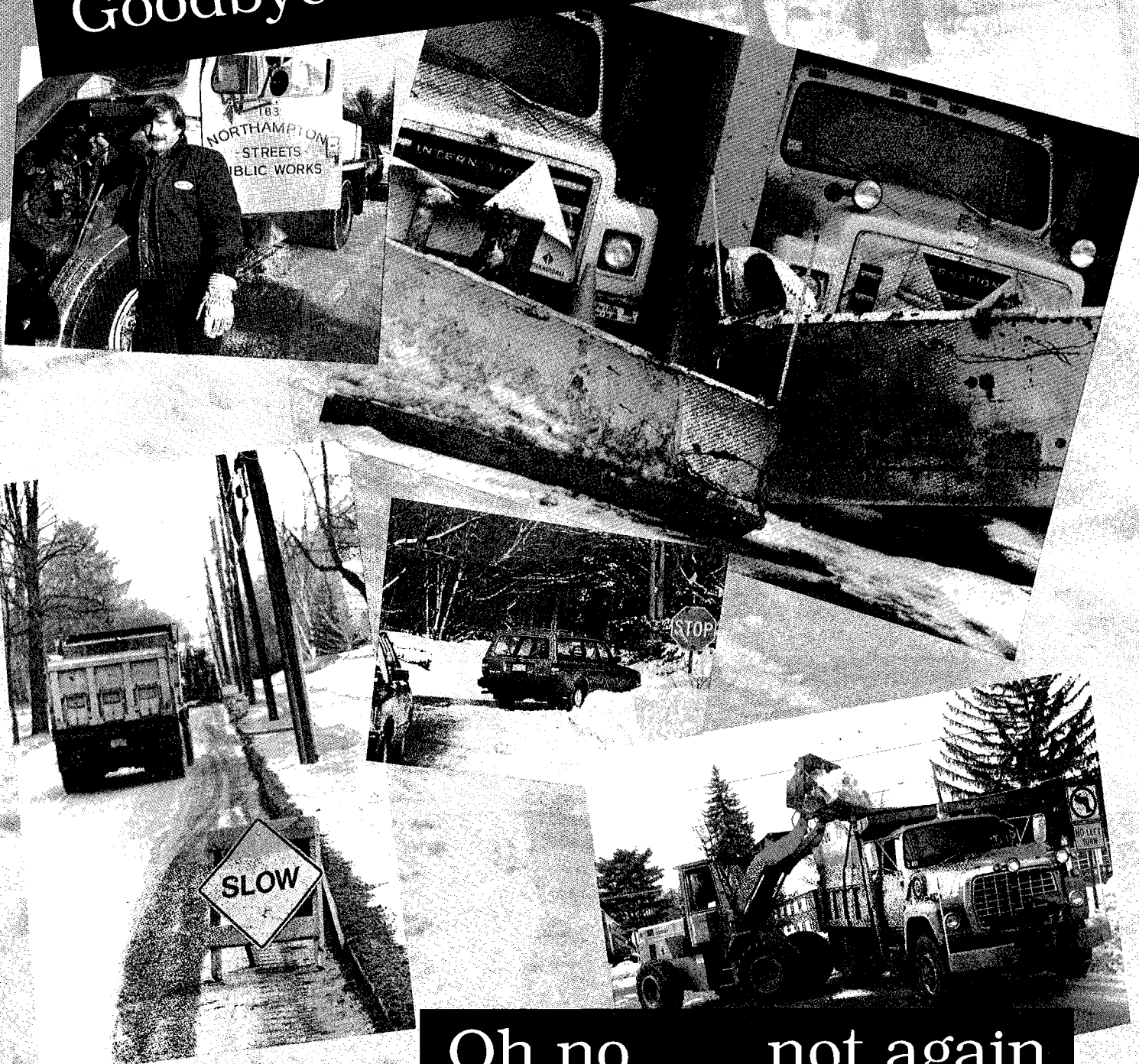
S

INTERCHANGE

Volume 10, Number 1

Fall 1995

Goodbye Summer, Hello . . .



Oh no . . . not again

Now is the Time

It may be only October, but now is the time to get ready for the snow season ahead. In Massachusetts we know that winter is just around the corner. Just as you winterize your car before the cold weather, so should you provide routine maintenance now for the winter months ahead. Steps you take now could prevent major problems during and after winter's storms.

These are some of the important activities you should pay attention to now:

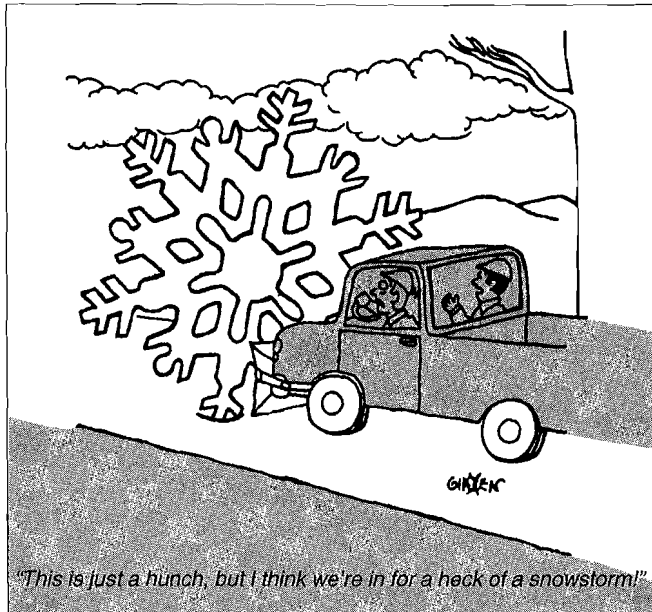
DRAINAGE: Now is the time to clean out roadside ditches and grade the roads to drain. Clean out culverts, slotted or perforated underdrains, and get rid of dirt and debris along curbs and gutters.

BRIDGES: Sweep bridge decks, especially along the gutters, so they will drain properly. Repair erosion around abutments, bridge embankments, and other strategic locations to protect against spring run off.

CORRECTION

In our Summer, 1995 issue of *Mass Interchange* we identified our cover photo as a road in Deerfield. In fact, the road was in Ashfield.

PAVEMENT AND ROAD SURFACE: Seal cracks where appropriate. By sealing cracks in the fall there is only a slight compression on the crack



sealant in the summer and slight tension on the sealant in the winter. Expect less failure of the sealant if timely sealing is accomplished. Also, grade unpaved roads to provide adequate crown. Standing water or inadequate drainage will lead to deterioration of the road surface.

TRAFFIC CONTROL: Pavement stripes and markings should be in good shape since winter painting or placement is difficult. Traffic signs should be in reasonably good shape since the need for good reflectivity and sharpness increases during inclement weather.

MOWING: Mow roadside vegetation adjacent to the roadway or shoulder. At least one pass with the mower should be made. A wider swath will

decrease snow drifting problems. Mowing should be done at least on the windward side of streets and roads. Mowing around intersections and interchanges will help to reduce drifting problems and will improve sight distance.

SNOW PLAN: Be sure you have a current, written policy about snow and ice control. Detail the standard of snow and ice control you will achieve and give a time frame for getting this done. You also need a written operations plan that includes this policy as well as a detailed plan specifying the duties, responsibilities, and authority of each member of your staff. Review the policy and your

operations statement with your staff, with any local contractors you will be working with, and with your municipal officials. If you get this all down in writing now you will be better prepared for the first snow fall and you will be prepared for possible litigation in the future.

SNOW ROUTES: To save time and fuel, plan plowing routes to bring trucks back to storage facilities when they are almost empty of deicing materials. Keep routes short so they can be completed as quickly as possible at a maximum speed of 25 mph. Priority should be given to fire and other emergency vehicle routes, and to school bus and mail routes. During trial runs pinpoint drains and waterways that must be opened after every storm.

Continued on Page 3

Now . . . continued from Page 2

EMPLOYEE TRAINING: Hold a fall meeting to familiarize road crews with their winter duties and with all routes in case someone becomes ill and someone else must take over the route. Explain how salt and antiskid material should be applied and at what rates. Have drivers review their routes and make a test run to be sure they are familiar with all possible obstacles. Review all policies and procedures especially for items such as emergencies and accidents.

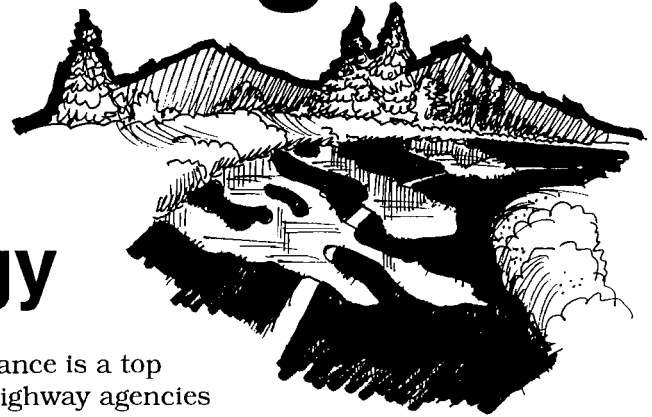
THE PUBLIC: Call media, police, fire, and other officials during the fall to discuss plans for snow and ice removal. Decide on the most effective way to get snow information to schools, industries, and government agencies so they can determine whether to remain open or close early. Provide citizens with a telephone number at which they can reach agency officials in an emergency. Publicize this number before and during winter maintenance operations. Make your snow and ice control plans available to the public so that they can see that you are using a definite and efficient method.

Getting all these things done now will put you one step ahead when the snow flies. And we know in Massachusetts that it is only a matter of time before those winter storms are upon us.

Revised and reprinted with permission from the Fall 1994 issue of *The Connection*, a publication of the South Dakota Transportation Technology Transfer Service. The original article was edited from material in *Vermont Local Roads*, September 1993; *Nevada Milepost*, Fall 1993; and *Virginia Roadster*, Winter 1993.

Cartoon credit: From the August 1991 *KUTC Newsletter* of the University of Kansas Transportation Center.

Anti-Icing: A Bold New Strategy



Winter maintenance is a top priority for many highway agencies right now, as they strive to keep their roadways free of snow and ice. In an effort to provide better service, fifteen states (including Massachusetts) experimented with a bold new strategy — known as anti-icing — for improving traction and safety during winter storms.

The states participated in FHWA's Test and Evaluation Project 28, a two-year experiment to determine the conditions under which anti-icing is most effective, as well as which strategies hold the greatest potential for success over a range of topographical, climatological, and traffic conditions. The project is a follow-on to the anti-icing study conducted by SHRP.

In August, 1994, the participating states met in Minneapolis, MN, to present a summary of their first year's experiences to an audience of 115 representatives from highway agencies both in the United States and abroad, as well as from industry and academia. The objective: to encourage other states to set up their own anti-icing evaluation programs and spur industry and academia interest in innovative winter maintenance technologies.

The two-day conference, titled "Anti-Icing Technology Review," was sponsored by FHWA and the American Association of State Highway and Transportation Officials (AASHTO). In addition to reports on the test and evaluation project, the conference featured presentations on the winter maintenance activities of the Swedish National Road Administration.

Continued on Page 4

in this issue

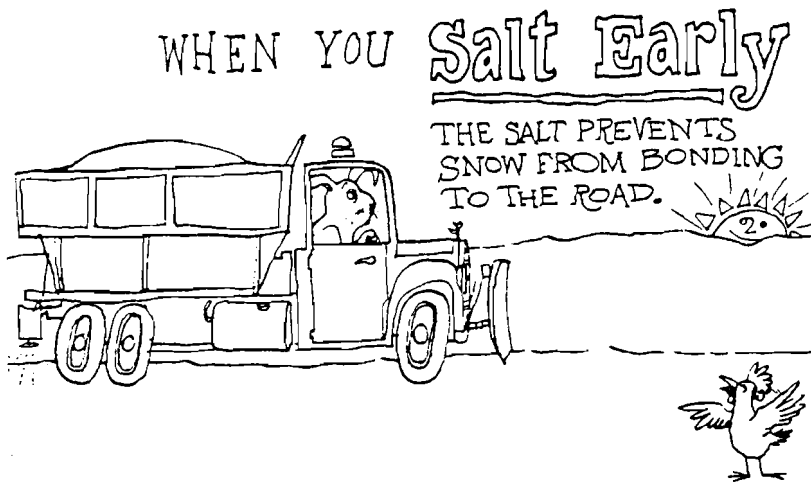
Now is the Time	Page 2
Anti-Icing: A Bold New Strategy	Page 3
Salt Tolerance of Trees and Ornamentals	Page 6
Snow and Ice Videos and Publications	Page 7
You and Your Car Phone	Page 10

A Preemptive Strike

Anti-icing operations involve applying a chemical to the pavement in order to lower the freezing point of water. This prevents a strong bond from forming between snow or frost and the

Anti-icing operations, on the other hand, usually begin before, or just as, a storm hits. With the aid of new, sophisticated weather information technologies, highway agencies can pinpoint when and where to begin anti-icing operations. They can take preemptive, rather than remedial, actions.

Anti-icing itself is not new.



pavement surface. If the bond can be prevented, the roadway will remain wet or slushy, rather than icy — making driving safer and plowing operations easier.

In contrast, most highway agencies that use chemical treatments as part of their snow and ice control operations rely on a *deicing* strategy. Deicing operations involve breaking the bond between pavement and the snow or frost on its surface. Although deicing operations are effective, they could be made more efficient. For example, highway agencies often wait until a storm hits before deploying their crews. By then, the storm has the upper hand. It takes more time, materials, and effort to clear the roadways. But lacking detailed information on exactly where and when the storm will hit, and what form the precipitation will take, agencies are reluctant to send the crews and trucks out in advance of a storm.

What is new is the integration of state-of-the-art weather forecasting and reporting systems with innovative materials and application methods to form an improved winter road maintenance strategy — namely, anti-icing.

“One of the biggest innovations in winter maintenance in recent years is the improved weather information that we’re now receiving from our road

With the aid of new, sophisticated weather information technologies, highway agencies can pinpoint when and where to begin anti-icing operations.

weather information systems,” said FHWA’s Andrew Mergenmeier, project manager for Test and Evaluation Project 28.

Many of the chemicals used in anti-icing operations are the same as those used in deicing operations. What differs is the

form of the material and the amount and timing of the material application. “Anti-icing is not a panacea,” said Mergenmeier, “but it can become an important tool in a highway agency’s toolbox.”

Experimental Design

The Cold Regions Research and Engineering Laboratory (CRREL) of the U.S. Army Corps of Engineers is performing the data analysis, under contract to FHWA. CRREL’s Stephen Ketcham, Principal Investigator for the project, outlined the experimental design and data reporting requirements.

For each test site, the state developed an anti-icing strategy, which was followed for each storm event. The strategy may have included different anti-icing applications rates and treatments for different storm types and conditions. The experiment consisted of anti-icing and deicing operations on the test section and a control section, documentation of the operations, and measurements and observations recorded during each storm event.

At various times before, during, and after a storm, the coefficient of friction was measured in the wheelpaths of the driving lanes and recorded on log sheets that were forwarded to CRREL.

Meteorological and traffic data were also collected and forwarded to CRREL. The highway agency documented the materials used, the mixture or concentration of the treatments applied, the rate of application,

Continued on Page 5

and why the action was initiated. All of this information was entered into a database at CRREL for analysis.

The project was designed to collect and report both objective data analysis results and subjective field experience. Both types of evaluations were needed, as they complement each other. The information gleaned from the evaluations will be beneficial to highway agencies interested in evaluating anti-icing strategies.

State's Experiences

Although Winter, 1993, was relatively benign at many project sites, with fewer storm events than normal, the study participants reported successful experiments. In general, they were enthusiastic about the anti-icing operations, citing the cost savings, environmental benefits, and service improvements.

The materials and applications used in the experiments varied from state to state, as the highway agencies designed their experiments to accommodate local conditions and practices. Materials used in the experiments included magnesium chloride ($MgCl_2$), salt brine, calcium chloride ($CaCl_2$), pretreated salt, calcium magnesium acetate, and liquid potassium acetate (KAc).

Project Status

David Minsk, from CRREL, summarized the expected benefits of an anti-icing strategy:

- * Faster recovery, or less loss, of pavement friction
- * Less chemicals needed (chemicals are applied earlier, in smaller amounts)

- * Lessened impact on the environment

- * Potential for lower costs, over the long term

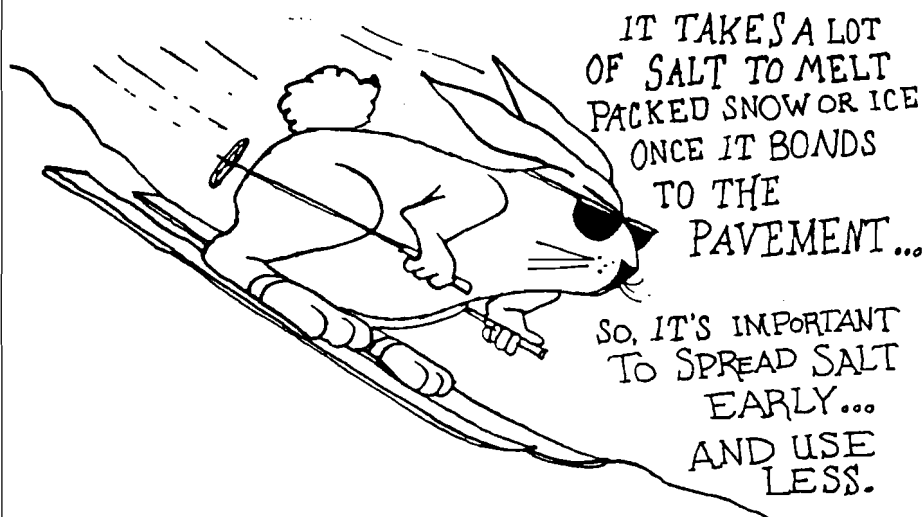
Minsk stressed the importance of proper timing of anti-icing applications. He also cautioned that there is no one perfect chemical — each has its advantages and uses. "There is a great need for quality personnel and training," said Minsk. "Anti-icing operations require judgment all the way from headquarters to the operator level."

The CRREL study focused exclusively on anti-icing operations, rather than winter maintenance in general.

Transportation Research Board organized a trip to Europe in 1994 to learn about innovative winter maintenance strategies.

Mergenmeier listed some of the technologies reviewed during the trip:

- * Rubber tire chains for private vehicles. They are quiet, easy to install, and don't damage the highway.
- * A plow attachment that prevents snow spoils from blocking driveways.
- * A highly instrumented snowplow, with front, side, and underbody plows.
- * Snow gutters. Water continuously flows through the gutter, and as citizens clear driveways and paths in urban



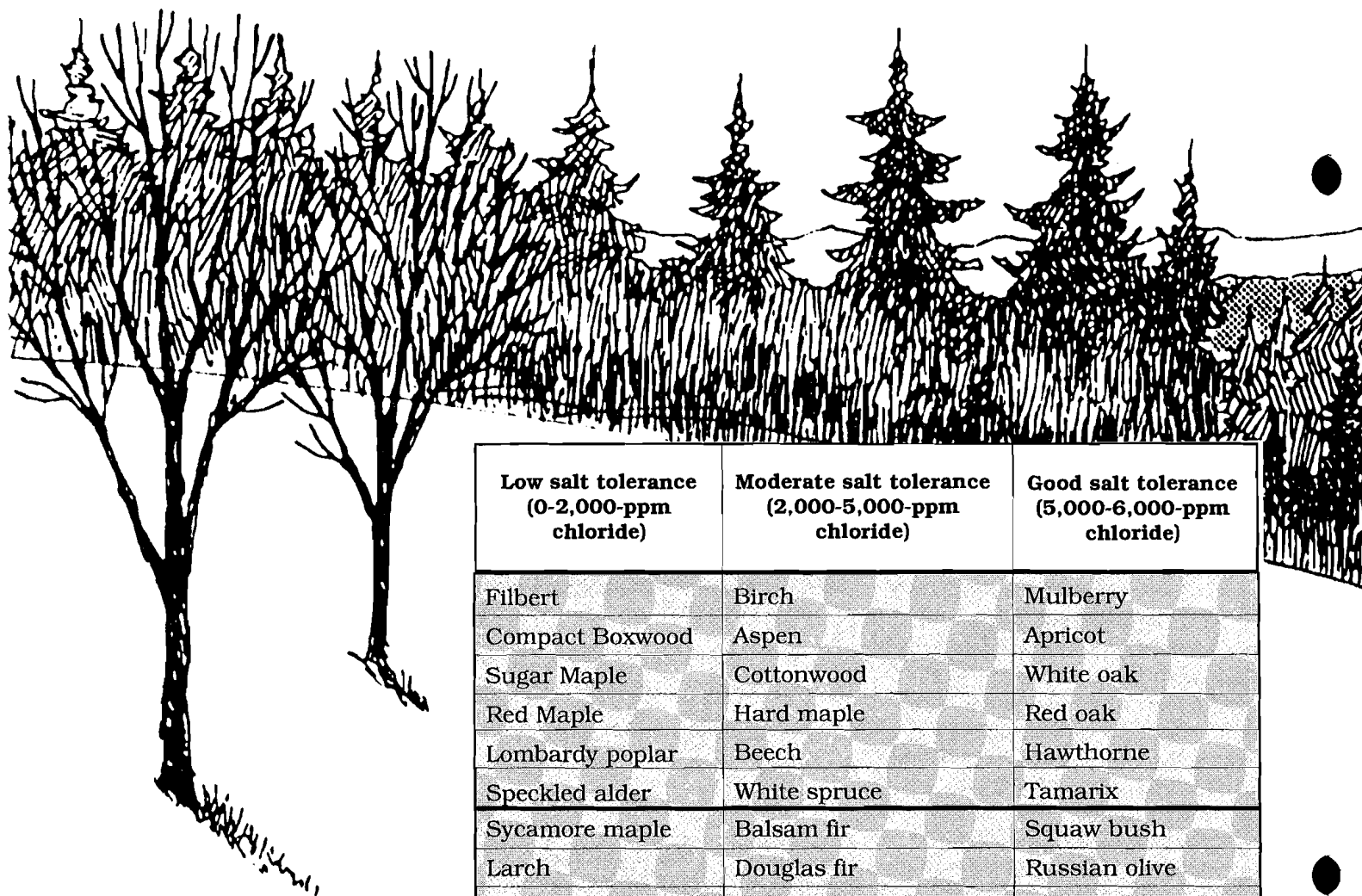
Innovations from Abroad

The Intermodal Surface Transportation Efficiency Act of 1991 authorized an international "scanning" program, to learn about advanced technologies developed outside of the United States that might have application here. As part of that effort, FHWA, AASHTO, and the

areas, they shovel the snow into the gutter, where it is carried away.

- * Geothermal water sprays for melting snow on roads.
- * Airfoils to keep the snow off the back of the spreader and thus increase the vehicle's visibility to vehicles approaching from the rear.

Continued on Page 9



The Relative Salt Tolerance of Trees and Ornamentals

Low salt tolerance (0-2,000-ppm chloride)	Moderate salt tolerance (2,000-5,000-ppm chloride)	Good salt tolerance (5,000-6,000-ppm chloride)
Filbert	Birch	Mulberry
Compact Boxwood	Aspen	Apricot
Sugar Maple	Cottonwood	White oak
Red Maple	Hard maple	Red oak
Lombardy poplar	Beech	Hawthorne
Speckled alder	White spruce	Tamarix
Sycamore maple	Balsam fir	Squaw bush
Larch	Douglas fir	Russian olive
Black alder	Blue spruce	Scotch elm
Italian poplar	Texas pivot	White poplar
European beech	Xylosma	Osier willow
European hornbeam	Pittosporum	Honey locust
Rose	Pyracantha	Black locust
Pineapple guava	European black currant	Gray poplar
Viburnum	Siberian crab	Silver poplar
Arctic blue willow	Boxelder maple	English oak
Spirea	Japanese honeysuckle	White acasia
Multiflora rose	Green ash	Bottlebrush
Winged euonymus	Ponderosa pine	Oleander
Barberry	Golden willow	Common matrimony
Little leaf linden	Lantana	vine
Black walnut	Spreading juniper	
	Arbor vitae	
	Silver buffalo berry	

Source: *Facts You Should Know About Effects of Deicing Salt on the Environment*, a review of a publication by the National Cooperative Highway Research Program, published as a supplement to the *Reporter* of the American Public Works Association. Reprinted with permission from *Better Roads*, June 1991.

Illustration: From *Public Roads*, Vol. 49, No. 3

"Get ready for the snow and ice"

Videos and Publications

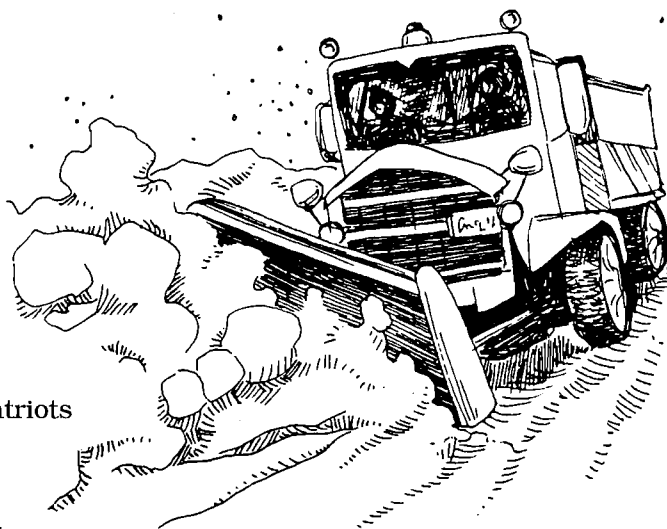
(Simply mark your choices and call or send in your request)

Yes, I would like:

Videos


(loan only)

- ☐ MO-184 Effective Snow Fences
- ☐ MO-169 Wetted Salt
- ☐ MO-122 Snow Fighters - Quiet Patriots
- ☐ MO-120 Plow Power
- ☐ MO-190 Snowfighting from A to Z
- ☐ MO-191 The Snowfighters. **New from The Salt Institute!**
A revised version of the original plus new footage.



Publications

- ☐ Environmental Impact of Highway Deicing - Interim Report, Environmental Protection Agency, Water Quality Office. December 1970.
- ☐ Deicing Salt and our Environment, Salt Institute.
- ☐ Managing Roadway Snow and Ice Control Operations, National Cooperative Highway Research Program, 1994.
- ☐ Snow Fence Guide, SHRP, 1991.
- ☐ The Salt Storage Handbook, Salt Institute, 1987.
- ☐ Highway Salt Management for Local Government Officials, Cornell Cooperative Extension Regional Office, February 1985.
- ☐ Snow and Ice Control Operations, U.S. DOT/FHWA, March 1977.
- ☐ Ice Melting Characteristics of Calcium Magnesium Acetate, U.S. DOT/FHWA.

(over for more) 

Detach here

- ☐ Highway Deicing: Comparing Salt and Calcium Magnesium Acetate, Transportation Research Board, 1991.
- ☐ The Snowfighter's Handbook, Salt Institute, 1991.
- ☐ Grygla Snow and Ice Service Level Study for Low Volume Highways, Minnesota DOT, January 1987.
- ☐ Safety Restoration During Snow Removal - Guidelines, U.S./DOT/FHWA, February 1991.
- ☐ Highway Deicing Salt Contamination Problems and Solutions in Massachusetts, National Water Well Association, September 1988.
- ☐ How to Solve Your Winter Weather Problems, Weather Services Corporation.
- ☐ Deicing Salt Facts: A Quick Reference, The Salt Institute.
- ☐ Calibration Chart, The Salt Institute.
- ☐ Sensible Salting Program, The Salt Institute.

and also our

Compact Disk - Interactive !

- ☐ **SNOW and ICE CONTROL.** This interactive disk is designed for employees who have a Commercial Driver's License (CDL) but may have never driven a truck with a plow attached. The fundamentals of pre-trip inspections, plowing procedures, application of salt and abrasives, and post-storm cleanup are covered. We have three of these for a two-week loan.

Please send to:

Name

Address
and phone

* Automated snow and ice control fixed-spray systems on bridges or steep roadways. Such

* Do more to educate the public and strengthen the link between the public and private sectors

What's Ahead

The anti-icing study continued through Winter, 1994, and the data which was collected by the states was forwarded to CRREL. Following data analysis, CRREL prepared a manual of practice for anti-icing operations. The manual guides the maintenance manager in choosing an engineered strategy that has the best chance of achieving the most effective results for a wide range of conditions. The manual includes a discussion of the following topics:

- * Winter maintenance program
- * Strategies to support the program

a system would work well in frosting conditions; sensors at the site would automatically energize the system for application.

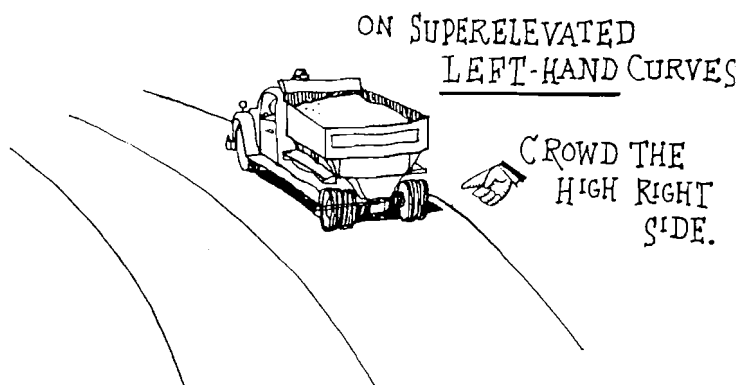
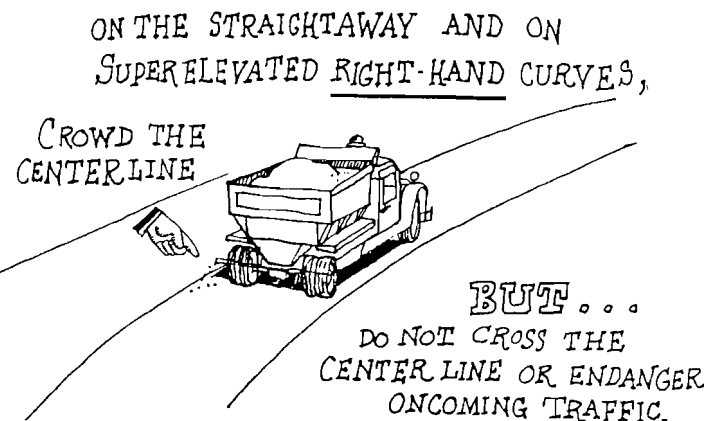
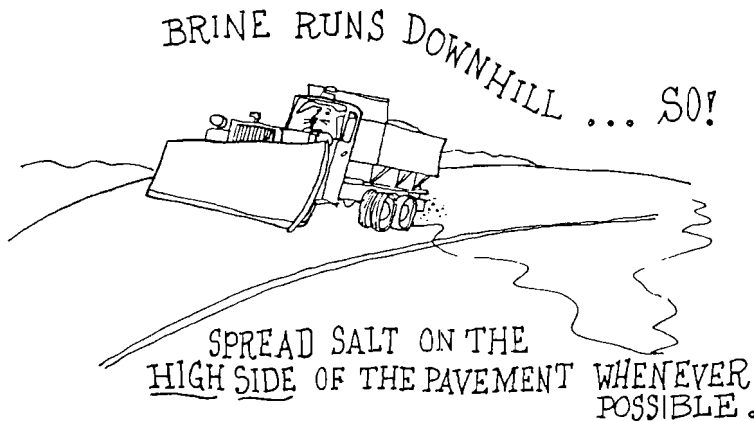
* Traffic control devices, such as changeable speed limit signs, on the back of spreaders.

The study group recommended the establishment of a national winter maintenance technology evaluation program. The program would evaluate the technologies listed above, as well as conduct the following activities:

* Investigate improvements in blowing snow/avalanche control

* Study the possibility of using global positioning system technologies in managing truck fleets

The study group's recommendations were submitted to the AASHTO Highway Subcommittee on maintenance. The Subcommittee submitted a proposal to the AASHTO Standing Committee on Highways (SCOH) for the development of a national winter maintenance program. The proposal was accepted by SCOH, and development of the program will be initiated soon.



- * Deicing and other techniques
- * Anti-icing operations

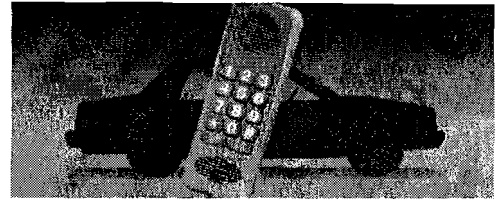
Planning and implementing an effective anti-icing strategy is also a major part of FHWA's snow and ice technology showcase. Results from the anti-icing study will be presented this October 10-13, at the Anti-Icing

Continued on Page 11

YOU AND YOUR CAR PHONE

Safe Driving Tips for Cellular Phone Owners

Safety and security. According to a national survey, they're the most important reasons why people own cellular phones. But while you can use your car phone to report car trouble, crimes or medical emergencies, you also need to be a safe driver.

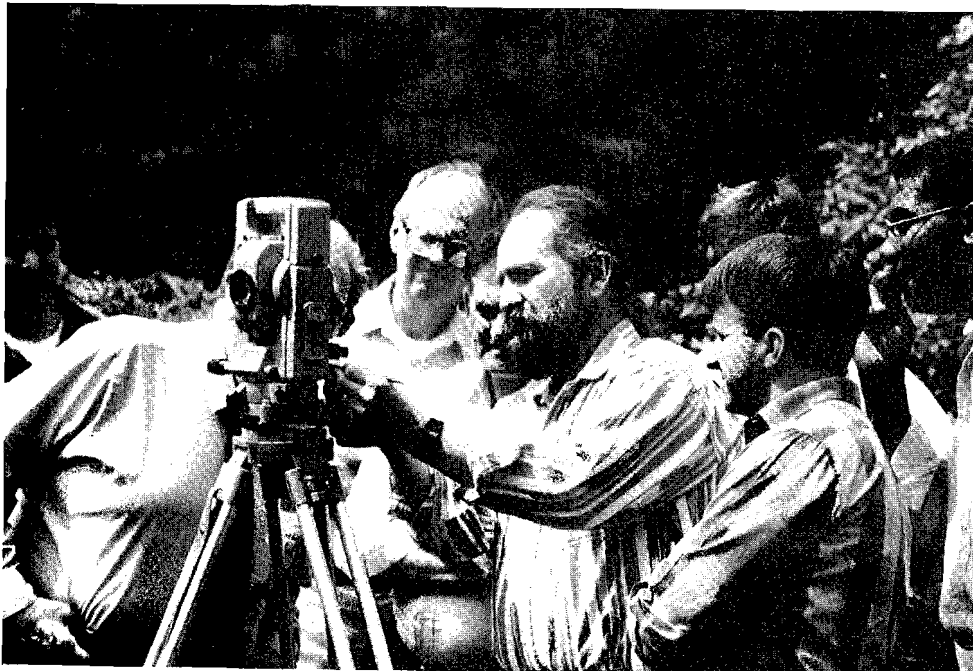


National Public Services Research Institute studies show a driver's concentration drops 20 percent when dialing a phone and 33 percent when involved in a complicated conversation. Here are some tips to follow to minimize distraction and improve your safety on the road:

- ◆ Be aware of all traffic conditions and road hazards before making or answering a call.
- ◆ If you have a passenger, ask him or her to place the call. If not, use the memory dialing function or pause between digits rather than dialing the entire phone number at once.
- ◆ Reduce your driving speed while on the road.
- ◆ If driving in bad weather or heavy traffic, use your voice mailbox option to pick up all incoming calls.
- ◆ Never attempt to write while driving.
- ◆ If your conversation is intense make the call only when parked.

Most important, remember that driving safely is your main priority. Drive defensively, obey all traffic laws, buckle up and stay within the speed limit.

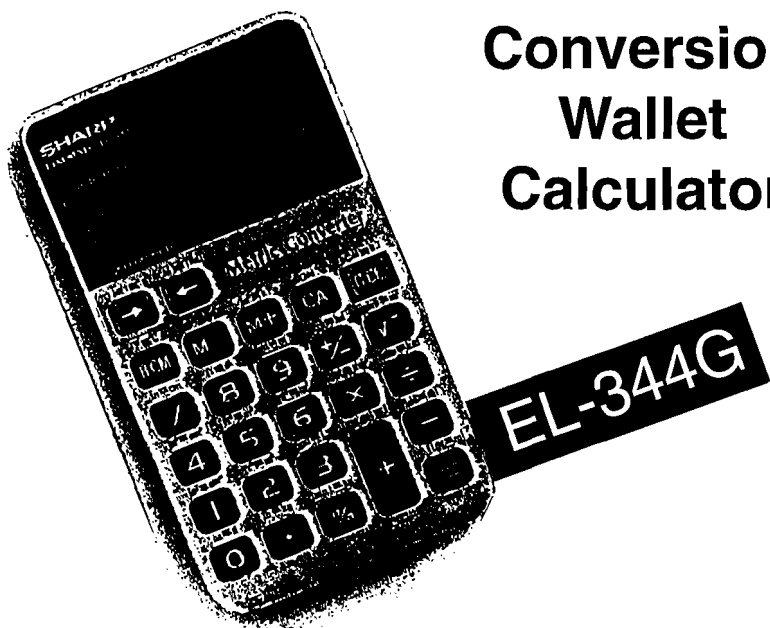
Source: Cellular Telecommunications Industry Associated



Participants learn the basics of total station survey equipment during a field exercise at our Survey Workshop held at the Andover Inn in May.

The workshop speaker, Ken Black, is an Adjunct Faculty member in the Civil & Environmental Engineering Department at UMass/Amherst.

Photo by Chris Ahmadjian



Metric Conversion Wallet Calculator

Ms. Nancy Knauber from the Portland, Maine, Public Works Department recently wrote to us to tell us about this Metric Conversion Wallet Calculator. It's inexpensive, easy to carry, and functional. Chris has one, and he loves it! Here are the details:

SHARP EL-344G **Metric Conversion Wallet Calculator** **With extra-large 8-digit LCD**

- Large 8-digit (10.5 mm) LCD display with punctuation
- 44 built-in metric conversions
- Operates on built-in solar cells (50 lux min)
- 3-key memory
- Colored conversion keys for easy operation
- Sign change, percent, and square root keys
- Comes with wallet

Dimensions: (WxHxD) 2-3/4" x 4-25/32" x 1/4"

Available in window box

Anti-Icing . . .continued from Page 9

Technology Symposium in Estes Park, Colorado. This symposium is part of the 15th Annual Western Snow and Ice Fleet Management Conference. Watch for the results of the study in Mass Interchange!

Much work remains to improve anti-icing winter maintenance operations. Continual systematic evaluation is needed, with a focus on plowing (equipment and methods specifically designed for anti-icing operations), prewetted salt systems (materials and spreader equipment specifically designed for anti-icing operations), and continual integration of additional information for use in decision making, including information on friction, pavement condition, weather, and residual chemical concentration.

"We'd like to strengthen the partnerships among industry, academia, and highway agencies," said Mergenmeier. "Anti-icing holds a lot of promise, and by working together, we can achieve significant improvements in service and safety."

"We in the United States have come a long way in improving snow and ice control operations. But we still have a way to go."

Revised and reprinted with permission from the December 1994/January 1995 issue of *Focus*. *Focus* is a publication of the Strategic Highway Research Program.

Illustrations are reprinted with permission from *Snowball/Snowfighter*, a publication of the Salt Institute.

Homemade Glass Bead Blaster

Brian C. Wilson (far right) poses with the glass bead blaster he made. Brian is a mechanic at the Bourne DPW. Also pictured is Neil Andres, Superintendent of Public Works for the Town of Bourne.

Brian estimates the cost of the parts to make the blaster to be \$100. He also informed us that kits and parts to build your own bead blaster can be purchased from Tip Sandblasting at (800) 321-9260.

Our thanks to Brian and the rest of the Bourne DPW for this innovative contribution.

P.S. Don't forget to send us your interesting stories and photos for our newsletter CONTEST. **Deadline extended to November 30th!**



Photo by Chris Ahmadjian

The Baystate Roads Program, which publishes *Mass Interchange* each quarter, is a Technology Transfer (T2) Center created under the Federal Highway Administration's (FHWA) Local Technical Assistance Program (LTAP). FHWA is joined by the Massachusetts Highway Department, the Department of Civil and Environmental Engineering at the University of Massachusetts/Amherst, and local public works departments in an effort to share and apply the best in transportation technologies.

In addition to publishing *Mass Interchange*, the Baystate Roads Program facilitates information exchange by conducting workshops, providing reports and publications and videotapes on request, and offering one-to-one technical assistance on specific roadway issues. Because the program relies on input from many sources, inquiries, articles, and ideas are encouraged.

To contact the Baystate Roads Program, call (800) 374-ROAD (in state) or (413) 545-2604.

BAYSTATE ROADS PROGRAM

University of Massachusetts Transportation Center
214 Marston Hall
Amherst, MA 01003

Non-Profit Organization
U.S. Postage Paid
Permit No. 2
Amherst, MA
01002



MASS HIGHWAY



Massachusetts Highway Department
Federal Highway Administration
University of Massachusetts/Amherst

