

Crossroads

Winter 1996



TRANSPORTATION Information Center

University of Wisconsin-Madison

Weather—the winter guessing game

A winter storm is howling through central Minnesota. Should you call out the plows? The air temperature is 18° F at 6:00 AM. Will it warm up enough by noon for salt to work?

Good questions. Where do you get the answers?

These days there's good satellite, radar, air and pavement condition information to help make winter maintenance a more exact art.

Pavement sensor forecasts

Pavement temperatures and forecasts are about the most sophisticated information currently available for road



maintenance. Wisconsin now has a network of pavement sensors and weather stations on Interstates and other major divided highways. The stations continuously report weather and pavement data via personal computer to all County Highway offices, WisDOT District offices, and other municipalities.

The system, coordinated by WisDOT, includes a 24-hour forecast of projected pavement temperatures.

Knowing pavement temperatures may let you eliminate a round of salting, says WisDOT's Wayne Peterson who has been coordinating the system until recently. (Mike Adams is the new on-site program manager.) Even though air temperature is below freezing, if pavement temperature is 40°, it doesn't make much sense to salt, Peterson says. But if the pavement temperature is 34° now, and projected to go down later, you want to salt right away to prevent ice bonding and buildup on the pavement. Peterson believes the system will help cut salt use around the state.

There are 30 stations now, and WisDOT will have 21 new stations on line in December. The department is

working towards a 35-mile grid covering the whole state. The information is quite accurate for up to 35 miles, Peterson says.

Larger communities can access this information directly through a computer hook-up. Contact the WisDOT District Maintenance Engineer for information.

Smaller communities can call their county Highway departments for a current status report and forecast.

Contract forecasts

Many municipalities contract for commercial weather forecasts. The cost varies with the level of service and size of community. At the simplest, you can just call whenever you want a forecast for your area. The businesses also offer daily routine forecasts, storm alerts, and 24-hour telephone calls. (Contact T.I.C. for a list of forecast services.)

Milwaukee, for example, has received forecasts from Murry and Trettle for more than 30 years. "We use them like an alarm clock," says Dave Lorbeske, the city's field manager for winter maintenance operations. "They will call and warn us if snow is coming, 24 hours a day."

The city's on-call manager writes the meteorologist's verbal weather observations and forecasts on a form. He can ask questions and get more information right away. Routine 24-hour forecasts are delivered in the morning by phone or fax and updated in the afternoon. The company also supplies storm alerts and longer range forecasts. The service costs Milwaukee about \$5000/yr.

"We want to know what time of day the storm will hit, the temperature before and after the storm, its

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Idea Exchange

Mobile pavement sensor improves salt use

In Vermont they are using pavement temperature information to limit salting to conditions where it will be most effective. Pavement and air temperatures can often be very different. Supervisors collect pavement temperatures using an infrared sensor mounted on their patrol trucks.

Vermont's Smart Salting strategy, first fully implemented for winter 1994-95, appears to have cut salt and sand use. "We used 59,000 cubic yards of sand, compared to an average of 100,000 cubic yards, and kept salt use to the average of 100,000 tons, with 10 more storm events last year," says Milan Lawson, State Maintenance Engineer. He supervises winter maintenance for 3072 road miles in Vermont.

The infrared sensor looks like a flashlight mounted to the truck's frame. A digital unit inside the cab continuously displays pavement temperatures while the supervisor drives at highway speeds. The sensors cost Vermont about \$2200 each.

Pavement temperatures vary about five degrees with local conditions like shading, pavement type and age, road elevation, and bridge decks. The range remains

relatively constant over the geographical area for which a supervisor is responsible.

Supervisors determine salt application rates by combining pavement temperature with an estimate of the ice or snowpack thickness. Since one pound of salt can melt more than 46 pounds of ice when pavement temperatures are at 30°, and about 8.6 pounds at 20°, they try to limit salting to that 10 degree range. This gets the job done while conserving salt and keeping excess out of the environment.

Using ground speed controlled salters and keeping them calibrated are important elements of the strategy as well. Pre-wetting the salt, either as it's being loaded or through tanks on the truck, helps jump start the salt's melting action when the snow is dry. The salt sticks better and less bounces off when it is spread or kicked off by following vehicles.

Copies of Vermont's **Smart Salting** booklet are available from the T.I.C. Use the form on page 7 or call us at 800/442-4615. Vermont's sensor supplier is Control Products Inc., Vancouver, WA, 360/571-0988.

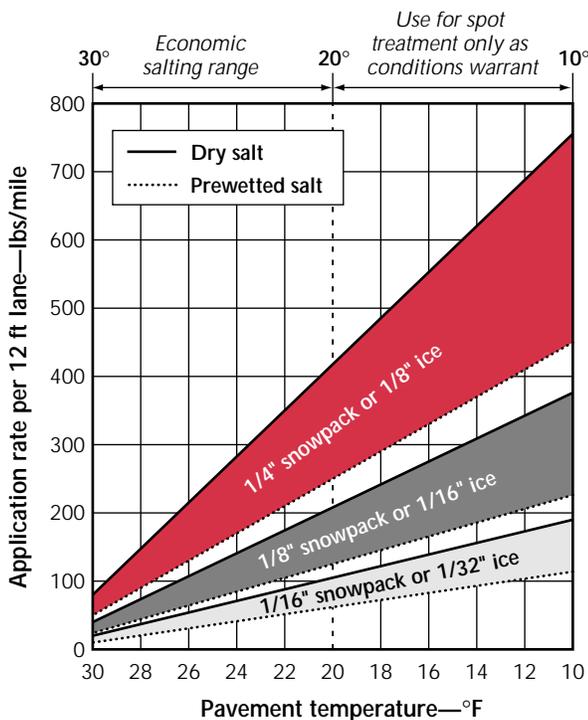
Thermal system fixes problem manholes

"There's nothing more frustrating than to hit a high manhole when you're plowing," says Rick Heisler, public works supervisor in the city of West Bend. He's found a system for repairing them that is quick, effective and efficient. The city hires a local contractor to level raised manholes using an infrared thermal patching system.

The unit heats a six by eight foot area of bituminous concrete around the raised manhole. Workers rake and loosen the softened material, then spray on an emulsion to help rejuvenate the existing pavement materials. New hotmix is also added and the pavement surface is reshaped and compacted to eliminate the high spot. The whole process takes about 15 minutes.

"We did 400 in the summer of 1994, and it cost us \$38 each," says Heisler. "Now we have them on a regular maintenance schedule and are doing about 125 a year for \$45 each."

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This chart shows effective salt application rates as determined by melting formulas. In actual salting patrols with ground-oriented spreaders, the practical minimum is about 100 pounds of salt per lane mile with an error factor of ± 25 pounds.

Crossroads

A newsletter providing information on roads and bridges to local officials, published quarterly by the Transportation Information Center, located at the UW-Madison, Dept. of Engineering Professional Development, 432 N. Lake St., Madison, WI 53706. Phone: 800/442-4615. Fax: 608/263-3160.

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Thermal system fixes manholes

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Infrared heater softens asphalt around a raised manhole, readying it for repair.

section of the city and prepare a bid spec. It takes one person two or three days to survey the manholes, spray-

When they started the manhole program, they repaired problem manholes all over the city. Now, each spring they review all manholes in a

paint numbers on them, and mark corresponding numbers on a map for those needing repair.

West Bend considered buying one of the units, but decided it was more economical to contract for the service. "Then they're responsible for everything including traffic control," says Heisler. The contractor took just two days to repair 126 manholes last summer.

Copies of West Bend's bid specs for thermal manhole repair are available from the T.I.C. Use the form on page 7 or call us at 800/442-4615. Or call Rick Heisler at 414/335-5060.

Do you have an idea to exchange? Have you designed a gadget or found a new way to do something that other streets and highway people can use? Use the form on page 7 to let us know, or call Don Walker or Steve Pudloski at 800/442-4615.

Resources

Materials listed here are available from the Wisconsin T.I.C. unless otherwise noted. To get your copy call 800/442-4615 or use the form on page 7. Videotapes are loaned free through Wisconsin County Extension Offices.

Where to go with the snow: Snow treatment and disposal guidance for municipalities, Wis. DNR, PBL-WR-154-95REV, 1995, pamphlet. This brief pamphlet points out that snow removed from streets may have salt, nutrients, oil, sand, silt, litter, heavy metals, and toxic chemicals. Explains potential problems, recommends disposal methods, and offers strategies to reduce contaminants.

Metric training on computer

WisDOT now has available a training program on metric (SI) use in highway agencies. The program, *Metric (SI) Training for Highway Agencies, CBT 1.0*, is based on the National Highway Institute course by the same name. The disks run on IBM compatible computers, 286 or better, with VGA graphics.

The training allows users to progress at their own speed, use whatever modules apply to them, and participate in training at their convenience. The course includes: building blocks for conversion to SI, overview of SI in the highway context, five modules, quiz and quiz questions. The modules are: Planning and roadway design, Drainage, Bridge design, Materials, Quantity/cost estimation.

Available on loan from BJ Panke, WisDOT Division of Highways Training Coordinator, 608/267-3615.

New tapes in video library

Privatizing Public Works, UW-Madison (#17787, Tape 1–120 min., Tape 2–90 min.) Phoenix, Charlotte, and Indianapolis are the "giants" in privatizing public works, but smaller cities have also succeeded including San Mateo,

Calif., Highland, Mich., and Wauwatosa and Salkville, Wis. Key players from these seven cities present their experiences through panel discussions, case studies, and question and answer sessions. This tape records a nationally televised satellite conference held at UW-Madison July 19, 1995.

Roads of Winter Driving, WisDOT (#17788, 18 min.) Depicts actual winter driving conditions and, through driver comments, provides correct driving techniques for given situations. For all drivers.

Snowplow Safety, National Safety Council (#17789, 23 min.) Discusses pre-operation vehicle inspection procedures and techniques for safe operation of the vehicle in a wide variety of situations. Good for plow operators and supervisors.

The Snowfighters, Salt Institute (#17790, 21 min.) Provides good information on costs vs. benefits of salt as a highway deicer, maintenance and winter preparation, spreader calibration, and snowfighting techniques. For supervisors, maintenance, and operator personnel. Elected officials can also benefit.

School Zone Safety, Utah DOT & Utah Technology Transfer Center (#17791, 22 min.) Good training for school crossing guards. Includes duties at reduced school speed zones, school crossings, and traffic signals. Also presents proper signing and marking for school zones. For school crossing guards, traffic engineers, school officials, and local safety groups.

Winter Control Operations, Ontario Ministry of Transportation (#17796, **Snow Plowing**, 26 min.; **Sanding and Salting**, 27 min.; **Sidewalk Maintenance**, 19 min.) An excellent three part video involving all aspects of winter road and sidewalk maintenance. It includes fall preparation, equipment preparation and maintenance, communication procedures, and materials usage and handling. For supervisors, equipment maintenance personnel and safety-related groups.

Good ideas from winter maintenance workshops

Nobody knows the tricks of snow plowing better than you who do it. We often hear good ideas for removing snow at our T.I.C. workshops. If you've attended, you may have heard these ideas first hand, asked questions, and shared some of your own tricks. Here are some winter maintenance ideas.

Pre-snow planning

Planning plow routes, setting priorities, and putting plans on paper makes you more efficient. It also helps elected officials answer those inevitable constituent complaints.

Elkhorn's street maintenance folks developed their plan seven years ago. They started with a sample plan from UW-Extension Engineering's **Snow and Ice Control** course. It took about a week and a half of work to modify it for Elkhorn. The plan categorizes all streets as 1) *priority* (plowed first and maintained throughout a storm), 2) *secondary* and 3) *neighborhood*. To address citizen complaints about waiting to get plowed out, the plan has trucks start plowing from different points, rotating from storm to storm.

Each plowing route (with drawings) is in the office computer and in the truck. This makes it easy for a substitute driver to take over a route. While some routes look bigger than others, says Michael Early, Elkhorn's Streets Foreman, they all take about the same plowing time. Road width and drifting make the difference.

The plan classifies snowstorms by type and tells what to do for each. It lists all equipment and tells how to plow cul de sacs and remove windrows downtown. It lists dos and don'ts (like don't help push out stuck cars) and what equipment a truck must carry as required by their insurance—fire extinguishers and safety kits, for example. The plan gives everybody guidance—bosses and drivers. And the insurance company loves it, Early says.

Each year streets administrators update the plan based on their experience and present it to elected officials. In fall they hold a half-day snow school and go over the plan with everybody—including backup drivers from other departments. All regular plow drivers drive the route before the first snow.

❄️ Right turns clear streets faster Howie Krieski, Stevens Point's superintendent of services, has developed a plowing plan in which his wingplow-equipped trucks make mostly right turns. The driver plows all the way around each block instead of straight across a section. "It saves time and clears the intersection with one pass by dumping the snow at the curb as it goes around the corner," says Krieski. Since the method requires backing across streets, it is best used at night when there is little traffic or on lightly traveled streets.

❄️ Training makes a difference Two-man plow teams and driving apprenticeships are history, thanks to tight budgets. And there's only so much you can learn on a parking lot obstacle course. So how do you train new plow drivers? In Portage County all new drivers are accompanied by an experienced person for their first 40 hours behind the wheel.

"Legally, if they have a CDL you can turn them loose," says Dale Peterson, the county's state patrol superintendent. "But there are a lot of little things that they need to learn through experience." Things like: how fast to plow a shoulder, slowing down for bridges, how fast to drive while salting, and how to take the wind into account when salting.

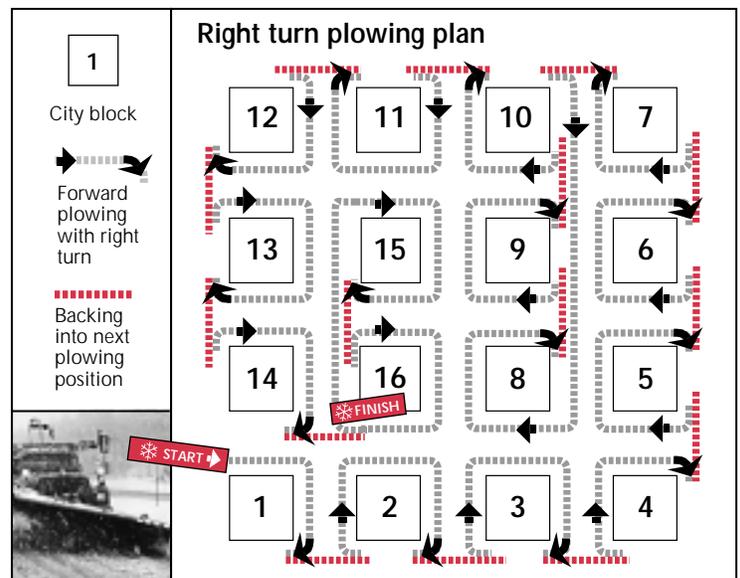
The two talk about the route and its problems. The experienced driver charts the trips and judges when the new driver is fit for duty. Peterson estimates that 40 hours equals about 10 snowstorms. When staff levels and snow conditions permit, they assign the training crews to work straight time rather than overtime.

Plowing advice

Recent Winter Maintenance Workshop participants shared many good ideas about how to plow efficiently.

❄️ Plowing cul de sacs Cul de sacs, with their many drive-ways and limited terrace space, are a plowing nuisance. In West Bend the city doesn't plow them at all; private contractors do. They come in with loaders, which are more maneuverable than trucks, and mound the snow in the cul de sac's center. When the piles get too high they truck the snow away. Contractors charge \$75/hour and it takes them about 15 minutes to plow each of West Bend's 65 cul de sacs, according to Streets Superintendent Richard Heisler.

Plowing cul de sacs is easier in the Town of Vernon near Waukesha because mail and newspaper boxes are grouped at the entrance. "It gives us more room to move and store the snow and we don't blow the boxes over with snow or the



The driver works a multi-block section, starting at #1, plowing around the corner just till the snow is distributed through the radius, then stops and backs across the street (red line). At this point the driver begins plowing the next block. After all the blocks are done, the entire perimeter gets plowed.

plow any more," says Lee Titze, town director of public works. Box placement is in the town's subdivision code.

Town of Vernon no longer plows private driveways except in extreme emergencies, Titze says. When there were more requests for the service than they could fulfill, the town quit doing it. The town newsletter let everybody know.

❄️ Parked cars To deal with cars parked in the plow path, Titze has another trick. The town has no police department, but Titze can legally write citations. The town board approved ordinances against parking in snow routes, private plows leaving snow windrows in streets, garbage removal, and other nuisances, then deputized officials to enforce them.

Tickets are \$25. If they aren't paid, the town asks WisDOT to restrict drivers license renewal or car registration. "I put 12 to 15 warning tickets on illegally parked cars at the beginning of every snow season," says Titze. "And then usually I only have to give about one actual ticket." Titze also has the authority to have the vehicle towed.

❄️ Wing plows clear urban streets Although some people are still reluctant to use them, wing plows are working well on the urban streets of Stevens Point, West Bend and Portage County.

"We bought our first one in 1987 and the operator reluctantly began to use it," says Richard Heisler of West Bend. "He quickly began to see its benefits. Now all 17 patrol trucks are equipped with wings." Drivers realized that the wings cut plowing time and made the job easier, especially in clearing intersections. West Bend's efforts to level manholes has also helped. (See story in *Idea Exchange*, page 2.)

In Stevens Point wings clear most city streets in two passes instead of three, says Howie Krieski. A fiberglass rod mounted on the wing end helps drivers judge its distance from the curb or parked cars. Point's plow drivers also were reluctant at first. "Now you can't get the wings away from them!" says Krieski. They don't use the wings on gravel streets till they are frozen, he says, to preserve the surface.

❄️ Plowing shoes Portage County saves wear on wing blades and conserves gravel shoulders by fitting wings with commercially available plowing shoes. The \$50 metal piece is bolted on the plow's bottom to reduce pressure on the blade. "They're reasonably priced compared to the volume of shoulder gravel you would lose otherwise," says Dale Peterson of Portage County. In West Bend they put protective shoes on the outside edge of the wing and both edges of the front blade. "The wear goes on the inexpensive shoe rather than on the moldboard plow," says Richard Heisler.

❄️ Underbody blades, pro and con Using underbody blades cuts salt use and gets slow-moving graders off the road, says Dale Peterson, state patrol superintendent for Portage County's Highway Department. The extra downward pressure, compared to front-mounted plows, helps them bite through the ice, he says. That pressure also wears the blades out so they have to be replaced after each storm, he admits. The county has underbody blades on five trucks used to

maintain state highways and plans to put them on all major salt routes eventually.

"They're real 'knee jammers,'" says Jim Harer, St. Croix County patrol superintendent. "They're really only useful on one or two storms a year, and the rest of the time they add weight and bulk to the truck." In his relatively rural county they prefer using graders with serrated blades to remove compacted snow and ice since salt sits in the grooves made by the blades and quickly cuts through to the pavement.

Spreading and wetting sand and salt

When people see sand on the roads, they can tell that maintenance is being done, says Jim Harer of St. Croix County. He uses sand mixed with 5% to 10% salt most of the time on county roads. The spreader located at the inside corner of the truck is set to turn very slowly. Traffic action quickly kicks the sand into the travel lanes. They spread the sand more widely on hills and curves and at intersections.

Automatic controls help Stevens Point drivers spread salt and sand more economically. "We've really noticed a savings in our use of salt and sand," says Howie Krieski. This is the fourth year they've used the controls on their trucks. While it took the drivers a while to get used to the new way of spreading, the better control is worth it.

Using pre-wetted salt along with automatic spreaders makes salt use even more efficient, according to Portage County's Dale Peterson. Wet salt sticks to the ice instead of bouncing into the ditch so trucks can drive faster while applying it. Wetted salt starts to work faster, and wetting it with calcium chloride helps it work better in colder temperatures.

They wet the salt in the loader bucket while loading the truck. On the newest equipment, truck-mounted brine tanks wet the salt as it leaves the chute. Peterson likes the new brine tanks because they are easy to clean after the storm.

Keeping storm records

So, how did yesterday's plowing operation go? How many trucks were on the road? How long did it take to clear the roads? You're so busy getting the job done, it can be hard to track the details. Yet, the public is interested and reporters often ask these questions. If serious accidents occur, this information will be helpful if a lawsuit develops. The data also can help with later snow plan reviews.

In Stevens Point they fill out a simple form after each storm event. It includes beginning and ending times for the storm and for plowing salt routes and regular routes, along with current and forecast temperatures, and whether salt or sand was used. There's also room to note any special occurrences.

If you'd like more details on these ideas, contact the sources: Michael Early, Elkhorn, 414/723-2298; Jim Harer, St. Croix Co., 715/796-2227; Richard Heisler, West Bend, 414/335-5060, Howie Krieski, Stevens Point, 715/346-1540; Dale Peterson, Portage Co., 715/345-5230; Lee Titze, Town of Vernon, 414/662-3001. For a copy of Stevens Point's snowfall data reporting form, contact the T.I.C. Use the form on page 7, or call 800/442-4615.

Calendar

T.I.C. workshops

Specific details and locations for workshops are in the announcements mailed to all Crossroads recipients.

Equipment Maintenance If you work for a county, city, village, or town and operate, maintain, repair, or manage diesel equipment, this workshop is for you. The morning session covers winterizing operations, including fuel systems, cooling systems, electrical systems, air systems, and cold weather starting. The afternoon session covers preventive maintenance programs.

Dec 5	Rhineland	Dec 12	Green Bay
Dec 6	Cable	Dec 13	Brookfield
Dec 7	Eau Claire	Dec 14	Barneveld
Dec 8	Tomah		

Pavement Management for Local Roads This revised workshop is offered in three four-hour sessions to meet a range of training needs for those using PASER and ROADWARE to implement pavement management. During the morning of Day 1 you will learn the basics of pavement management and of using ROADWARE and how to rate pavements using PASER; that afternoon you will see the program features of ROADWARE 5.01 and try your hand with it in the computer lab. During the morning of Day 2 you will test various maintenance strategies by running computer simulations with several data bases. You can register for one, two, or all three half-day sessions depending on your needs.

January 3-4, 1996 in Madison

Highway Safety This workshop will help you reduce risk to your work force and the public. It covers the basics of work-zone traffic control and the fundamentals of highway and street signing, and introduces a new method that you can use to improve the safety of your streets and roads through a systematic evaluation and mitigation of roadway safety hazards.

Jan 16	Tomah	Jan 23	Green Bay
Jan 17	Eau Claire	Jan 24	Brookfield
Jan 18	Cable	Jan 25	Barneveld
Jan 19	Rhineland		

Bidding Small Road Improvements (audio ETN conference)

How to legally and effectively bid and contract for small road improvement and construction projects. The session will be particularly useful to town and village officials who do not usually contract for large amounts of road work. Sample bid documents will be provided. The workshop is presented by the UW Local Government Center and T.I.C. Contact your county UW-Extension Office to enroll.

February 13, 1996 10:30-11:50 AM
at 103 locations throughout Wisconsin

Maintaining and Controlling Roadside Vegetation (satellite conference) This short workshop focuses on the maintenance and control of roadside vegetation. Course highlights

include the rights and obligations of towns, villages, and counties; engineering and safety considerations; environmental and aesthetic concerns; and maintenance policies, standards, and methods. Presented by the UW Local Government Center and the T.I.C. (See also *Commercial Pesticide Applicator Training below.*)

February 29, 9:30 to 11:30 AM
at numerous Wisconsin locations

Roadway Maintenance This workshop is your opportunity to improve your street and road maintenance operations. It includes preventive maintenance techniques; investigating and repairing pavement failures; and asphalt and gravel roads.

Mar 19	Rhineland	Mar 25	Green Bay
Mar 20	Cable	Mar 26	Brookfield
Mar 21	Eau Claire	Mar 27	Barneveld
Mar 22	Tomah		

UW-Madison seminars

Local government officials are eligible for a limited number of scholarships for the following engineering courses in Madison. Use the form on page 7 for details or call 800/442-4615.

Bridge Inspection Update, December 4-6

Asphalt Pavement Maintenance, February 5-6

Writing Civil Engineering Specifications, February 5-7

Managing Fleet Maintenance Operations, February 26-27

Improving Public Works Construction Inspection Skills,
February 26-28

Bridge Rehabilitation, March 4-6

Environmental Impacts of Highway Projects, March 18-20

Highway Safety Improvements, April 15-17

Managing Highway Liability, April 17-19

Other training opportunities

Commercial Pesticide Applicator Training—Right-of-Way Pesticides are valuable for managing roadside vegetation but they must be applied by a certified applicator, or under the supervision of one. This workshop prepares you to take the examination the same day. (Training 8:30 AM to 2:30 PM, followed by 90 minutes to take the exam.)

Jan 24 Arlington (preregister by Jan 10)

Jan 25 Wausau (preregister by Jan 11)

To register, complete a Commercial Pesticide Applicator Training (CPAT) registration card available from your county Extension office or from the CPAT office in Madison (608/262-7588 or 265-2950). A fee is required.

A *self-study video tape* is available through the T.I.C. Video-tape Library. Contact your county Extension office to borrow a copy. To receive print materials and exam instructions, complete a CPAT registration card and pay the fee.

Local Roads and Streets Council formed

As part of WisDOT's *TransLinks21* long-range planning process, Department Secretary Charles Thompson formed the Local Roads and Streets Council last April. Members come from county, town, city, and village organizations as well as Regional Planning Commissions and Municipal Planning Organizations. WisDOT is represented by five non-voting members.

The Council and its committees are to study financing policies for local roads and streets, gather better data regarding their conditions, and identify the most cost-effective ways to provide local road and street services. The goal is to do a better job of directing local road funding to the highest-priority needs.

Local officials can talk to Council members to let WisDOT know about concerns, problems and policy issues that affect their communities. Its 23 members are drawn from Wisconsin Alliance of Cities, Wisconsin Towns Association, League of Wisconsin Municipalities, and Wisconsin Counties Association. A membership list with addresses and phone numbers is available from the T.I.C.

"We're addressing broad issues that include some knotty problems," says Douglas Duckert, head of WisDOT's Office of Local Highway Programs. "The Council has some very capable people working on these things, and we hope to have some useful recommendations to give to the Secretary by mid-summer."

For a Council membership list with phone numbers and addresses, use the form on page 7 or call 800/442-4615.

Clarifications

Must CDL drivers inspect their trucks?
Lt. Lyle Walheim, State Patrol Program Manager, Motor Safety Program, replies: *Privately employed* holders of the CDL must carry out daily pre- and post-trip inspections of their equipment and maintain those records according to part 396 of the Federal Code of Regulations (49CFR). *Municipal employees* are specifically exempted from this regula-

tion under part 390.3(f) of those regulations. This means that drivers who contract with a municipality for snow removal and other services operate under different rules and must fill out and keep appropriate inspection forms. Forms are available from commercial vendors.

What is the appropriate use of an arrow board on a two-lane two-way road?
Uses of the arrow panel are described in

Part VI F-3 of the *Manual on Uniform Traffic Control Devices (MUTCD)*. Because it indicates that vehicle drivers have the right of way and can freely move to the other lane, it should never be used in the arrow mode on a two-lane road. It can be set up on the shoulder in the caution mode (all four corners blinking) when both lanes of the highway remain operational and all the work is on the shoulder.

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Route To

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Crossroads is produced with assistance from the Federal Highway Administration, the Wisconsin Department of Transportation and UW-Extension

