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Road salt's environmental impact

Final article in a series about transportation and the environment



IMPROPER SALT STORAGE presents more danger to vegetation and water supplies than spreading salt on roads and bridges, according to the Salt Institute's publication, *Deicing Salt and the Environment*.

Stored bulk salt that is exposed to rain and snow can develop harmful runoff. It's also a waste of salt.

Another drawback to exposed salt storage is that the anticaking agents can wash away from the outer layer, resulting in lumpy salt. Lumpy salt is more difficult to move through spreaders.

Salt storage basics

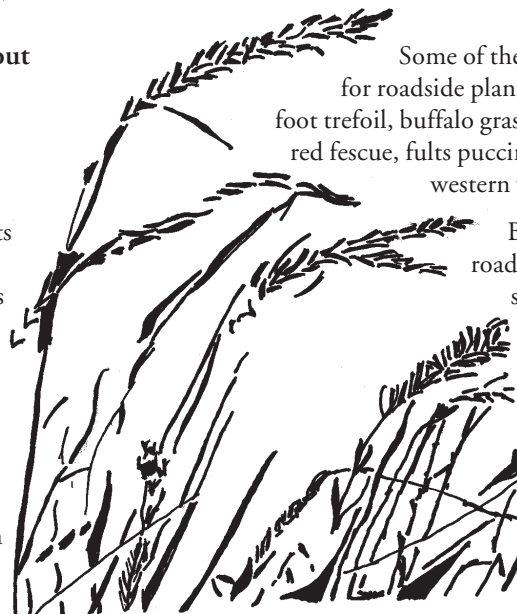
Keep road salt covered in a permanent roofed storage facility or one with a waterproof covering that's weighted and tied down.

Store salt on an impermeable pad made of asphalt or high quality, air-entrained concrete that's been treated with a quality sealant to prevent spalling.

Slope the storage pad slightly (minimum two percent) to let any water drain away. Channel water into a collection point, especially if the storage area is near a water supply.

Spreading basics

Spreading too much salt can harm roadside vegetation. Since sodium from road salt can build up in the soil over the years, it makes sense to choose plants and grasses that can handle salt runoff.



Canada wild rye is a hardy plant that tolerates roadside salt relatively well.

Some of the most salt-tolerant grasses for roadside plantings in Iowa include birds-foot trefoil, buffalo grass, Canada wild rye, dawson red fescue, fults puccinellia distans, tall fescue, and western wheat grass.

Beyond 80 feet from the roadway, the effects of deicing salt are insignificant.

More information

For more information about salt storage, contact Stan Ring, CTRE's librarian, 515-294-9481, stan@ctre.iastate.edu, to request *The Salt Storage Handbook* or *Deicing Salt and Our Environment*.

The Salt Institute's World Wide Web site also has valuable information: (<http://www.saltinstitute.org/>).

Farewell, BBS

On January 1, 1998, the CTRE's electronic bulletin board service (BBS) will be shut down.

The BBS has fulfilled its original purpose as an electronic data link between Iowa's transportation agencies and as a stepping-stone to the world of electronic data transfer. Other technologies will soon take over these functions.

For details, see page 7.

The preparation of this newsletter was financed through the Local Technical Assistance Program (LTAP). LTAP is a nationwide effort financed jointly in Iowa by the Federal Highway Administration and the Iowa Department of Transportation. The mission of Iowa's LTAP:

To foster a safe, efficient, environmentally sound transportation system by improving skills and knowledge of local transportation providers through training, technical assistance, and technology transfer, to improve the quality of life for Iowans.

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TECHNOLOGY NEWS
nameplate was designed by
Jennifer Reed.



MoGO in snow

Second article in a series of tips for motor grader operators



THERE'S A "DEFINITE ART to plowing," Winnebago County Superintendent Mark Johnson said at the Iowa Winter Training Expo in Ames last October.

Johnson and a few other experienced motor grader operators led a discussion about plowing snow. Some of their suggestions follow:

On deep banks of snow "always take just a little bit less than you think you should," Johnson said. Keep your speed up and throw the snow out. Put a "V" shape on each bank so the snow has more chance to blow through. A road with a squared off bank of snow will fill in more quickly, he said.

Dubuque County Maintenance Supervisor Ray Scheerman said if the snow is deep, "get a hole punched through the drifts." Get the first track as wide as possible because severe blowing and drifting can close it up again quickly.

Driving an articulating motor grader as fast as you can with the front end of the V against the drift works great on deep drifts, said Tom French, superintendent for Buena Vista County. He wings six to eight inches at a time, throwing it as far as possible.

Taking time to learn the art and craft of winter operations with a motor grader will help you get the job done better, faster, and with fewer complaints from residents.

Tips for cleaning snow off roads with a motor grader are illustrated on the next page. ■■

Storage facility saves salt



A SALT PILE that's exposed to the weather "ends up being one big hard chunk of salt," Ames Street Supervisor Craig Kirk says.

The city of Ames's salt storage facility, built in 1990, measures 61 feet in diameter and holds about 1,300 tons of salt. The city uses between 1,500 and 2,000 tons of salt in a year.

With the storage facility's convenient location near the railroad, salt is delivered to the site by rail a little bit at a time. The storage facility cost about \$52,000 to build. The facility "eliminates waste and runoff," Kirk says, and it pays for itself in about 10 years. ■■



CTRE welcomes new Safety Circuit Rider



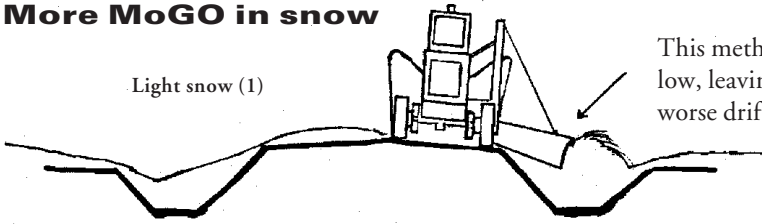
TOM McDONALD, currently development engineer at the Iowa DOT's Southeast Iowa Transportation Center,

will join the CTRE staff as Safety Circuit Rider in early January 1998. Watch for details in the next issue of *Technology News*.

Line art and tips on this page courtesy of the South Dakota LTAP center.

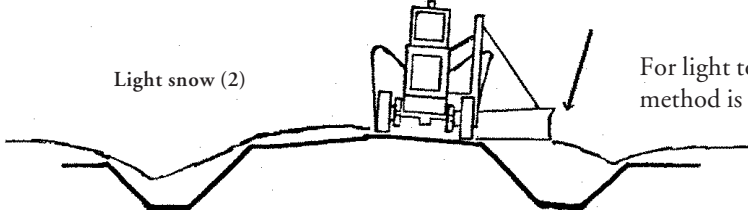
More MoGO in snow

Light snow (1)



This method is incorrect. The wing is too low, leaving a ridge of snow that will cause a worse drift during the next storm.

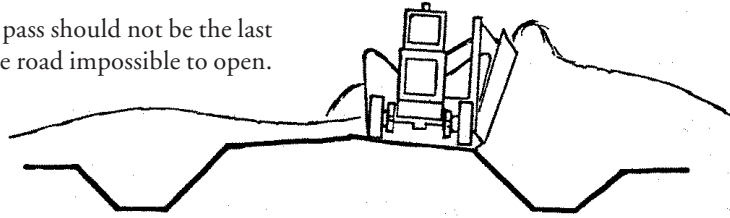
Light snow (2)



For light to moderate snow conditions, this method is correct. It leaves no ridge.

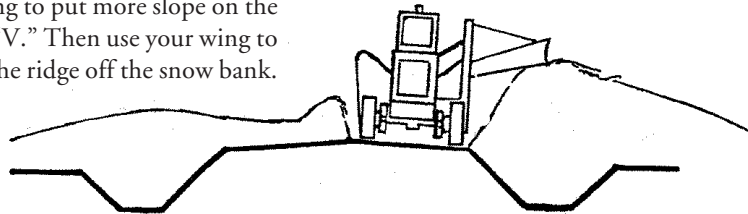
For deep snow conditions, the first pass should not be the last pass or the next storm will make the road impossible to open.

Heavy snow (1)



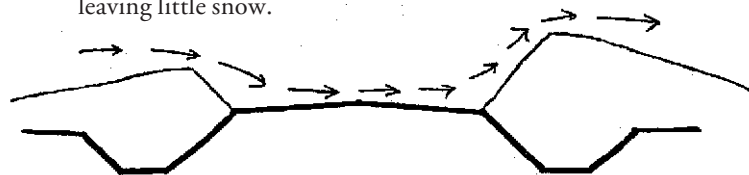
On your second pass, use your wing to put more slope on the snow bank so it's shaped like a "V." Then use your wing to "bench" the ridge off the snow bank.

Heavy snow (2)

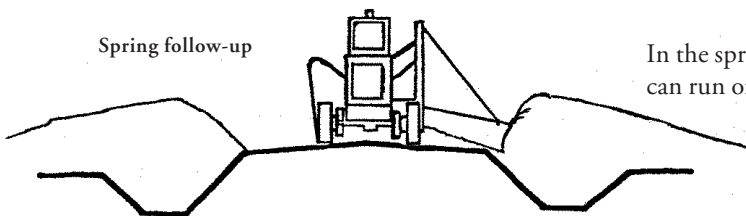


The "V" shape allows wind and snow to blow right across, leaving little snow.

Heavy snow (3)



Spring follow-up



In the spring, clean the shoulders so water can run off.

LTAP Advisory Board

The people listed below help guide and direct the policies and activities of the Center for Transportation Research and Education's Local Technical Assistance Program (LTAP).

The committee meets at least annually. Representatives of rural and urban agencies and individuals concerned with the transfer of transportation technology in Iowa are welcome to attend advisory committee meetings.

Contact any of the advisory committee members to comment, make suggestions, or ask questions about any aspect of LTAP.

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 Iowa Department of Transportation



Center for Transportation Research and Education

IOWA STATE UNIVERSITY

Iowa's pavement management program: an update

by Omar Smadi, Pavement Management Specialist

This is the fifth in a series of periodic articles updating Iowa's local government agencies on the progress of the state's pavement management program. The program covers all of Iowa's non-National Highway System (non-NHS), federal-aid-eligible roads.



IOWA's pavement management program (IPMP), under development since 1994, is nearing full operation. Training events will be held in early 1998.

The IPMP is a system for programming pavement maintenance, rehabilitation, and reconstruction. Very generally, the IPMP will

- collect data—an inventory of roadways, the history of roadway construction and maintenance, and the current condition of all segments of the system— about the non-NHS, federal-aid highway system.
- load these data into a GIS database and summarize the data by sections for pavement management purposes.

- provide the summarized data to jurisdictions to display graphically, to query, and/or to run through pavement management software to help agencies select and prioritize highway projects and allocate highway funds.

So far, the basic form of the pavement management program has been designed. The GIS database has been designed, equipment to automatically collect pavement distress data has been evaluated and selected, and pavement management software tools have been evaluated and selected.

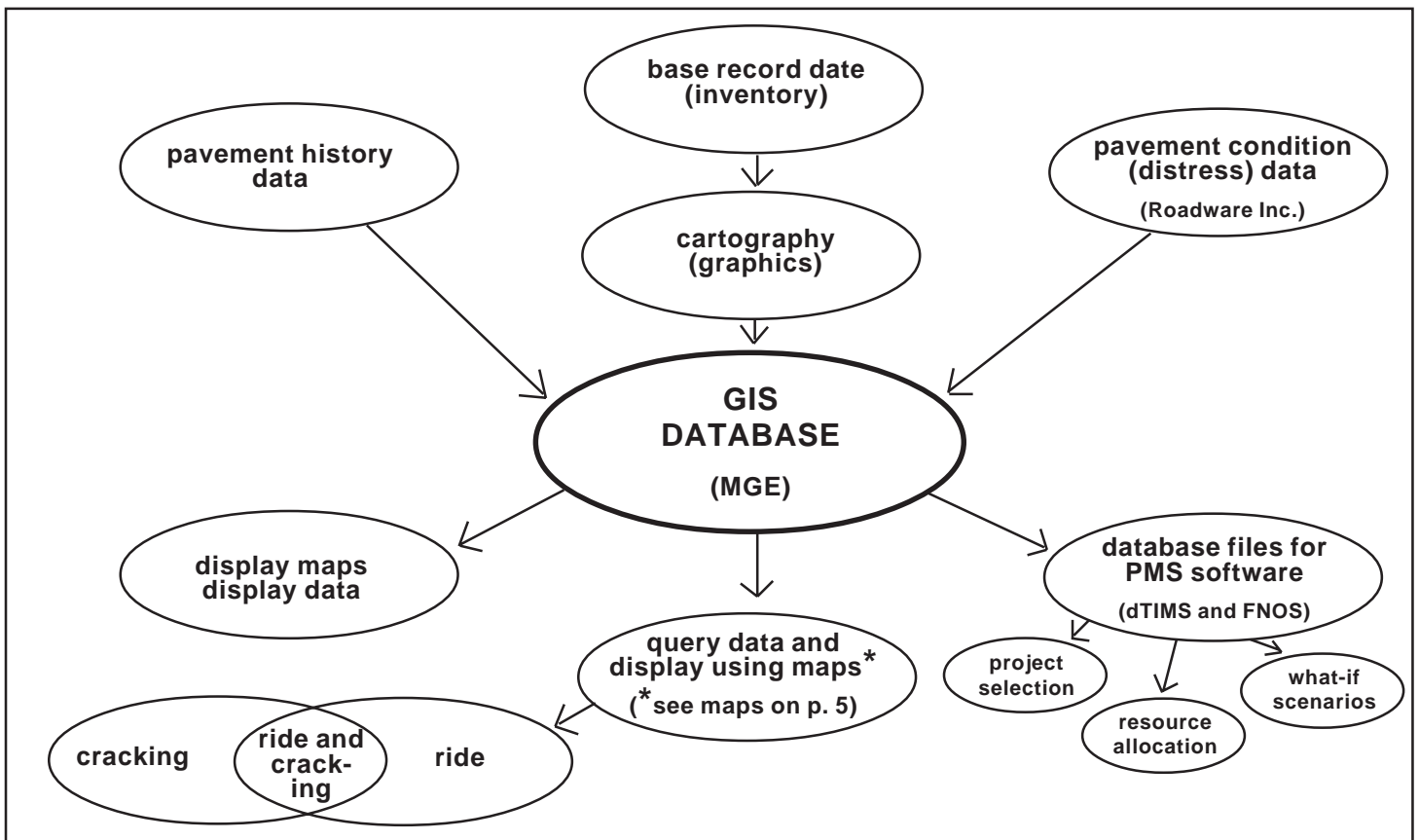
Tasks that continue include populating the GIS database, collecting distress (or highway condition) information, setting up parameters for the pavement management software, updating construction history information, and finetuning procedures for delivering and exchanging information.

Following is a brief description of ongoing and future tasks under the IPMP.

Populating the GIS database

The IPMP GIS database is being populated with data from three different sources: (1) highway inventory information from Iowa DOT base records, (2) roadway history information and pavement management

The basic scheme of Iowa's pavement management program shows the data that populate the GIS database, along with possible outputs.



section limits from local governmental agencies, and (3) distress (or highway condition) information collected by the automated distress equipment (Roadware Inc.).

During 1996, the database was completely populated with these three kinds of data for eight regional planning agencies (RPAs 2, 3, 4, 6, 7, 10, 12, and 18). The task of populating the database with information for another five RPAs (8, 9, 14, 15, and 16) and for both the Des Moines and Cedar Rapids metropolitan planning organizations (MPOs) will be completed by the end of 1997. Information from the rest of the RPAs in the state will be added as soon as they become part of the IPMP project.

Collecting distress data

Roadware Inc. has finished one cycle (two years) of collecting distress data for Iowa's federal-aid-eligible highways on the non-NHS. During 1996 Roadware Inc. collected and delivered distress data for RPAs 2, 3, 4, 6, 7, 12, and 18. In 1997 Roadware Inc. collected distress data for RPAs 8, 9, 14, 15, and 16 and for both the Des Moines and Cedar Rapids MPOs. Data delivery was completed in November.

The distress data will be loaded into the IPMP GIS database. Then, using dynamic segmentation to accommodate different referencing methods used by various highway data sources, the distress data will be summarized for the pavement management sections. The summary data will be provided to local governmental agencies.

Pavement management software tools

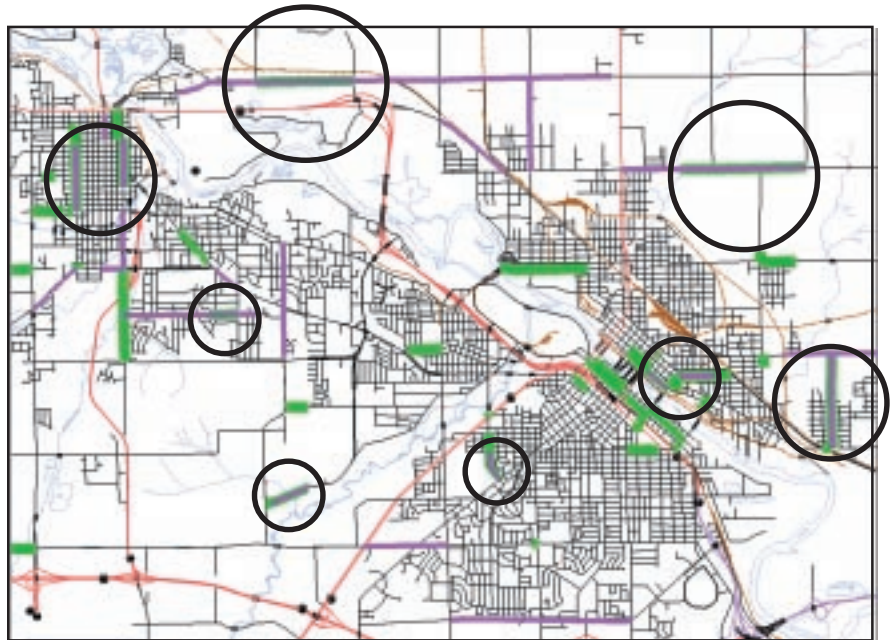
The IPMP task force has selected two pavement management software tools: dTIMS (Total Infrastructure Management System, from Deighton Associates in Canada) for project selection and management, and FNOS (Financial planning Network Optimization System, from VEMAX Management Inc. in Canada) for network-level management.

The pavement management software subcommittee is negotiating a contract with the two vendors regarding initial cost, maintenance and update costs, and usage options. Local government agencies' input on these issues will be sought at a workshop on distress data delivery, tentatively scheduled for January 1998.

Work is going on now to develop the parameters for the pavement management software, including performance parameters (deterministic and probabilistic), treatment strategy alternatives, and trigger limits.



The pavement management GIS database can be queried and the results displayed graphically. For example, data about roadways with poor ride quality (displayed by green lines, above right) and data about roadway cracking (pink lines, above left) can be overlaid to show where roadway cracking may be affecting ride quality (circled areas, below).



Future tasks

In 1998 the operation phase will begin. Remaining issues regarding the delivery and exchange of information will be resolved, the management systems will be put into operation, and personnel from participating RPAs and MPOs will be trained to use the systems.

Several formats and mechanisms for distributing data and have been investigated. The first distress data were distributed on hard copy and some on a spreadsheet format. Other possible data formats include GIS, CAD, and paper maps.

Alternative mechanisms for distributing data and reports include floppy disks, zip disks, CD-ROM, and the Internet. The CD-ROM and Internet options may be the most feasible because of the large amount of data to be delivered, especially if the GIS format is selected.

Finally, training for local government agencies on the selected pavement management software and on basic pavement management principles will be provided in 1998.

As the IPMP is fully implemented in 1998, it will be evaluated and changes to the system will be made to ensure that the system is up to date and fits local government agencies' needs.

For more information on the IPMP, contact Omar Smadi, 515-294-8103, omar@ctre.iastate.edu. ■■

County engineers share what works



“This report is going to be useful to county engineers,” says Lowell Richardson, former director of Local Systems at the Iowa Department of Transportation. “I think we’ll see engineers referring to these suggestions and modifying the way they do some things.”

TALK SHOP with any county engineer in Iowa, and sooner or later the conversation will get around to the challenge of making a first-class secondary road system out of deteriorating roads and bridges. Never mind that highway budgets and other resources are shrinking; their constituents and boards of supervisors often expect the impossible.

Richardson believes that Iowa counties will lag behind other jurisdictions in reaching their infrastructure needs. To satisfy the public’s expectations for good roads and bridges, county engineers must experiment with and adopt more efficient practices. One of their best resources for discovering such practices may be their fellow county engineers.

Researchers at Iowa State University undertook a study to determine the most challenging transportation-related issues facing Iowa counties and to discover how counties deal with those issues most effectively. They met with county engineers and supervisors around the state to determine and prioritize a list of highway-related issues facing counties. Then they surveyed engineers and supervisors statewide to learn how they handle these issues.

The resulting report does not prescribe answers but provides a reference of best practices and recommendations. A few summarized examples follow:

Privatizing services

Counties are increasingly contracting services to private companies. Contracted services that generally prove cost effective include applying dust control materials, constructing roads, crack sealing, seal coating, and collecting/disposing of solid waste.

Services rarely contracted include removing snow, maintaining equipment, inspecting construction sites, surveying, and acquiring rights of way.

Recommendations:

- Review your privatization policy every year.
- If you do not contract out for services, consider doing so on a trial basis.

Developing formal policies

Some counties rely, at least in part, on unwritten policies based on past common practices. Unwritten policies can be ambiguous, however, making a county vulnerable to liability lawsuits. Most counties have official ordinances or resolutions covering their critical policies. A few counties have complete, indexed policy manuals.

Recommendations:

- Develop a policy manual—a written record—containing all ordinances and resolutions and clearly outlining other policies.
- Use guidelines (developed for this report from information received from counties, the Iowa DOT, and the Iowa State Association of Counties) to determine if a common practice should be developed into an ordinance or a resolution.

Purchasing equipment

Most counties use standard specifications when purchasing equipment. Some counties share and/or loan equipment among area counties and even cities.

Recommendations:

- Produce lists of specialized equipment owned or needed by your county.
- Circulate the list among surrounding counties and cities to develop opportunities for sharing equipment.

Adopting snow and ice removal policy

Many counties have adopted the Iowa State Association of Counties policy on snow and ice removal. Engineers in some of those counties report reduced lawsuits or threats of lawsuits over liability issues.

Recommendations

- Adopt the ISAC Snow and Ice Removal Policy and make sure practices conform with the policy.
- At the very least, write down common practices to make them official policies, and review them regularly to make sure they are being followed.

Building roadway entrances

Many counties are exercising more control over the construction of entrances to roadways to reduce costs and improve safety.

Recommendations:

- Require landowners who benefit to bear the cost of constructing entrances.

The report does not prescribe answers for county engineers but provides a reference of best practices and recommendations.

continued on next page

Farewell, BBS



ON JANUARY 1, 1998, CTRE's electronic bulletin board service will shut down.

Many of the data files and other services provided by CTRE's BBS, including bid letting information, will eventually migrate to the Iowa Department of Transportation's World Wide Web site (<http://www.state.ia.us/government/dot/>). The Iowa DOT's Office of Local Systems will inform local agencies about developments in distributing information.

Bid letting information, as well as accident data to use with the Accident Location and Analysis System, will be provided immediately via other avenues.

Bid letting

The Iowa DOT is providing bid letting information via CompuServe. To subscribe to CompuServe, call 1-800-848-8990. The service costs \$9.95/month for basic service and another \$15.00/month to subscribe to the Iowa DOT forum. CompuServe will send you software to install. After installing and opening the software, at the "go" prompt enter DOT5 to access the Iowa DOT forum. For more information, contact Gary Makovek or Mary Thompson, Office of Contracts, 515-239-1414.

PC-ALAS data

The Engineering Division at the Iowa DOT can provide accident data on diskette through the mail. Contact John Wehr, Engineering Division, 515-239-1668. The Iowa DOT is exploring options for distributing crash data updates en masse. ■■

continued from previous page

- Reduce the number of entrances and control their locations, especially on more heavily traveled roads.
- Require a permit for new entrance construction.

These topics and many others are covered in detail in the final report.

Guidelines for County Engineering Decisions, written by Kathleen Waggoner and Lowell Richardson of Iowa State University and sponsored by the Iowa Highway Research Board as project HR-369 and by the Midwest Transportation Center, is available through CTRE's library. Contact Stan Ring, librarian, 515-294-8103; stan@ctre.iastate.edu. ■■

Taste of Iowa at TRB



ONCE AGAIN CTRE will join with other Iowa organizations—the Iowa Department of Transportation, Asphalt Paving Association of Iowa, Iowa Concrete Paving Association, John Deere Company, Rockwell International, and the Department of Civil and Construction Engineering at Iowa State University—to host an evening reception at the annual meeting of the Transportation Research Board.

If you are attending TRB this winter, please join us in the Marquee Cabaret room of the Omni Shoreham hotel in Washington, D.C., on Tuesday, January 13, 1998, from 5:30 to 7:30 pm. ■■

Assertiveness: management's middle ground

Second article in a series about management



IN THE 1994 Video Arts, Ltd. interactive CD, "Straight Talking: The Art of Assertiveness," John Cleese discusses management assertiveness techniques that are efficient and effective. He defines assertiveness as "behavior that ensures you get the attention and respect you deserve."

For people who haven't mastered assertiveness, often their default behavior is submissiveness or aggression.

People may be submissive if they fear confrontation or if they need to be liked by their peers. But submissive people may be ignored and their confidence undermined. Aggressive people, on the other hand, often provoke defensiveness in others and have trouble winning cooperation from their peers.

Neither submissive nor aggressive managers get the job done as effectively as they could with a middle-ground approach: assertiveness.

CTRE offers the Video Arts, Inc. video series in CD-interactive format, as well as CD-I players, for loan. Contact Stan Ring, librarian, 515-294-9481; stan@ctre.iastate.edu. ■■

Editor's note: In the next issue of Technology News, the management series will continue with the first of four articles by Alan Estvold, Montgomery County engineer. Estvold will discuss a philosophy of management inspired by the golden rule.

1997 Iowa Winter Training Expo report



More than 30 vendors displayed their wares at Iowa's Winter Training Expo in October 1997. The expo was held in conjunction with Iowa's Snow Plow Rodeo and attracted about 1,000 winter maintenance personnel and supervisors from all around the state.



IOWA'S ROADS will be drier and safer this winter, thanks to hundreds of maintenance personnel and supervisors from Iowa's cities and counties and the Iowa Department of Transportation who attended the winter training expo in October at Iowa State University. Participants took home the latest information regarding winter road maintenance strategies and science. More than 30 vendors displayed new technologies and machines. Snow plow operators tested their skills in the statewide "rodeo."

The expo was a resounding success, says Duane Smith, director of outreach at CTRE. For those of you who didn't make it to the expo, "We'll definitely do it again next year," says Smith. ■■

Dale Bennett (left) and Tim Schroeder of Cedar Rapids took top honors at the 1997 Iowa Snow Plow Rodeo.



1997 Snow Plow Rodeo



"I WISH we had a course like this to practice on," Ames employee Ken Jones said while watching the championship round of the 1997 Snow Plow Rodeo in Ames last October, held in conjunction with the Iowa Winter Expo.

The top five rodeo teams (of 36 teams competing from 21 different organizations) drove the street simulation course a second time to decide the winner. The Clive team racked up a top score until the very last test—the stop line. They dropped their blade past the stop line, a major deduction from their score.

Dale Bennett and Tim Schroeder of Cedar Rapids, who were in fifth place going into the final round, drove their snow plow to victory. Cedar Rapids Streets Director Scott Pepler offered them an added incentive by promising a \$50 gift certificate to their favorite restaurant if they won. ■■

Fueling the operator's engine



YOUR SNOW PLOWS are in top condition, ready for the first snowflake. But are the snow plow operators in equally good shape? At Iowa's Winter Training Expo in October 1997, participants learned about the importance of good sleep habits and proper nutrition to help operators perform efficiently and safely during long hours behind the wheel.

Sleep well

"Sleep's not like money," says Mark Hislop of the Sleep Disorders Center at Mary Greeley Hospital in Ames. You can't store it up ahead of time or make it up once it's lost.

When bad weather keeps operators out on the road for extended hours, they need to be well rested. Hislop and other sleep experts offer the following advice for getting a good night's sleep:

- Eat only a light snack before going to bed; heavy food in your stomach will disrupt your sleep.
- Keep your bedroom fairly dark and at a consistent temperature.
- Go to bed and get up at the same times daily.
- Get regular exercise to sleep more soundly. But don't exercise right before bed. Exercise acts as a temporary stimulant.
- If you can't sleep, don't stay in bed; get up and read or perform some light activity until you're sleepy.
- Don't take long naps during the day. Short naps work fine for some individuals.

Hislop adds these warnings about the effects of common stimulants on sleep patterns:

- Drinking alcohol before going to bed may make you sleepy but generally disrupts sleep.
- Chronic tobacco use disrupts sleep.
- Sleeping pills shouldn't be used more than three or four nights in a row.

No matter how well you rest at night, overtime hours behind the wheel in a snowstorm are going to take their toll, especially after several long days. Operators need to recognize the symptoms of serious sleep deprivation:

- Your eyes go in and out of focus.
- It's hard to hold your head up.
- You can't stop yawning.
- You don't remember the last few miles.

- You're drifting between lanes.

According to Hislop, major catastrophes like the space shuttle Challenger accident, the Exxon Valdez oil spill, and the Three-Mile Island leak were at least partially the result of employee drowsiness. If you're experiencing any of the above symptoms of sleep deprivation, let your supervisor know immediately.

Supervisors, "listen to your guys," says Hislop. If they start "sounding a little goofy" over the radio, "pull them off the road."


Nutrition

Good eating habits can forestall sleepiness and keep operators alert, says Tonya Hargrove-Klein, supervisor of the Wellness Activity Center in Ames, Iowa. "The foods you eat," she told participants at the expo, "can cause you to feel sleepy or energized."

Here are her suggestions for keeping your energy level high and warding off sleepiness:

- **Eat small amounts of mood-booster foods** regularly—every three to four hours. High in complex carbohydrates and low in fat, mood boosters will refresh, not sap, your energy.
- **Hydrate yourself well.** "Fatigue is often mistaken for hunger" when your body is low on fluids, says Hargrove-Klein. Water is always the best hydrator. Take a water break every hour. For every cup of coffee you drink, drink a cup of water.
- **Avoid excessive caffeine.** Although a cup or two of coffee will have an energizing effect in the short run, too much caffeine will cause you to "crash harder" and may cause jitters, stomach problems, and dehydration. Caffeine also acts as a diuretic. Moderation is the key.
- **Take short exercise breaks.** Do some simple stretches right in the driver's seat, or walk around the truck a few times.

The key to staying alert is to be well rested and "fuel your body well," says Hargrove-Klein.

"Get the most from your own 'engine.'" 

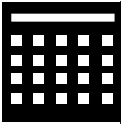
"High-octane" foods

- animal crackers •
- apple slices •
- baby carrots •
- bagels •
- bananas •
- fig bar cookies •
- fruit •
- popcorn (unbuttered) •
- pretzels (low-salt) •
- low-fat sandwiches •
- whole wheat bagel •
- whole wheat English muffin •

Apple pie is a great treat at Iowa's Winter Training Expo but not the best snack when you're driving a snow plow.

When you're behind the plow for long hours, stick to mood-booster foods that are high in complex carbohydrates and low in fat.





This calendar lists training events and conferences sponsored by CTRE, as well as events sponsored by ISU's Engineering Extension, the Iowa DOT, or other organizations that may be of interest to local transportation agencies.

January 1998

		Location	Contact
11-16	TRB Annual Meeting (Iowa reception: January 13)	Washington, D.C.	Duane Smith 515-294-8103
22	Construction Inspection	Ames	Sharon Prochnow 515-294-3781
27	AC Paving Conference	Ames	ISU ECE* 515-294-6222 or 800-262-0015
27	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781
28	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781
29	Structural Design/Construction Quality Workshop	Ames	ISU ECE* 515-294-6222 or 800-262-0015

February 1998

12	Construction Inspection	Iowa City	Sharon Prochnow 515-294-3781
19	Construction Inspection	Carroll	Sharon Prochnow 515-294-3781

March 1998

12-13	SLSI Land Surveyors Conference	Ames	ISU ECE* 515-294-6222 or 800-262-0015
24	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781
25	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781
27	ASCE Geotech Conference	Williamsburg	ISU ECE* 515-294-6222 or 800-262-0015

April 1998

1	Pavement Markings	Ames	Duane Smith 515-294-8103
1-2	ASCE Environmental Design and Water Resources Conference	Ames	ISU ECE 515-294-6222 or 800-262-0015
7	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781
8	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781
28	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781
29	Accident Location and Analysis System	Ames	Sharon Prochnow 515-294-3781

May 1998

11-12	Iowa Summer Maintenance Expo	Des Moines	Duane Smith 515-294-8103
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*For information about this workshop, contact ISU's Office of Continuing and Extended Education, Scheman Building, Ames, Iowa, at the number(s) listed.

Publications

Driveway and Street Intersection Spacing
(Transportation Research Board C-456, 1996) 44 pages

This circular compiles contemporary practices and basic considerations for spacing standards.

Request #P1273

Flexibility in Highway Design
(USDOT-FHWA PD-97-062, 1997) 193 pages

This guide helps highway designers address scenic, historic, aesthetic, and other cultural values while addressing safety and mobility. It reviews the flexibility for highway design available within the Green Book.

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Urban Drainage Design Manual HEC #22
(USDOT-FHWA SA-96-078, 1996) 478 pages

This comprehensive manual outlines procedures for evaluating rainfall and runoff, pavement drainage, gutter flow, inlet design, median and ditch flow, structure design, storm drains, retention facilities, and pump stations.

Request #P1279

Asphalt Paving Inspection and Chip Seal Application Checklist (USDOT-FHWA SA-97-046, 1997) 6 pages

This shirt-pocket-sized, spiral-bound booklet reviews all aspects of chip sealing and is especially helpful for new workers.

Request #P1283

Highway Safety Design and Operations Guide (AASHTO C97-SR-3, 1997) 118 pages

This book replaces the 1967 and 1974 revised form of the Yellow Book. It combines proven practices with state-of-the-art technology to achieve safe traffic operations.

Request #P1285

Videotapes

Highway Safety Series (IRF, 1997) 50 minutes

Identifies safety problems and solutions, and evaluates safety alternatives and safety program results.

Request #V520

Contract Maintenance Series (IRF, 1997) 60 minutes

Gives an overview and details regarding contract maintenance, procedures, and supervision.

Request #V521

Technology Transfer Series (IRF, 1997) 44 minutes

Provides guidance in establishing an effective technology transfer program.

Request #V522

Highway Management Systems
(2 volumes) (IRF, 1997) 188 minutes

These videos provide an overview of highway, pavement, and maintenance management systems.

Request #V526

Defensive Driving—Prepared for the Worst (Coastal MTV03V, 1997) 16 minutes

Defines various hazardous driving situations and suggests precautionary measures and preventative maintenance. A handbook with tests and answers is included.

Request #V517

Defensive Driving—A Crash Course
(Coastal MTV01V, 1997) 16 minutes

Motor vehicle accidents are the number-one cause of employee injury and death. This video gives practical tips on driving and explains how to develop a defensive attitude and cope with distractions. A handbook with tests and answers is included.

Request #V518

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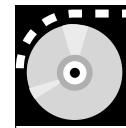
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More from the winter expo

So, you didn't make it to Iowa's Winter Training Expo in October? You can still get a copy of the expo "proceedings," available free through CTRE's library.

A collection of speakers' handouts, the proceedings includes information about chemicals, equipment maintenance, roadway weather information systems, plowing techniques, brine systems, and other winter highway topics. Contact Stan Ring, librarian, 515-294-9480; stan@ctre.iastate.edu.

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