Technology News

Roads Bridges Transit

Iowa Transportation Center

Iowa State University

December 1994

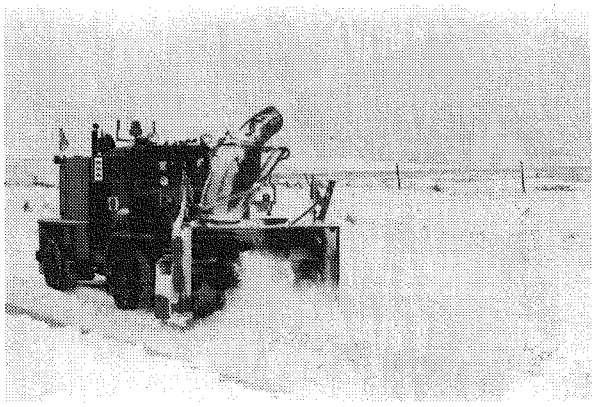
# Iowa tests anti-icing strategies

**By April Greenbeck**
**Editorial Assistant**

Winter has arrived in Iowa with a vengeance, dropping several inches of snow across the state and making highways treacherous. When a snow or ice storm hits Iowa, maintenance crews hit the roads, investing significant time and money to keep our byways clean and safe. Now new, experimental anti-icing technologies are helping some Iowa road crews make their first strike *before* the storm hits.

Anti-icing is the practice of applying a deicing chemical to pavement before or soon after precipitation begins. Acting as a freezing point depressant, the chemical prevents a strong bond from forming between pavement and ice so snow and ice can be removed easily. According to Strategic Highway Research Program H-683, "Anti-icing is a promising alternative to deicing, since much less chemical is needed to eliminate bonding of ice and snow when the chemical is applied directly on the pavement" before ice forms.

Anti-icing is designed to work with deicing methods because chemical pretreatments alone may not be sufficient to maintain acceptable levels of performance. When used as part of a total snow management program, anti-icing helps maintenance departments by saving them chemicals and labor-hours. It benefits motorists because travel is more safe and convenient. It also benefits the environment because less chemical is applied.



**Anti-icing technology shows promise of reducing the amount of time spent on traditional road cleaning strategies like snow plowing/blowing.**

Although anti-icing shows potential for improving efficiency and reducing costs associated with winter road maintenance, many states have not adopted an anti-icing policy because of uncertainties surrounding the technology. To eliminate some of these uncertainties, the Federal Highway Administration (FHWA) is conducting a two-year anti-icing study dealing with anti-icing

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## Inside this issue



# Iowa's statewide safety programming takes off

**The Strategic Planning Project (StraPP) Committee on Information Systems for Highway Safety is developing a plan for a comprehensive system of safety information to undergird Iowa's safety management system.**

The abundance of highway-safety information in Iowa boggles the mind: police accident reports; driver, vehicle, and owner records; roadway data; traffic volume; driver adjudication files; information regarding emergency medical services (hospital patient care, emergency department and discharge, long-term care, and treatment costs); and motor carrier safety records, licensing data, and driver files, to name the most obvious.

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# Anti-icing continued from page 1

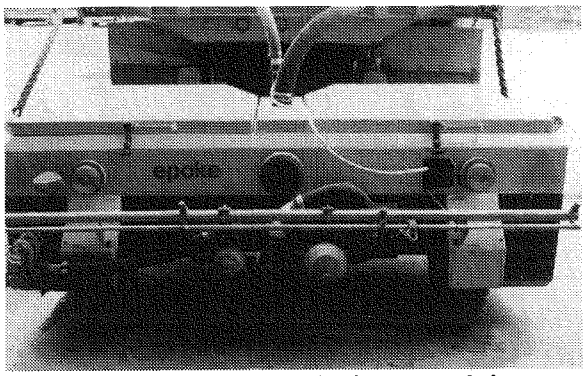
chemicals, equipment, and strategies. Iowa, one of fifteen states involved in the study, reported positive results at the end of the first year.

Charles Pickett, a highway maintenance supervisor for the Iowa Department of Transportation, heads one garage participating in the FHWA study. In the first year of the study (winter 1993–94) Pickett examined how effectively anti-icing treatments maintain road conditions during adverse weather conditions while reducing the level of chemical, labor, and equipment use.

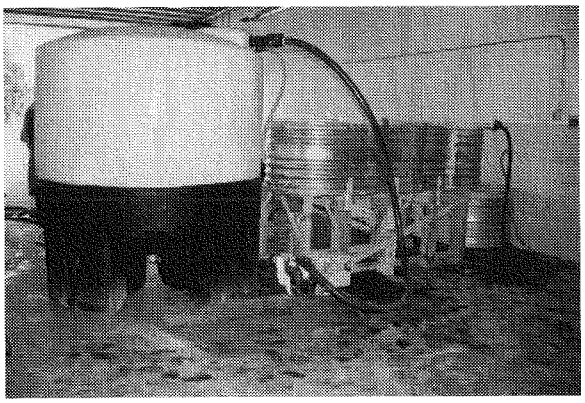
Pickett's garage has experimented with saline solution as an anti-icing agent. After trying different amounts of salt in solution, the garage settled on a 24–26 percent salt brine. If the salt content is too much higher, Pickett says, the solution "gets thick like ice cream."

The garage makes the salt brine by running water through a 300-gallon tank of salt to attain the proper percentage of salt in solution and then pumping it into the holding tank where it is circulated periodically. A hose from the holding tank fills a spreader truck in about five minutes, so operators can get in and out of the garage quickly.

Pickett uses the Epoke SW2000 spreader for anti-icing operations. Two sets of diode banks on the spreader open the valves and determine the pressure of the spray. Pickett has found 35 pounds per square inch works well. At this pressure, the spray is a light fog. To spread a consistent amount of chemical regardless of vehicle speed, sensors in the Epoke SW2000 determine the ground speed through a wheel hooked into the gear box and correlate the speed with the amount of chemical dispersed.




**The Epoke SW2000 spreader is state-of-the-art in anti-icing technology.**



**Salt brine is mixed in this 300-gallon tank and then pumped to a holding tank.**

According to Pickett, the ideal time to spray the saline solution is approximately two and a half hours before precipitation occurs. To monitor developing weather, Pickett carries a laptop computer loaded with software that displays current information from the state road weather information system (RWIS) at the test area. This information helps him decide when precipitation is imminent. It also keeps him apprised of pavement temperatures; anti-icing chemicals should generally be applied to roads before pavement temperatures drop below freezing. (For more information about RWIS, see the microtechnology column in this issue.)

Last winter, Pickett's test area ran on Interstate 35 from Highway 5 north four miles to the Ashworth Road overpass. After refining his materials, equipment settings, and timing, Pickett was able to keep the test lanes (northbound) at reasonable driving conditions in bad weather, even when the control lanes (southbound) became 100 percent ice-covered. The day following a storm, workers cleaning the southbound lanes usually found the northbound test lanes already clean and dry.

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Director — Tom Maze; Assistant to the Director — Jan Graham; Associate Director of Outreach — Duane Smith; Editor — Marcia Brink; Safety Circuit Rider — Ed Bigelow; Program Coordinator — Sharon Prochnow; Library Coordinator — Stan Ring; Account Clerk — Diane Love; Secretary — Margaret Hammer

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Iowa Transportation Center

IOWA STATE UNIVERSITY

# Iowa's pavement management system: an update

**Task force to participate in FHWA's automated distress data collection test in December 1994**

**By Omar Smadi**
**Pavement Management Specialist**

The Iowa Department of Transportation has begun the implementation phase of a statewide pavement management system (PMS) for all non-National Highway System roads in Iowa. Begun in April 1994, the PMS project is managed by a task force of city, county, regional, and Iowa DOT representatives, with staff support from the Iowa Transportation Center (ITC).

The statewide PMS project is divided into three phases, with a final completion date of September 1997. The initial phase of the project was finished in October 1994, when a draft work plan was submitted to the Federal Highway Administration (FHWA) for certification by January 1995. The work plan contains the basic design steps for the statewide PMS. The second phase of the project, implementation, is divided into two parts, with the first part being scheduled for completion in December 1995 and the second part by September 1997.

The tasks for the first part of the implementation phase include establishing a database to contain all information necessary to run the PMS; implementing an inventory system; evaluating collection options for pavement distress data; collecting pavement inventory and historical information; and evaluating and selecting pavement management software. These tasks should be completed by December 1995.

The task force is now undertaking two of these initial phase-two tasks: establishing the database and evaluating data collection options. First, during the coming months the task force will discuss the database design and implementation. The relationship between the statewide PMS database and the

**continued on page 10**

## Anti-icing **continued from the previous page**

Pickett says anti-icing techniques show tremendous cost savings. His smaller anti-icing truck needed to make only one trip for every three trips of the larger conventional snow removal truck.

Other states participating in the FHWA anti-icing study used other chemicals (e.g., sand/salt mixtures, calcium chloride, calcium magnesium acetate) and techniques and experienced varying degrees of success. All states also have reported some limitations to anti-icing. One such limitation occurs when one county uses an anti-icing strategy and the next county doesn't. During a storm, it may be dangerous for motorists to drive from clean or wet (anti-icing) roads to roads that have not yet been treated.

Another limitation concerns keeping the chemical active. Dry chemicals must be applied immediately before the storm or they may be blown off the road by traffic. Prewetting the chemical can help keep it on the road. Chemicals in solution, like Pickett's, stay on the road longer than dry chemicals.

A problem associated with certain liquid anti-icing agents occurs when the pavement becomes slick because the pavement is overly wet with chemical. For example, Rapid City, South Dakota noted that the pavement became slimy if a large amount of magnesium chloride was applied. Iowa has not encountered this difficulty with the salt solution.

Another potential problem is the negative opinion of uninformed motorists. Oregon had this experience: Without informing the public, Oregon switched from using sand as an abrasive to using calcium magnesium acetate (CMA) as an anti-icing agent because dust particles from sanding operations were contributing to poor air quality and affecting water supplies. Motorists assumed the CMA wasn't working because they weren't hearing the sand interact with the underside of their cars. They also viewed the "prestorm deployment of spreader trucks as an obvious inefficiency."

And finally, even with the best RWIS, icing events are not perfectly predictable. This is Iowa, after all.

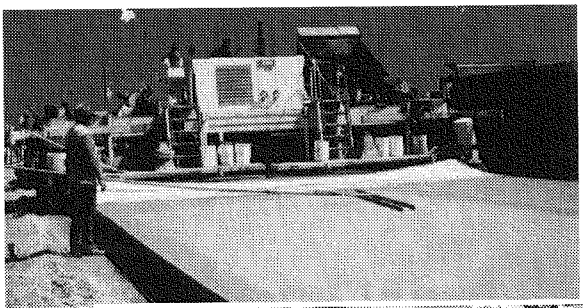
Year two of the FHWA study should yield solutions to some of the problems and refinements for some of the techniques of anti-icing. In spite of the drawbacks, anti-icing appears to be a viable alternative in winter road maintenance. Anti-icing techniques reduce costs; reduce the burdens placed on maintenance workers during the sometimes tedious, troublesome winter months; and provide motorists with cleaner, safer roads.

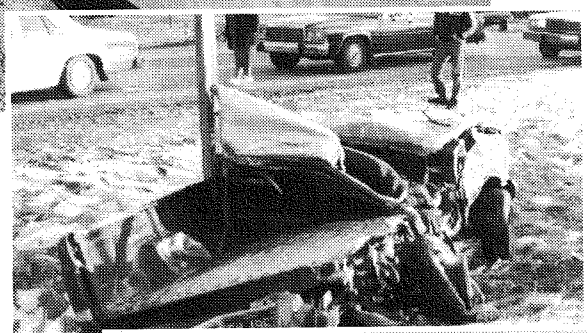
For more information about Iowa's participation in the FHWA study, call Charles Pickett at 515/225-3322. For more information about results from the first year of the study, call Tom Donahey, director of maintenance programs at the Iowa DOT, at 515/239-1388. Refer to "Federal Test Evaluation 28 Program."

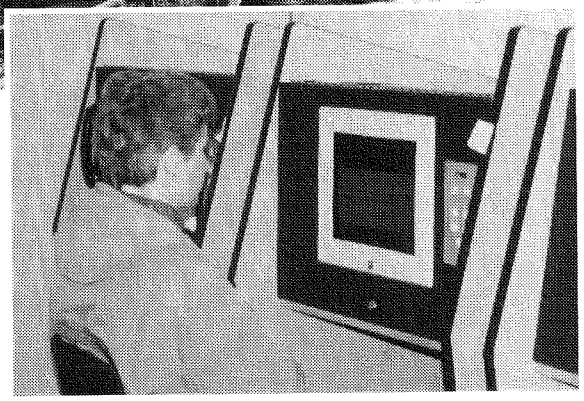
The ITC library has the following materials available on loan: SHRP-H-683 "Anti-icing Study: Controlled Chemical Treatments" (1994) and SHRP-H-385 "Development of Anti-icing Technology" (1994). Call Stan Ring, librarian, at 515/294-9481. ■

# Safety continued from page 1

The list of users of this information is as mind boggling: law enforcement personnel; highway engineers; prosecutors and judges; licensing agencies; emergency response teams; health care organizations; motor carrier officials; federal, state, and local officials; and the general public.







**"Highway safety" is not a neat little category in itself but crosses all highway transportation disciplines. It is a central consideration in programs like highway construction, accident reporting, driver license testing, and many others.**

***Accident photo courtesy Iowa DOT***

**The problem**

Because safety data are collected and maintained by many diverse and autonomous agencies in Iowa, problems can arise. Some records are not accessible to users who might need them. Different agencies collect duplicate sets of information. There is often no common reference system for reports. Agencies have varying levels of analytical expertise with which to draw conclusions from the data. And, not least of all, some data simply slip through the cracks and go unreported. As a result of these problems, users sometimes experience delays finding the information they need or, worse, get incomplete or incorrect data.

Weaknesses in safety records can become serious defects in light of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). ISTEA requires each state to develop a comprehensive system to manage highway safety. The safety management system (SMS) will apply to all public roads, with the goal of reducing highway crashes and the resulting injuries, fatalities, and property damage.

The backbone of an effective SMS is a comprehensive, coordinated, statewide framework of safety information—a framework that Iowa and many other states currently lack.

**The solution**

To provide this comprehensive framework of safety data, the Iowa Department of Transportation has contracted with the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA) to develop a strategic plan for a comprehensive safety information system in Iowa. Iowa's is the first such NHTSA contract awarded in the nation.

The result: Iowa's Strategic Planning Project (StraPP) Committee on Information Systems for Highway Safety.

StraPP is a coalition of state and local safety agencies in Iowa. Its major goal is to establish, through interagency cooperation and coordination, shared information systems or networks that enable safety data users statewide to access the best data possible.

StraPP's specific objectives are to

- assess current traffic records systems statewide,
- develop a strategic plan for implementing a statewide safety information system, and
- identify and apply technologies necessary for the statewide safety information system.

The StraPP committee has been meeting regularly since June 1994. In these few months, the committee has conducted a traffic records assessment, established subcommittees responsible for prioritized functions of the strategic plan, and held a major statewide conference on highway safety information systems technologies.

**Traffic records assessment**

More than 50 professionals from more than 30 agencies in Iowa—including the Iowa Transportation Center—participated in the assessment of current traffic recordkeeping practices. Other contributing agencies included personnel from courts, engineering, and local law enforcement, as well as the Iowa DOT, the Governor's Traffic Safety Bureau, the Iowa Department of Public Health, and many others. Participants completed questionnaires and were interviewed by an outside review team.

The assessment report identified different types of safety records currently collected (accident, driver, vehicle, roadway, citation/conviction, and emergency medical services (EMS)); determined the characteristics that make

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## Safety continued from the previous page

safety records effective (e.g., timeliness, uniformity, consistency, completeness); and categorized the uses of these traffic records (e.g., management process, problem identification, output reports, and evaluation). As a result of the assessment, the StraPP committee now has a set of recommendations identifying major problems and suggesting courses of action.

**Subcommittees**
To address issues raised by the assessment that must be addressed in the strategic plan, the StraPP committee has established three subcommittees.

- The location subcommittee is addressing all areas of safety records that involve referencing a location.
- The systems integration subcommittee is addressing the integration of existing, centralized, statewide information systems and is facilitating a movement already underway to integrate information on crash victims being collected by first responders, trauma centers, and hospitals.
- The local empowerment subcommittee is assisting local agencies with their information systems needs, as well as dealing with issues of training and technology transfer to local agencies.

Working through the subcommittees, the StraPP committee plans to have its strategic plan drafted by April 1995.

**Statewide conference**
The StraPP committee held Iowa's first statewide conference on highway safety information systems in November 1994. One hundred thirty representatives from nearly 50 state, local, regional, and private agencies and the federal government attended to explore the challenges and opportunities for providers and users of highway safety information. Many of the StraPP committee's issues—electronic data capture, EMS and health data systems in Iowa, traffic safety assessment in local communities, technologies like global positioning systems and geographic information systems—were addressed by speakers and workshops at the two-day conference in Waterloo.

**Integration with statewide SMS**
The StraPP committee was formed in June 1994; Iowa has since developed a work plan to implement a statewide safety management system as mandated by ISTEA. Iowa's SMS is for all public roads and streets, not just for federal-aid highways.

A management system is a systematic, objective process of gathering information to help with decision making. According to the federal definition of a safety management system, the goal of the SMS is to establish a process that will "reduc[e] the number and severity of traffic crashes by ensuring that all opportunities to improve highway safety are identified, considered, implemented as appropriate, and evaluated in all phases of highway planning, design, construction, maintenance, and operation."

Iowa's SMS will be an umbrella program to help the state's autonomous safety groups communicate, collaborate, and coordinate their efforts. Because information gathering and sharing are central to that effort, StraPP has been integrated as a major task force of Iowa's SMS. In fact, StraPP was established in large part to support the development of Iowa's SMS.

According to Joyce Emery, safety program administrator at the Iowa DOT, the SMS "won't replace or usurp any existing programs. It will help them work better, reduce duplication of effort, prevent 'the right hand from not knowing what the left hand is doing,' and reduce safety risks that now are going unrecognized and untreated."

The governor has appointed the Iowa DOT as the focal point for Iowa's SMS. An SMS coordination committee will appoint and/or oversee interdisciplinary task forces of varying types, sizes, and duration to address major safety areas suggested by the Federal Highway Administration and the National Highway Traffic Safety Administration. The task forces will consist of representatives from Iowa's large pool of safety-related agencies and interest groups.

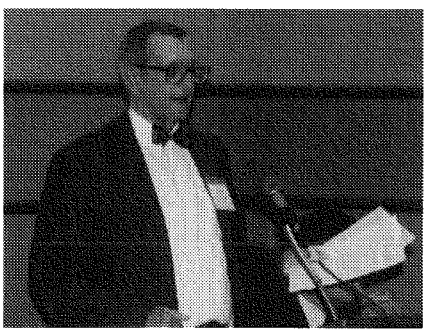
In addition to the StraPP committee, the SMS coordination committee plans to establish the other initial task forces by March 1995 and to begin action on the work of these task forces by October 1995. The SMS must be fully implemented by October 1996. StraPP's contract with NHTSA will be completed by June 1995.

For information on StraPP or on the progress of Iowa's SMS, contact Joyce Emery at 515/239-1016. For information about StraPP's local empowerment subcommittee, contact Safety Circuit Rider Ed Bigelow at 515/294-6384. ■

## Ralph Speer dies

Staff at the Iowa Transportation Center will greatly miss Ralph Speer, Jr., who died in October of complications of cancer. Ralph had headed West Des Moines' Public Works Department since 1990. He was an enthusiastic and valued member of the ITC's advisory committee and a regular participant and speaker at ITC-sponsored workshops and events.

Ralph was a visionary and a realist, and the ITC will miss Ralph's feisty personality, valuable insights, and willingness to pitch in when his help was needed.



**The late Ralph Speer gave opening remarks at ITC's snow management conference in September.**

# Road weather information systems

**RWIS collects real-time data for on-time decisions.**

*It's 8:30 p.m. and C. D. Weather, county highway maintenance supervisor for Whiteout County, has just finished tucking his youngest daughter into bed. Since the 6:00 local forecast, C. D. has been keeping his eye on an approaching snowstorm. He returns to his laptop computer, open on the kitchen table, and frowns; some ugly weather is definitely on the way. That dangerous section of county road C20, the Oskaloosa stub at the Nishnabotna bridge, is going to be a mess in a couple hours.*

*C. D. monitors the storm until 9:15 and then calls a crew chief. In 20 minutes, a maintenance operator is spraying carefully measured saline solution on the road and bridge. At 10 p.m. icy drizzle begins, turning to snow and ice by midnight. The precipitation continues until noon the next day, but through the storm the Oskaloosa stub stays clear of ice and snow accumulation—and safe.*

Another supervisor might have waited until the storm hit and then applied pass after pass of deicing chemicals to the road. Or, relying on intuition and the 24-hour National Weather Service forecast, the supervisor might have tried to guess when precipitation would start—and sent the crew out hours too early.

But in Iowa today, some state maintenance supervisors don't have to wait or guess because they have 24-hour access to real-time, site-specific weather and road conditions and forecasts, thanks to an RWIS (road weather information system).

An RWIS is a system of sensors, computer hardware, and software that detect, interpret, and format pavement and atmospheric conditions at specific sites (like the "Oskaloosa stub" in our story). An RWIS collects information

## Microtechnology

By Marcia Brink
Editor

from a network of sites. When combined with site-specific weather forecasts (for example, a forecast specific to the "Oskaloosa stub"), an RWIS allows users to predict with considerable accuracy the onset of precipitation or road frost at particular locations.

Such predictions are the heart of an effective anti-icing program. When combined with information about pavement and subsurface temperatures collected by RWIS sensors, these accurate predictions enable maintenance supervisors to spread anti-icing chemicals during the critical hour or two immediately before precipitation or frost develops or before pavement temperatures drop below freezing. This accurate timing reduces both the number of chemical-spreading passes and the amount of chemical spread per pass, because ice doesn't have to be melted and removed from the road. With anti-icing, ice never gets a chance to form or bond with the road surface.

At each data collection site, a remote processing unit (RPU) captures data from four sensors in the roadway and bridge deck. These data include *pavement and subsurface temperatures*, the *status of the pavement* (wet or dry), the *amount of chemical* on the road, and the *surface freezing point* (the temperature at which a liquid deicing chemical mix would freeze).

Each RPU also captures data from an atmospheric sensor at the site. These data include *air temperature*; *wind direction and speed*; *dew point temperature* (the temperature at which the air would be saturated with water vapor and precipitation would begin); *relative humidity*; *occurrence, amount, and kind*

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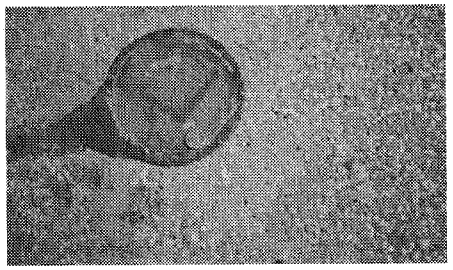
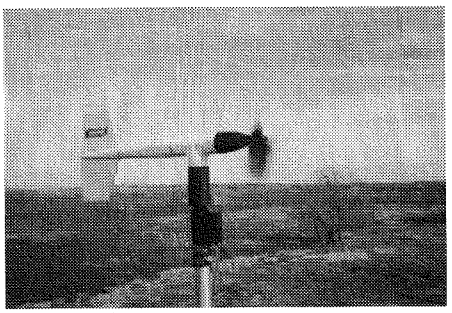
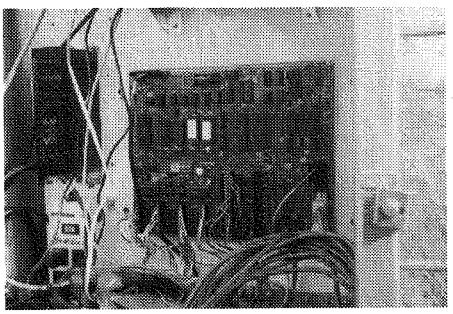


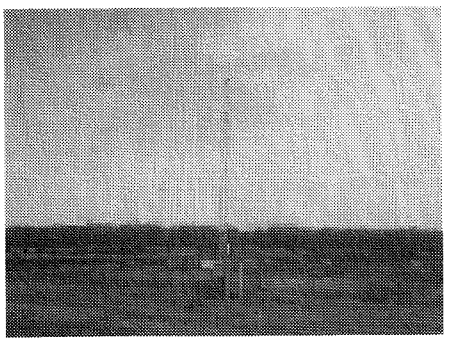
**Data collected by sensors in the road surface and bridge deck . . .**



**. . . along with data from atmospheric sensors . . .**



**. . . are collected at the remote processing unit and relayed to a central processing unit.**



**RPU tower near Des Moines**

# Reader survey

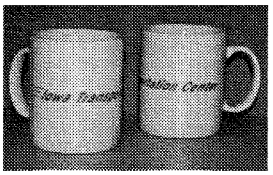
## Give us your opinions, and have a cup of coffee—on us!

Help us serve YOU better.

Please take a few minutes to complete the following survey about our newsletter and library services. Return postage is prepaid.Your responses will help us plan future technology transfer activities.

Besides, we're giving away heavy-duty, extra large, ITC mugs to 25 randomly selected survey respondents. Please **return the survey by January 31, 1995**.

Note: If you circulate *Technology News* in your office, please copy the survey for each reader.



**Don't YOU need something new to hold that morning brew?**

**Return our reader survey and you could receive one of these ITC mugs . . . FREE.**

**Name (Required only if you want to try for a mug.)** _____

**Address (Required only if you want to try for a mug.)** _____

**Job title** _____

**What type of agency do you work for?**

___**Association** ___**County** ___**Supplier**
___**Consultant** ___**Municipality** ___**University/college**
___**Contractor** ___**State agency** ___**Other** _____

**What is the single most important transportation-related issue/challenge/problem you face right now?** _____

### Newsletter

1. Overall, how do you rate *Technology News*?

___Valuable ___Useful ___Not very useful
___Very useful ___Somewhat useful ___WOMT (Waste of my time)

2. Which of these sentences describes best how you usually use *Technology News*? (Check one that applies.)

___Look at cover, read picture captions, check one or two favorite columns.

___Read most articles and columns.

___Skim entire newsletter, reading headlines and articles of interest.

___Do not use the newsletter in any significant way. *(If you check this one, please explain.)* _____

_____

_____

3. Which regular column(s) do you read often? (Check all that apply.)

___Microtechnology

___Conference calendar

___For more information (library material)

___Tips from the field

___Other *(Please be specific.)* _____

_____

4. Which of the following subjects interest you for future articles? Rate your top three choices (1, 2, 3); place check marks beside other subjects of interest.

___Bridges, especially _____
___Computers
  ___Geographic information systems
  ___Hardware
  ___Networks
  ___Communication
  ___ITC bulletin board service
  ___TranPlan user group
  ___Transportation software
  ___Other _____
___Environmental issues, especially _____
___Event coverage
  ___Special events (e.g., snowplow roadeo)
  ___Workshop/conference highlights
  ___Other _____
___Maintenance
  ___Bridge
  ___Equipment
  ___Roadway
  ___Other _____
___Management
  ___Budgeting
  ___Communication skills
  ___Grant writing
  ___Human resource management
  ___Litigation
  ___Partnering
  ___Project planning
  ___Risk management
  ___Stress management
  ___Time management
  ___Other _____
___Recycling, especially _____
___Regulations
  ___ISTEA compliance
  ___New legislation
  ___Other _____
___Roadway design, especially _____
___Safety, especially _____
___Traffic engineering
  ___Design elements
  ___MUTCD updates
  ___Signal design operations
  ___Signs and markings
  ___Studies and warrants
  ___Other _____
___Transit, especially _____
___Other _____

5. *Technology News* attempts to balance articles between technical subjects, general transportation-related information, and regulatory requirements. In your opinion, articles should focus

___more on ___less on ___about the same regarding technical subjects.
___more on ___less on ___about the same regarding general information.
___more on ___less on ___about the same regarding regulatory requirements.

6. If you could change one thing about *Technology News*, what would it be?

_____
_____

**Library**

1. Before reading this survey, were you aware that the Iowa Transportation Center has a lending library?
___Yes
___No

2. Have you ever requested materials (publications, videos, audio-visuals, computer-aided-transportation-training) from the ITC lending library?
___Yes
___No

3. Have the ITC library materials been useful to you?
___Yes
___No
___Does not apply

*(If no, please explain.)* _____
_____
_____

4. Have you ever requested a technical bulletin or report through the library?
___Yes
___No

5. Do you read the "For more information" column in *Technology News* for information regarding new library resources?
___Yes
___No

6. When you call the Iowa Transportation Center for information about library resources, do you get the help you need?
___Yes
___No
___Does not apply

*(If no, please explain.)* _____
_____
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7. If you could change one thing about the ITC's lending library services, what would it be?

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# Road weather information systems continued from the previous page

*of precipitation*; and possibly other factors like *visibility*.

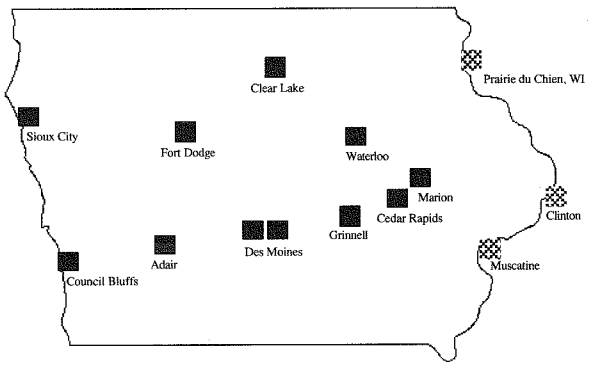
The RPU collects readings from the roadway, bridge, and atmospheric sensors and transmits them to a central processing unit (CPU). The CPU processes the data and sends them in a readable format to maintenance supervisors' terminals and workstations (including laptop computers via modems). In addition to the information from the RPUs, maintenance supervisors using an RWIS have access to professional meteorological services via their computers.

The Iowa Department of Transportation currently has 11 RPUs around the state, with plans to install 37 more during the next three years. The cost of each RPU, installed, is nearly $90,000.

Compare that cost to the approximately $65,000 the Iowa DOT spends per hour when a storm hits the state and maintenance crews are on the road removing snow and ice, and the potential savings are obvious. Several studies indicate that snow management crews who use anti-icing strategies based on RWIS data spend fewer hours on the road and spread significantly less chemical than crews whose snow management programs do not include such anti-icing strategies. The Strategic Highway Research Program (SHRP H-207) reports that an RWIS can provide a cost-to-benefit ratio of approximately 1:5 and a twenty percent increase in level of performance.

Because the number of RPUs is limited, site choice is critical. RPU sites are chosen primarily for detecting, monitoring, or forecasting road conditions and for providing data used by meteorological services to develop site-specific weather forecasts. For example, some sites are located at known trouble spots to detect conditions requiring attention at the earliest possible time; others are located in areas from which significant weather tends to come, in order to monitor conditions; and others are chosen because they represent a larger area for forecasting purposes.

Iowa is using Surface Systems, Inc. (SSI) sensors and software. Other system vendors include Climatronics and Vaisala. The state's RWIS is designed to be an open architecture rather than proprietary; that is, it will be compatible with other RWIS hardware and software, allowing local jurisdictions and neighboring states to become partners with the Iowa DOT.




**Black boxes show the Iowa DOT's 11 current RWIS sites. Grey boxes show 3 bordering sites.**

After using RWIS for a year now, Paul Ludwig, state highway maintenance supervisor in Adair County, appreciates the efficiency of anti-icing strategies based on RWIS. He uses an anti-icing mixture of half salt and half sand, which he applies about an hour before precipitation begins.

"It takes more salt to melt snow and ice off the road than it takes to keep them from sticking to the road in the first place. If you can get the chemical down at the right time, you can use a whole lot less of it.

"With the road weather information system, you always know how much chemical is on the road," he adds. "So, if you're at, say, 85 percent chemical, you don't waste time and money reapplying."

For more information about Iowa's RWIS, contact Tom Donahey, director of maintenance programs at the Iowa DOT, at 515/239-1388.

*It's 10:30 p.m. and C. D.'s computer displays the chemical factor on the Nishnabotna bridge. The chemical factor helps him decide if and when the next round of chemical should be applied, and he gives directions to the crew for the rest of the night. He can continue monitoring conditions closely, or he can get a good night's sleep in anticipation of tomorrow's after-the-storm cleanup.*

**References**

"Savings Associated with the Use of Road Weather Information Systems: A Literature Review." RWIS Committee, Iowa Department of Transportation. March 17, 1994.

"Development of Anti-icing Technology." SHRP-H-385. Strategic Highway Research Program, Federal Highway Administration. 1994. (This publication is available through the ITC lending library. Contact Stan Ring, librarian, at 515/294-9481.)

*Editor's note: Iowa's cities and counties do not yet have access to the Iowa DOT's RWIS, but such access is envisioned for this technology.* ■

## Sign Management 4.0 delayed

There's still hope that Sign Management version 4.0 will be out late this winter—probably by March 1995. Until its release, continue using version 3.4. For more information, call Safety Circuit Rider Ed Bigelow at 515/294-6384.

# Iowans trying out SHRP products

Do you ever wonder what came of all those Strategic Highway Research Program dollars? SHRP was established by Congress in 1987 as a five-year program to improve roads and make them safer. Of SHRP's $150 million research budget, $20 million was allocated to highway operations, resulting in dozens of new products, specifications, tests, and reports to help local personnel maintain roads and conduct other routine operations more efficiently and safely.

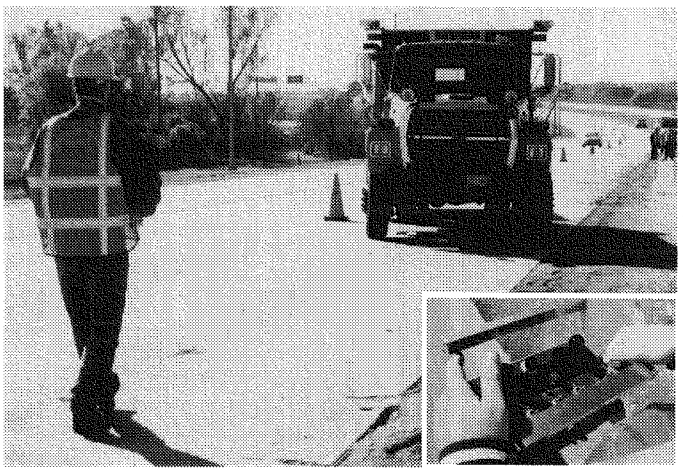
SHRP products range from simple to high-tech. As Iowans experiment with these new products, we will highlight them in *Technology News* and let you know users' reactions.

For general information about SHRP products, including sample products available on loan from the ITC, contact Duane Smith, ITC's associate director for outreach, at 515/294-8103. The ITC library has SHRP publications and videos and a SHRP catalog. Contact Stan Ring, librarian, at 515/294-9481.

For detailed information about SHRP products, check out the new SHRP Information Clearinghouse, a user-friendly computer database developed by Tonya Inc. under contract to the Federal Highway Administration. The clearinghouse has product information, report abstracts, directories of FHWA contractors and others involved in SHRP implementation, and information about the implementation status of SHRP products. It runs in a Windows environment, but users do not need to be running Windows on their computer. You need an AT-compatible or faster computer with at least 640K of random-access memory and a VGA monitor. You can reach the clearinghouse with a high-speed (9600 baud or faster) modem. To request a copy of the self-installing software required to dial in to the clearinghouse, contact Tonya Inc. at 202/289-8108. ■

## SHRP driverless vehicle protects road workers

In spite of every precaution, it keeps happening: A motorist or road worker is injured, maimed, or killed in a rear-end collision at a highway work zone. As of 1991, rear-end collisions accounted for 45 percent of maintenance worker accidents and 33 percent of fatalities nationwide. Last year alone, more than half a dozen motorists rear-ended a maintenance vehicle on Iowa's state roads.



**Ken Nelson of the MnDOT demonstrates SHRP's remotely driven vehicle in Council Bluffs in October. This fall the vehicle has also been demonstrated in Ohio, Indiana, Kentucky, Nebraska, North Dakota, Kansas, and Texas. Inset shows close-up of remote control box.**

The shadow truck follows a work zone, directing and moving traffic away from the work lane. Accidents involving the shadow truck generally occur when motorists don't see—or ignore—work-zone-ahead warnings, or when motorists try to pass other traffic before reaching the work zone. Because of the shadow truck's vulnerability to errant vehicles, and because waiting in the truck for the work zone to move forward can be tedious, driving the shadow truck is not a favorite work zone assignment.

To help alleviate some of the shadow truck problems, SHRP teamed up with the Minnesota Department of Transportation to customize a dump truck for radio-controlled, remote operation. The "driverless" vehicle is operated from a radio transmitter control box up to 1,200 feet from the truck. From a relatively safe distance, the operator can steer, brake, stop, accelerate, activate lights and turn signals, sound the horn, and change gears. The truck operator is safely away from the truck and is available to perform other road work.

The remote control features can be mounted on any truck and removed when the truck is sold or traded. The remote features can also be disabled and the truck used for other maintenance operations.

The remotely driven vehicle has several built-in safety features, like an automatic shutoff when sensors detect movement near the truck, a manual emergency shutoff, and a top speed of about 5 miles per hour. When equipped with a truck-mounted impact attenuator, the vehicle protects motorists as well.

# SHRP's flashing stop/slow paddle gets attention


**John Carmody of the Iowa DOT shop in Ames demonstrates SHRP's flashing stop/slow paddle.**

Designed to get drivers' attention quickly, this flashing stop/slow paddle should improve safety in work zones. The paddle's design, modified from regular flagger paddles, incorporates two high-intensity quartz halogen lamps on the stop side of the paddle. To get the attention of approaching traffic, the flagger pushes a button on the handle, and the lights alternately flash quickly ten times.

Bobbi Mead-Mehle, an equipment operator for the state garage in Ames, first heard about the flashing paddle at a signing workshop last winter. She immediately thought of Highway 65 east of Ames, where the Iowa DOT does a significant amount of road maintenance. In certain sections of that highway, rolling hills obstruct drivers' view of the road ahead, and even with plenty of warning, drivers are sometimes surprised to come up over a hill to find maintenance work in progress. Under such conditions, and on curves and stretches of road with little traffic, the flashing paddle can be especially helpful in catching motorists' attention.

John Carmody, another operator in Ames, has experimented with the paddle and has found some bugs to be worked out. The flashing paddle he has tried is somewhat smaller than traditional paddles and is therefore less obvious to the worker at the other end of the work zone. The paddle doesn't fit on a regular paddle cart and must be held manually, making it difficult for the flagger to use the flashing paddle in conjunction with a flag. The Ames garage has experienced some problems getting the batteries to hold a significant charge. John also notes that when the sun is behind the flagger, motorists cannot see the paddle light if the sun is in their eyes.

Leland Smithson, deputy director of the maintenance division at the Iowa DOT, emphasizes that the flashing paddle is designed to attract the attention of errant or unresponsive vehicles. When used with other flagging equipment, it can increase the safety of highway work zones.

Each Iowa DOT district is currently experimenting with the flashing paddles.

*Editor's note: variations of the flashing paddle are now available from various manufacturers.*

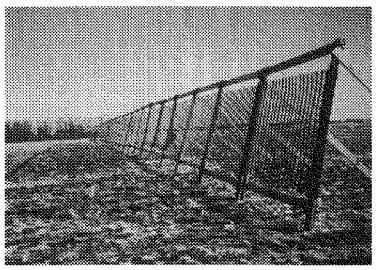
# SHRP snow fence solves visibility problem

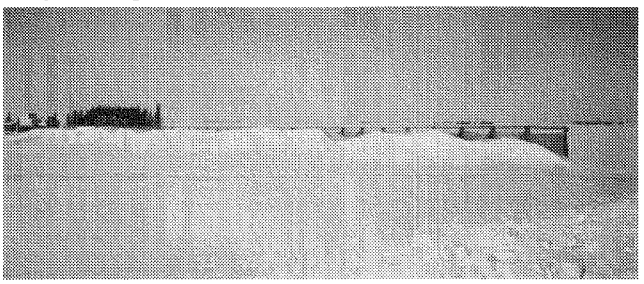
"They got this product right." That's the opinion of Jim Schultz, state maintenance foreman for Hancock and Winnebago counties, regarding SHRP's new engineered snow fence. Schultz installed a total of 2,600 feet of the new fence last year on Iowa Highway 18 just east of Iowa 17 and was pleased with the results.

"We've been putting the new fence in areas where visibility is a problem during a snowstorm. Where we've put up the fence, we've gone from zero visibility to good visibility. We don't even get snow in the ditch."

Schultz contracts with area farmers to leave the fence in the field all year. He'd like to install more fence, but some farmers are reluctant to give up the field space. "I think they'll come around," Schultz says. "They're going to appreciate how much safer the highway is wherever that fence is installed. That's important to the farmer, too."

A guide is available describing the new fence materials and location techniques. It also suggests ways to negotiate with property owners for permission to install fences on property adjoining the road. A separate engineering design manual can help you select the proper snow fence design for a particular environment.

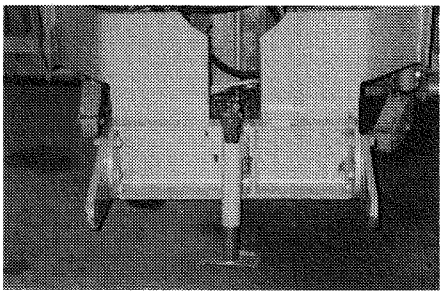


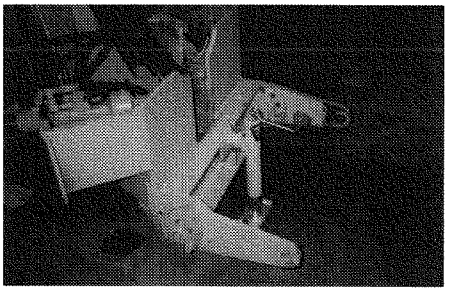


**SHRP engineered snow fence in northern Iowa catches plenty of snow.**

# Tips from the field

## Jack eases plow mounting





**Front and side views show the snow plow poised and ready for mounting. When the plow is mounted, the operator can pull the pin and lift the jack out.**

Snowplow drivers will agree that mounting and dismounting plows can be quite a hassle. Bob Dingman of West Des Moines Public Works has found a solution to this problem.

Dingman welds a 3/8-inch steel plate to the plows to provide a place to secure the circular jack mount. Using a removable Bulldog hand jack, an operator can mount the plow more quickly. The jack is then removed with a quick release pin and left in the shop to prevent corrosion and rusting.

This trick allows you to mount plows without waiting for someone to help. It also eliminates the worry of plows falling off floor jacks while being moved.

For more information, contact Bob Dingman at 515/222-3480. ■

## Pavement management update continued from page 3

various Iowa DOT pavement-related databases will also be discussed and recommendations for the statewide PMS database software and design made.

Second, the task force is evaluating options for collecting distress data. An effective and functional PMS depends on a good account of pavement conditions. Optimal and cost effective decisions regarding highway maintenance, rehabilitation, and reconstruction depend on accurate past and projected pavement conditions. Therefore, representative, objective, and quantitative measures of current pavement conditions must be collected. The task force will first determine the required measures to be collected and then select the appropriate method of distress data collection. Manual, semi-automated, and automated methods are currently used by different highway agencies. The Iowa DOT uses both manual and automated collection methods for the national highway system.

The task force has not yet ruled out any distress data collection option, but its goal is to select the option that will facilitate collecting objective, consistent, and accurate measures of pavement conditions in a cost effective manner. ITC staff will research the available commercial technologies for collecting automated or semi-automated distress data. The ITC will also evaluate the effectiveness of existing collection systems at the Iowa DOT to see if they can feasibly be used on a larger scale. Advantages and disadvantages of each system will be investigated, as well as institutional issues like purchasing or leasing equipment for distress data collection purchasing distress data, and the economics of each option.

To facilitate an informed decision by the task force, staff from the Iowa DOT and the ITC will participate in an automated distress data collection test to be conducted by the FHWA in mid-December 1994 in North Carolina. This is the second in a series of tests that are part of the FHWA's ongoing process to determine the effectiveness of automated distress data collection equipment.

Through this entire process, the task force will inform local governmental agencies of the steps being undertaken in the implementation phase of Iowa's statewide PMS. Information will be disseminated through presentations at, for example, the annual county engineers' conference and through meetings with local governmental agencies.

These two implementation tasks will be completed by June 1995, after which work will start on the remaining tasks of the second phase (implementation) of the project. The third phase—an ongoing process of updating, modifying, and improving the PMS to reflect changes in the pavement network—will start after the statewide PMS has been fully implemented.

For more information, contact Omar Smadi at 515/294-7110. ■

# For more information

Following is a sampling of new or popular materials available from the ITC library. To obtain materials or a catalog of library materials, contact Stan Ring, library coordinator, Monday, Wednesday, and Friday mornings at 515/294-9481. Or use the order form below.

### *Publications*

**Minimum Retroreflectivity Requirements for Traffic Signs** This FHWA study seeks to establish minimum requirements for the service life of reflective signs. Limited copies available free! **Request #P993**

**Using Shredded Waste Tires as a Lightweight Fill for Subgrades** This report documents seven sites in Minnesota where shredded rubber tires have been used as filler material. Loan copy. **Request #P1003**

**Concrete Paving Technology** This publication provides an overview of the design, construction, and maintenance of pavements, including Iowa examples. Loan copy. **Request #P1015**

**Iowa Construction Site Erosion Control Manual** The suggestions and solutions in this manual help construction workers comply with Iowa's current soil erosion and storm water runoff regulations. For sale at $20.00. **Request #P1030 or #V378**

### *Videotapes*

**Quality Control Repair of Concrete on Site** This series of SHRP videos discusses quality control of concrete for pavements or structures. **Request #V362, 363, 364, and 365**

**Partial Depth Repair of Concrete Pavements** This SHRP video discusses distresses that occur in the upper one-third of concrete pavements, while focusing on the materials and repair processes used. **Request #V372**

**The Hazards of Hurry** Directed at backhoe operators, this video illustrates how accidents occur when people are in a hurry. **Request #V374**

**Roll of Drums** This video illustrates how accidents may occur when people are ignoring safety regulations. **Request #V375**

**Restoring Land Transfer in Jointed Concrete Pavements** This video reports on research conducted in Indianapolis, Indiana, involving the process of transferring load weight in jointed concrete. **Request #V377**

### *Computer-aided transportation training (CATT)*

**Snow and Ice Control** This compact disk, prepared by AASHTO, is for employees with a CDL who are involved with winter maintenance procedures like snow removal, application of salt and abrasives, and post-storm cleanup.

**Traffic Control in Construction Work Areas** This compact disk is designed for employees working on long-term construction projects who must inspect traffic control devices in work areas.

### CATT brings the training to YOU!

CATT materials allow you to conduct one-on-one interactive training programs right in your own office or shop, at your convenience. You may have seen them demonstrated this month at the county engineers conference in Ames or at recent ITC-sponsored workshops.

Compact disk-interactive (CD-I) players are required to use the CATT compact disks. The ITC library has three CD-I players for loan. We also provide guides for player set-up and examinations.

### NEW LIBRARY CATALOG

Hot off the press: The Iowa Transportation Center library has a new, up-to-date catalog of all the ITC library's publications, video tapes, slide programs, and computer-aided transportation training (CATT) materials.

To get your **FREE** catalog, call Stan Ring or check the last line on the order form below.

## Library order form

To obtain materials from the ITC library, return this form to the Iowa Transportation Center, Iowa State University, 2521 Elwood Drive, Suite 125, Ames, Iowa 50010-8263. (Please limit your request to four items. Thank you.)

| | Book/VideoTitle | Index No. | No. of Copies |
|---|---|---|---|
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| Address _____ | _____ | | |
| City/State/Zip _____ | _____ | | |
| Phone (___) _____ | _____ | | |

___**Please send a complete catalog of all publications and audio-visual materials available from your office.**

# Conference calendar

**Asphalt Paving Conference January 31—Scheman Building, Ames** The 40th annual Asphalt Paving Conference is designed to share advances in the design of asphalt paving mixes and asphalt paving technology. Contact Jim Cable at 515/294-2862.

**Construction Inspection Workshop**

| | |
|---|---|
| **February 2** | **Cedar Rapids** |
| **March 16** | **Ames** |
| **March 23** | **Council Bluffs** |

This workshop provides fundamentals of construction inspection for new and seasoned inspectors. Contact Sharon Prochnow at 515/294-3781.

**Iowa Concrete Paving Association Conference February 8–10 Des Moines** Contact Gordon Smith at 515/278-0606.

**Iowa Work Zone Safety**

| | |
|---|---|
| **February 14** | **Ottumwa** |
| **February 15** | **Coralville** |
| **February 28** | **Ames** |
| **March 1** | **Mason City** |
| **March 14** | **Council Bluffs** |
| **March 15** | **Storm Lake** |

This conference, coordinated by the Iowa Department of Transportation, Bureau of Transportation Safety, offers training in traffic control in construction, maintenance, and utility zones. Contact Jo Burt at 515/239-1557.

**ASCE Water Resources Conference February 28–March 3—Scheman Building, Ames** This conference will focus on examining the engineering and management challenges which lie ahead concerning important water resource issues of the 1990s and beyond. Contact Steve Jones at 515/294-3957.

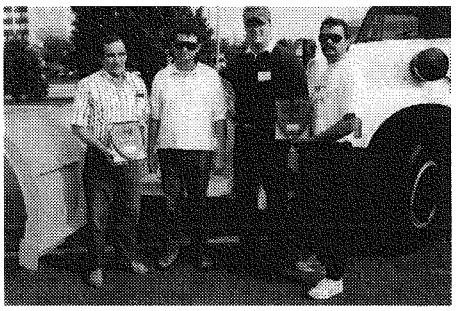
**National Highway Institute Hot Mix Asphalt Paving Workshop March 29–31—Newton, Iowa** Contact Duane Smith at 515/294-8103.

# Ridin' high at the APWA snow plow roadeo

Snow plow operators from the Iowa Department of Transportation and West Des Moines drove off with hard-earned first prizes in the 1994 APWA Snow Plow Roadeo held in Des Moines on October 5. Fred Thiede of the DeWitt garage and Dana Jurgens of the Chariton garage won the Class 1 division, squeaking by the second-place winners by half a point. Kim Niles and Harold Johnson of West Des Moines were the Class 2 division winners.

Designed for both drivers and supervisors, the roadeo focuses on the operation of a truck-mounted snow plow. Teams are divided into two classes based on their vehicles' wheel base dimensions.

In addition to providing operators a chance to sharpen their skills through friendly competition before the snow-clearing season begins, the roadeo demonstrates to spectators the skills involved in removing snow and ice from streets and roads. The contest consists of a written test, a timed search for vehicle safety defects, and a driving course simulating situations drivers commonly encounter when clearing streets.



**First place roadeo winners, from left to right: Fred Thiede, Dana Jurgens, Kim Niles, and Harold Johnson**



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