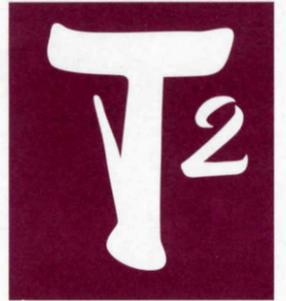


# TECHNOLOGY EXCHANGE



A Newsletter of the Minnesota Technology Transfer Program, Center for Transportation Studies

January-March 1997 Vol. 5, No. 1



## Maintenance Expos, Past and Future

Participants at the fall expo could view equipment and demonstrations of field operations; see page 5 for highlights.

The Minnesota Maintenance Expo last October was a huge success—so much so that a similar event is being planned for spring.

The fall expo had evolved from the old Mn/DOT “Snowfighter Rodeo” into a much larger event with a technology fair, equipment demonstrations,

exhibits, and training programs. Hundreds of city and county workers attended for the first time. (See page 5 for details.)

Due to the positive feedback from the fall expo and a similar Mn/DOT event held last April, planning shifted into high gear for 1997. The result is the First Annual Minnesota Spring Maintenance

Research Expo, which will take place on April 9 (10:00 a.m. to 7:00 p.m.) and April 10 (8:00 a.m. to 2:00 p.m.) at the St. Cloud Civic Center.

The 1997 spring expo will have over 40 concurrent session presentations featuring maintenance innovations in Minnesota. Topics include pavement and low-volume road maintenance; roadside management/vegetation control; work zone safety; bridge and building maintenance; and maintenance management systems. An indoor equipment display and technology fair are also planned.

In addition to transferring new research and technologies to users, the expo—with city, county, and state participants—lets innovators share their experiences and be recognized by their peers. It also strengthens interagency dialog, encouraging the expansion of beneficial partnerships (such as equipment and facility sharing).

Sponsors for the spring expo include Mn/DOT, the Minnesota Local Road Research Board, the Minnesota Street Superintendents Association (MSSA), the Minnesota Public Works Association (MPWA), and Minnesota T<sup>2</sup>. (Please note that the Second Annual Fall Maintenance Expo, focusing on winter maintenance activities, is planned for later this year.)

For registration information and further details call Bev Ringsak, (612) 625-6689.

—*Pamela Snop*

## On Tap for '97: New T<sup>2</sup> Directions

What does Minnesota T<sup>2</sup> (together with our partners) have on tap for 1997? For starters, local agency personnel will have an opportunity to participate in the statewide **Minnesota Spring Maintenance Research Expo** on April 9-10 at the St. Cloud Civic Center (see above). If this event is valuable to you (and we think it will be!), we hope to offer the expo each year.

Another area we are very excited about is the expansion of our T<sup>2</sup> circuit rider van program, now referred to as the **T<sup>2</sup> Circuit Training and Assistance Program**, or **CTAP**. We are again partnering with Mn/DOT Maintenance Research, the LRRB, and the FHWA on the program. Since its implementation the van has traveled to over 50 local maintenance facilities throughout the state, helping over 1,000 local agency maintenance workers and supervisors gain and exchange new knowledge essential to their jobs. For 1997, a full-time instructor will help us to expand our training topics of snow and ice control and pavement rehabilitation techniques to include topics such as oil and gravel road maintenance, work zone safety and traffic control, and roadside maintenance. In addition

Reflecting on 1996, I am again grateful for the support and commitment to technology transfer by our T<sup>2</sup> Program partners—the Minnesota Local Road Research Board (LRRB), Minnesota Department of Transportation (Mn/DOT), Federal Highway Administration (FHWA), and the many local agencies, associations, and industry and engineering consulting groups that make transportation technology transfer work in Minnesota. It seems that when I attempt to recognize the tremendous support of our T<sup>2</sup> partners, it may appear rather routine as I generically list the broad names of the various groups that support T<sup>2</sup>. However, we all know that it is the individuals who make up our partner groups that make the difference. Many individuals uniquely contribute their expertise, resources, and enthusiasm to T<sup>2</sup>. My sincerest thanks to each of you who have funded special projects, instructed a course, contributed an *Exchange* article, offered new transportation practices or technologies to share, served on a committee, answered a referral question...the list is endless! It is all of these countless contributions that add up to a T<sup>2</sup> Program that people want to be a part of and that makes a difference. Another year has ended, but our T<sup>2</sup> partnership network continues, is strong, and confidently leads the T<sup>2</sup> Program into 1997.

—*Cheri Trendera, T<sup>2</sup> Program Director*

to two “training circuits” of 10-15 statewide training stops, we are making our instructor(s) available on an “as requested” basis to visit your maintenance facility to cover a topic of your choice. By customizing many of the circuit visits, we hope to create a traveling training program that is more responsive to the differing needs of rural and urban personnel at city and county maintenance facilities.

Many will recall the 1995 publication of the Office of the Legislative Auditor, *Snow and Ice*

**Directions** continued on page 8

## CTS to Hire New T<sup>2</sup> Coordinator

The Center for Transportation Studies (CTS), the parent organization of Minnesota T<sup>2</sup>, has posted a job description for a new T<sup>2</sup> coordinator. This position will be responsible for the local technology transfer activities of Minnesota T<sup>2</sup> as well as other CTS educational programs.

The successful candidate will succeed Tom

**Coordinator** continued on page 7

## HIGHLIGHTS.....

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## SHRP Anti-icing Research Helps You Plan for Snow and Ice Control

Highway agencies spend approximately one billion dollars a year for snow and ice control. Thus, any small improvement in efficiency can result in big savings.

For this reason, the Strategic Highway Research Program (SHRP) focused part of its \$150 million of research on subjects related to snow and ice control. Researchers looked for new ways to reduce the detrimental effects of deicing chemicals on groundwater, vegetation, highway structures, and vehicles. Some of the new practices reduce costs, are more environmentally friendly, and also improve safety.

Several products were generated by the SHRP research, such as Road Weather Information Systems (RWIS), New Snowplow and Snow Fence Designs, Tests to Evaluate Deicer Chemicals, and Anti-icing Procedures and Strategies.

In anti-icing, maintenance personnel apply chemicals "just-in-time" to keep the snow and ice from bonding to the pavement surface. Something between 50 and 80 percent of needed chemicals can be saved by keeping the bond from forming, as compared to quantities needed to melt the snow and ice after bonding takes place (usually called "deicing"). From a safety viewpoint, the need for deicing is not usually detected until after some accidents occur. Thus, anti-icing technology not only saves the cost of chemicals and reduces environmental effects, but saves on accident costs, too. When applicable, anti-icing is truly a "win-win-win" situation.

The anti-icing study was started during the latter part of the five-year SHRP study, but was continued by a coopera-

tive highway research project managed by the Federal Highway Administration (FHWA). The continued study was titled *Test and Evaluation Project 28* and is now complete.

The results are revolutionizing procedures for snow and ice control. New techniques have been defined, equipment needs identified, and the marketplace is now responding with new and different equipment for application of chemicals. Relatively new chemicals also are being used, especially in the liquid form. Experience shows that liquid chemicals are easier to keep on the road surface until the snow and ice arrives. Liquid magnesium chloride is rapidly becoming a favorite in the northwestern part of the country. [See page 7 to order the SHRP final report.]

The states participating in the SHRP anti-icing study were California, Colorado, Maryland, Missouri, Minnesota, Nevada, New York, Ohio, and Washington. In addition to these nine states, six more states joined the continued study (Iowa, Kansas, Massachusetts, New Hampshire, Oregon, and Wisconsin).

For more details about the SHRP snow and ice technologies, contact Salim Nassif, FHWA Highway Operations Division - Construction and Maintenance Group, who is the engineer in charge of the anti-icing demonstrations project. Nassif's phone number is (202) 366-1557.

[Condensed from an article by John Hibbs of Hibbs Highway Engineering Services, Versailles, Kentucky.]

## MINNESOTA TECHNOLOGY EXCHANGE

January-March 1997 Vol. 5, No. 1

The Minnesota Technology Transfer (T<sup>2</sup>) Program is part of the Federal Highway Administration's Local Technical Assistance Program (LTAP). LTAP is a nationwide effort designed to foster and improve information exchange among local practitioners and state and national transportation agencies. Minnesota's T<sup>2</sup> Program is administered by the Center for Transportation Studies at the University of Minnesota, and cosponsored by the Minnesota Local Road Research Board and the Minnesota Department of Transportation.

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Mike Sheehan, Olmsted County; County Representative, Minnesota Local Road Research Board  
Tom Struve, City of Eagan; Minn. Street Superintendents Assoc.  
Dick Sullivan, Physical Research, Mn/DOT

Photo credits: Tom Struve (p. 1, p. 5 top); Mn/DOT (p. 2); Micky Ruiz (p. 3)

## Q & A

In the previous *Exchange* we ran a photo showing a series of snowplows that were pushing snow onto the road. We received several questions about this photo. This interest gave us the idea to cover the subject of urban snow removal.

Wayne Matsumoto, Hennepin County road and bridge engineer, took some time to answer some of our questions. Even though Hennepin County does not plow any freeway-style roadways, Matsumoto gave us his observations on how these types of roads are cleared as well as some information on snow removal in Hennepin County.

**Q** What exactly is happening in the accompanying photo?

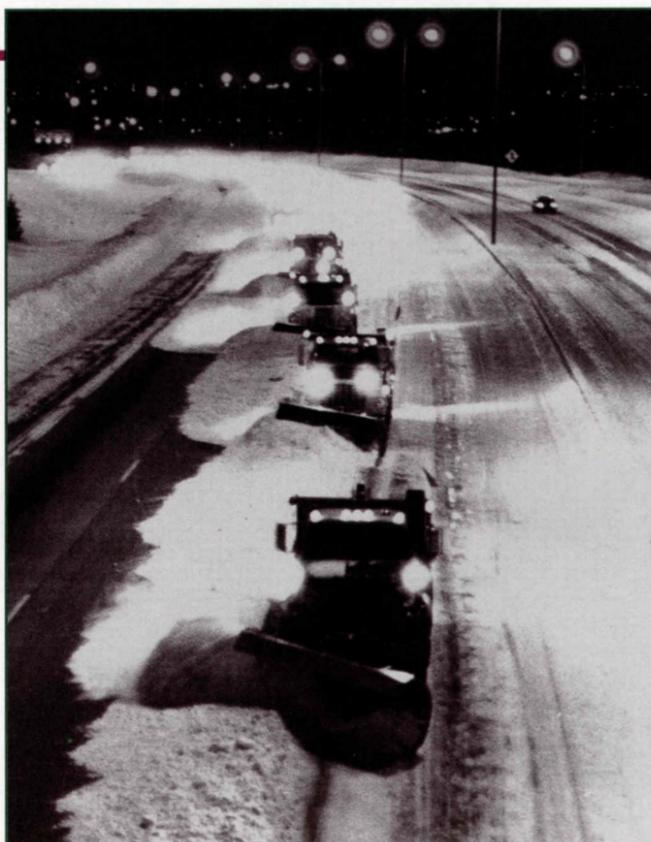
**A** This is called staggered plowing. By using multiple plows in a staggered line, snow can be removed from the center median to the outside shoulder. Snow needs to be removed from the inside median not only because of limited space, but also because if the snow along the center median starts to melt, the water could flow across the road to the outside shoulder. This could

be very dangerous if the water refreezes.

Staggering is also done in order to keep cars behind the plows. If cars drive through snow that has just been cleared from a portion of the road, the newly plowed snow scatters back onto the area that was just plowed. In addition, if a lot of snow is being removed, the snow that comes off the end of the plow blade will form a windrow which could cause drivers to lose control of their cars.

**Q** On which roads is this type of plowing done?

**A** It is done on multilane roadways. Hennepin County plows in this manner with two or three units. I have even seen as many as 10 Mn/DOT plows on I-94 in North Minneapolis.



Plows in a staggered line remove snow from the center median.

**Q** When is this done? (For example, is it done in a certain time interval or when a certain amount of snow has fallen?)

**A** Plowing is done in response to the weather condition. It's usually not necessary with really light snow, but on the other hand, it might be necessary with a snowfall as little as two inches.

**Q** What happens on a roadway that doesn't have wide shoulders on either side? (such as on bridges)

**A** On bridges, the snow is pushed out to one of the curbs and then the snow either is blown into an open area or is hauled away.

**Q** After this snow is gathered, where is it dumped?

**A** Hennepin County works with local municipalities for snow removal. The municipalities are required to provide a dumping site and in return Hennepin County helps the municipalities remove snow.

**Q** How many snowplows does Hennepin County have?

**A** Currently, we have 54 operational trucks.

—Cristyn Kowal

## Research Answers Questions—LRRB Asks Questions

by Micky Ruiz

At this time of year many local government engineers are busy reviewing budgets, planning winter maintenance activities, and thinking about next year's construction season. With so many deadlines, there never seems to be enough time to get it all done. In spite of this, four times a year a small, dedicated group of Minnesota's city and county engineers take time from their busy schedules to make decisions on an important aspect of engineering that many people don't think about—research.

The Minnesota Local Road Research Board (LRRB), with engineers representing county and city government, selects research projects that make up a \$1.6 million yearly research program. Research answers questions such as "Can rutting be eliminated by combining course aggregate with soft asphalt? Is Superpave the answer?"; "Is there a good, inexpensive method for selecting the best routes for snow plowing, traffic jam relief, or emergency vehicles?"; and "What are the effects of different types of surface preparations on overlay projects?" Answers to these questions are important because they help local government engineers do their jobs more efficiently.

Of course, there are many more problems needing solutions than there is money to solve them. And research is only part of the solution. Through technology transfer, the results of research are communicated and put into practice; and technology transfer costs money, too. So, the LRRB supports programs for technology transfer and implementation as part of its research program.

On November 17, 1996, the LRRB had the

### LRRB Membership—1997

**Chair:** Mike Sheehan, *Olmsted County*  
**Secretary:** Robert Benke, *Mn/DOT Office of Research Administration (ORA)*

Al Forsberg, *Blue Earth County*  
 Dave Hutton, *City of Savage*  
 Robert Johns, *Center for Transportation Studies*  
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 Julie Skallman, *Mn/DOT State Aid*  
 Glen Engstrom, *acting, Mn/DOT Office of Minnesota Road Research*  
 Walter Leu, *Lake of the Woods County*

Staff Support: Mn/DOT ORA

ominous task of making decisions on over \$600,000 worth of research proposals, with only \$542,000 of unobligated funds available, while keeping in mind that it's a good strategy to withhold some funding for projects that may be developed during the coming year.

Funding requests for new projects were presented at the invitation of the Board in response to problem statements solicited from city and county engineering and public works personnel statewide. So, what do Board members consider when deciding on whether or not to fund a research project? A lot of the time, it's cost. Not just what the research will cost, but the cost of implementing the results. For example, will local government be able to use the findings immediately or will they need to pursue policy changes or new regulations? And what will be the benefit to local government—can they save money?—increase safety to workers or the public?—protect the environment?

The Board has an obligation to the Minnesota Legislature, which enacted legislation to create the Board; to taxpayers; and especially to their own constituents—Minnesota counties and cities, since funding comes from their state aid apportionment. Board members show a strong commitment to their responsibility in the kinds of questions they ask about potential projects. Where did the proposal come from? Is it a direct result of a research problem statement received from local government? How many of their constituents can benefit? What new knowledge may be gained through the research? How can it be used by local government?

Research answers many questions posed by the people responsible for building and maintaining transportation systems. But getting results takes a lot more than asking the right question. It involves commitment by a number of people—not only those who make up the Local Road Research Board, but those who conduct the research and those who are responsible for implementing the results. Hundreds of people at Mn/DOT and the



Dick Sullivan (left), director of the Mn/DOT Office of Minnesota Road Research, which includes Mn/ROAD, receives a plaque from LRRB chair Mike Sheehan in gratitude of his 15 years of service to the LRRB.



Cheri Trendera, Dave Johnson, Roger Olson, and Paul Keranen at the LRRB meeting.

University of Minnesota, and more importantly, county and city engineering personnel throughout Minnesota, get involved in the research, technology transfer, and implementation process. That process begins with the LRRB and the questions they ask.

[Ruiz is with the Minnesota Department of Transportation's Office of Research Administration.]

## LRRB Chooses Projects for 1997

At its fall meeting the LRRB chose the following five new projects for full or partial funding in 1997.

**Investigating the Effects of Traffic Calming Strategies on Driver Behavior.** The research objectives are:

- To further understand how various traffic calming strategies affect driver behavior. For example, do narrower roads, the presence of parked cars, dividers, or traffic islands at intersections cause drivers to reduce speed without introducing other safety problems?
- To explore applications of various traffic calming strategies and devices using the wraparound driving simulator at the Human Factors Research Laboratory at the University of Minnesota.
- To make recommendations on the effectiveness of certain strategies so that the most promising can be tested in the field.

**Implementation of Superpave Mix Design at the Local Government Level.** The Superpave (Superior Performing Asphalt Pavements) program is part of the Strategic Highway Research Program (SHRP). The program includes a performance graded asphalt binder specification system, new or updated aggregate and mixture tests, and new gradation requirements. The Federal Highway Administration is encouraging the implementation of Superpave Level I mix design, and Mn/DOT and county agencies have been actively exploring the applicability of Superpave to Minnesota pavements.

This research is expected to provide local governments in Minnesota with an economical means of implementing the Superpave program.

**Ultra-Thin and Conventional White Topping at Mn/ROAD.** The transition zone between the 5-year and 10-year mainline concrete cells at the Minnesota Road Research Project (Mn/ROAD) is approximately 1440' in length and consists of roughly 14" of bituminous pavement on a plastic subgrade. There is currently no research being conducted on this part of the mainline, and it is not instrumented or tested with the falling weight deflectometer (FWD). Since this part of the pavement receives the same traffic as the rest of the Mn/ROAD cells it seems to be an ideal location to evaluate the performance of white topping in a high traffic volume environment.

What makes this research project unique in the United States is the availability of large traffic volumes from the interstate. All the other white topping projects constructed to date have been on relatively low volume arterial roads where the primary traffic is automobiles or on low-volume highways with AADT's below 1,000. The advantage of the high traffic volume available at Mn/ROAD is that the number of loadings available in one to two years is roughly equivalent to what a typical white topping project would receive in 20 years. This allows for a mechanistic modeling approach to the pavement analysis and evaluation that cannot be done elsewhere.

**Effects of Transverse Stiffener Beams on Shear Transfer.** The general objective of this research is to help design an effective load-sharing system for Longitudinally Nail-Laminated (LNL) timber bridges. It will result in (1) a national method for the design of Transverse Stiffener Beams (TSBs), and (2) a means to determine and guarantee quantitative performance results that TSBs contribute to LNL timber bridge

### Other LRRB-Funded Research

- Minnesota Road Research Project
- Experimental Investigation of Bridges with Integral Abutments
- Surface Preparation Prior to Overlay
- Preventive Maintenance for Streets and Highways
- Surface Stabilization on Low-Volume Roads
- Mechanical Properties of Shredded Tire/Soil Mixtures
- Measurements of Traditional Pavement Design Methods
- Fabric for Strength
- Efficacy of Erosion Control Blankets and Soil Stabilizers

deck configurations. This information will make it easier to use TSBs to add to the function of interlamina nail fasteners in distributing traffic load along the width dimension of the deck.

**Equilibrium Moisture Content of Wood in Minnesota Timber Bridges.** Wood stabilizes to a particular moisture content when it is exposed to a constant temperature and relative humidity. Indoors in Minnesota wood equilibrates to an average annual moisture content of 8 percent. Wood exposed to the outdoors but protected from the elements generally will equilibrate to an average annual moisture content of around 12 percent. This varies depending on location in the United States. The objective of this research is to establish the equilibrium moisture content (EMC) of wood used in timber bridges in Minnesota.

[Ed. note: The LRRB provides base funding for Minnesota T<sup>2</sup> plus funds for special projects. See page 1 for more about T<sup>2</sup> directions.]

**MAINTENANCE  
UPDATE**

**Alternatives to Wet Detention Basins for Water Quality Treatment**

by Steven Klein

If you have ever designed a water quality treatment basin for stormwater treatment, chances are the basin you designed was a "wet detention basin" or "NURP pond."

A wet detention basin is a basin that has a permanent pool of water in which stormwater quality treatment largely takes place. The requirements, size, and cost of such facilities vary greatly, depending on the governmental agency or agencies involved with the project. Also, water quality treatment is usually only one set of concerns a host of regulatory agencies and special interest groups may have over the parcel where you plan to provide stormwater water quality treatment.

Typically, stormwater projects I am involved in require coordination from many, if not all, of the following entities:

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife
- Minnesota Department of Natural Resources
- Watershed district or water management organizations
- Minnesota Pollution Control Agency
- The municipality
- The county
- The Archeological Society
- The County Soil and Water Conservation District
- The Environmental Quality Board
- Special interest groups
- Landowners

As a result of the coordination efforts with the above entities, I frequently find that when trying to combine their needs or requirements with the project's financial and physical constraints, there are many instances where site, cost, or other constraints prohibit the ability to construct a wet detention basin. Some of these other constraints might include:

• **Locations where goose and other waterfowl may cause problems or may add to existing problems.** This is frequently the case in metropolitan areas where the goose and duck populations have already become problems and also in locations in close proximity to airports, where flocks of birds can pose potential problems for airplanes. Wet detention basins can provide habitat for such waterfowl and, therefore, may not be the appropriate facility for water quality treatment.

• **When wetlands are involved.** The Wetland Conservation Act requires that any portion of a wetland disturbed or destroyed by various activities needs to be replaced elsewhere, and the replaced wetland typically needs to be twice as large as the disturbed area of wetland. The financial or physical constraints involved with constructing a wet detention basin in a wetland area, and then replacing the destroyed wetland elsewhere, may be prohibitive.

• **When valuable upland vegetation is involved.** Often areas where water quality treatment and stormwater detention need to be provided are surrounded by valuable upland vegetation such as oak or other forested areas. Constructing a combined wet detention and stormwater detention basin where the stormwater detention volume is placed above the standing pool of water may require a basin to be so large that it encroaches upon such valued vegetation.

*Dual-purpose basins can be significantly less expensive than combined wet pond/stormwater detention basins—sometimes one-half or even less.*

tion of outlet and weir control structures. The figure below shows schematic drawings of both outlet-controlled and weir-controlled facilities.

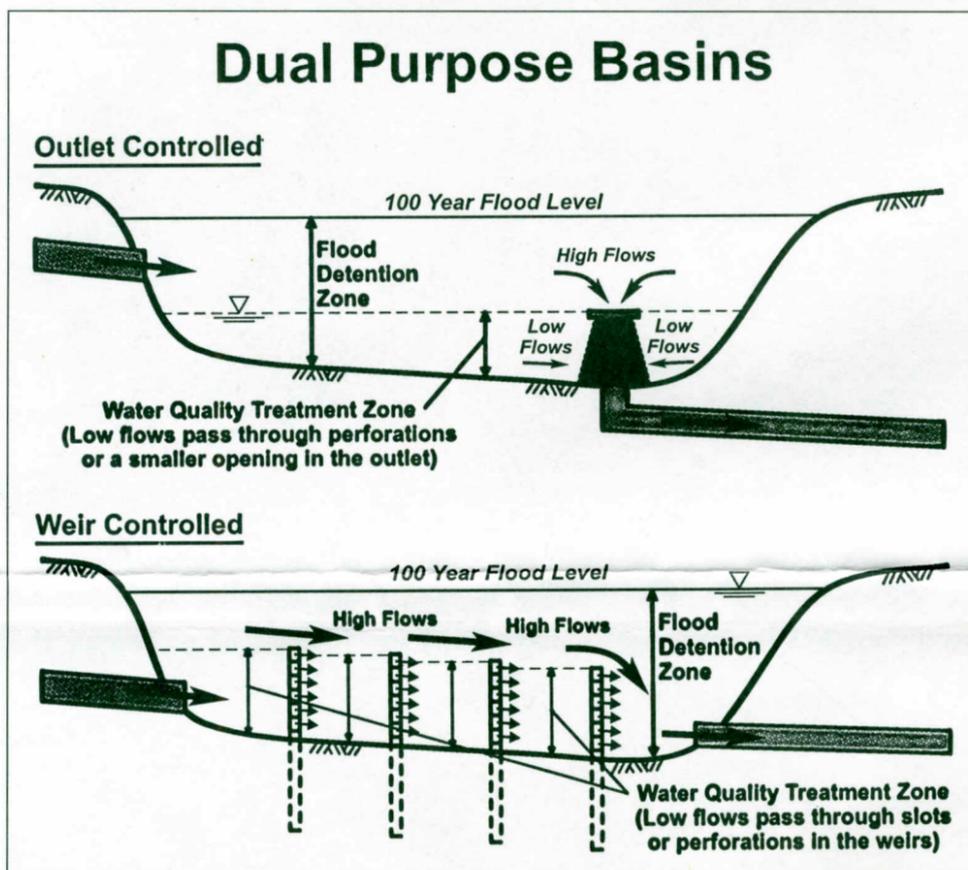
There are many possible variations on the type of structures, but they are always designed to significantly detain and treat the runoff from frequent one-year or two-year storms while allowing larger storm runoff to leave the basin more rapidly if space is limited.

An added advantage of dual-purpose basins is that they can be significantly less expensive than combined wet pond/stormwater detention basins—sometimes one-half or even less than the cost of a wet detention facility. This is due to the fact that a wet pond provides for water quality treatment in the standing pool zone and flood detention is provided above the standing pool of water. But in a dual-purpose basin, water quality treatment and flood detention are provided in the same zone. A dual-purpose basin, therefore, can be much smaller than a wet pond and, in turn, can result in a significant initial cost savings.

One disadvantage of a dual-purpose basin, when compared with a wet pond, is that dual-purpose basins need to be maintained more frequently. Therefore, the operation and maintenance costs of dual-purpose basins are somewhat higher than a comparable wet pond facility.

Governmental agencies are becoming more aware of the value of dual-purpose basins and, as such, you may wish to consider such facilities when wet detention ponds are not appropriate. For more information about dual-purpose basins, contact Steven Klein at Barr

Engineering Company, (612) 832-2809. [Klein is a senior engineer with Barr Engineering and was the instructor of the popular T<sup>2</sup> workshop held last fall on "Design, Construction, and Maintenance of Stormwater Treatment Basins and Erosion Control Facilities."]



So what can be done in cases where water quality treatment cannot be provided in a wet detention basin? Well, frequently "dual purpose" basins (otherwise known as "extended detention" basins) can be the answer.

Dual-purpose basins, as studied by the Nationwide Urban Runoff Program (NURP), were found to have water quality treatment capabilities that were "typically high and comparable to the performance efficiency of wet ponds." Dual-purpose basins are facilities that are typically dry or have very little standing water between storm events.

These facilities are designed to significantly detain short-duration, frequently occurring storm events. Typically, these events might be a one- or two-year storm event. Various studies have shown that storms up through a one- or two-year event may account for up to 90 percent of all of the pollutants carried away from urban watersheds by stormwater or snowmelt runoff. So, if a facility can be designed to effectively treat all the water from these frequent storms, the majority of the pollutants leaving the watershed in stormwater will, in turn, be removed.

The structures designed for dual-purpose basins, therefore, are designed to significantly detain the volume of water from the one- or two-year event while allowing flows from larger, less frequent storms (often the 100-year event) to pass through the basin more rapidly.

In dual-purpose basins, the flows can be controlled by (1) a structure placed at the basin's outlet (outlet-controlled), (2) an in-basin or in-wetland set of permeable weirs (weir-controlled), or (3) a combina-

**Related EPA Reports**

The U.S. Environmental Protection Agency (EPA) offers three fact sheets dealing with related topics:

**Erosion, Sediment, and Runoff Control for Roads and Highways** (EPA 841-F-95-008d, Dec. 1995). This six-page fact sheet discusses principles of runoff control, best management practices, sources of pollution, and operation and maintenance.

**Pollution Control Programs for Roads, Highways, and Bridges** (EPA 841-F-95-008c, Nov. 1995). This four-page document covers nonpoint source programs, FHWA environmental policy, and wetlands programs.

**Planning Considerations for Roads, Highways, and Bridges** (EPA 841-F-95-008b, Oct. 1995). This four-pager discusses road, highway, and bridge planning, construction, and operation and maintenance.

All three provide additional sources of information. For a copy, please call the T<sup>2</sup> library at (612) 626-1023.

## Hats Off to the Fall Maintenance Expo

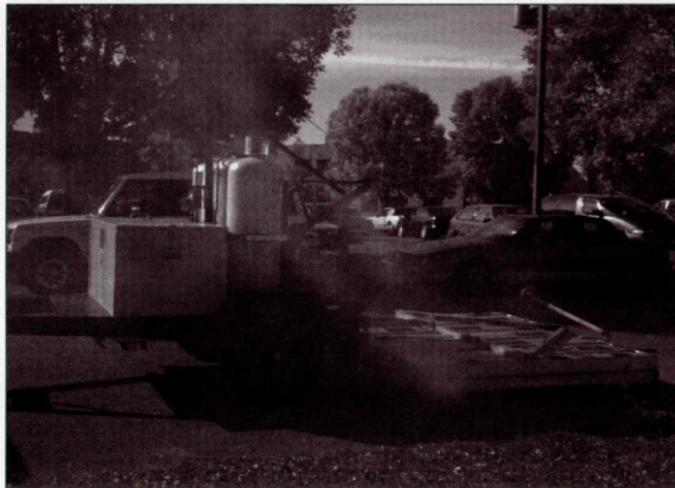
By almost any measure, the Fall 1996 Minnesota Maintenance Expo on October 23 was a success: approximately 900 state and local maintenance professionals attended; 40 vendors exhibited; 140 workers participated in the snowfighter roadeo; and over 1,000 commemorative hats were sold.

The event combined the old Mn/DOT snow roadeo with new training/education sessions, a technical fair, and exhibits. The training agenda included sessions on prewetting, patching, salt brine mixing systems, snowplow lighting, worker safety and health issues, and much more. It also included a Circuit Rider Van workshop on snow and ice control, with van instructors Kathy Baker, Larry Martini, and John Scharffbillig (see page 6 for more about the van).

The expo also gave greater emphasis to local needs. Tom Struve, street supervisor in Eagan and a T<sup>2</sup> Steering Committee member, shared his experience in a session on winter crack seal. Other local agency presentations included:

- "Prewetting: Equipment and Methods," Anoka County and Andover
- "Successful Winter Mixes in Patching," Mike Kennedy, Minneapolis
- "Backlit Mapping Displays," Pat Dunn and John Fox, Woodbury

Wayne Fingalson of Wright County and Richard Hansen of St. Louis County served as session moderators.



"The expo was a great educational opportunity for local agencies," Struve said. "Bringing together all levels of Minnesota maintenance forces helped us learn the latest tricks of the trade."

The event was part of a cooperative partnering effort by Mn/DOT, the MSSA, LRRB, MPWA, and several local agencies, including Minnesota T<sup>2</sup>. A big hats off to the planning committee for the fine debut of the fall expo.

*Clockwise, from top left: drivers from cities, counties, and Mn/DOT competed in the snowfighter roadeo; equipment displays and demonstrations occupied several acres; local agency prewetting technology; ongoing presentations with Power Ray Infra Red Bituminous patcher.*

## Smooth Pavement, Smooth Ride

The previous issue of the *Exchange* told you about some recent activities of the Smooth Pavement Task Force, which held a special technology exchange and equipment review last May along Trunk Highway 169. In August three of the subareas in Mn/DOT District 7 worked with the equipment for a second time. Following are some of the crews' comments about the equipment.

### Minimac Microsurfacing Machine

This machine worked on an area of Highway 19 that had received a lot of complaints due to deep cracks. The materials—CSS1H emulsion, aggregate, and Portland cement—were mixed in the machine and applied to the roadway with a garden-style tractor with a squeegee to spread the slurry (it was hoped the slurry would fill cracks to full depth). Some of the test sections had rubber sealants, others did not; one section used standard fines patching. The negatives of this machine are that it is a slow operation—it takes 1.5 to 2.5 hours before traffic can be returned to the roadway—and that the aggregate had to be trucked in from St. Cloud and the emulsion from the Twin Cities.

### Rosco RA-300 Patcher

The patcher was used along I-90 between Blue Earth and Wells. The patcher broke down for a while, but was in the area for 29 working days. "The patches are not as smooth as the two-man patcher, because the operator

is further from the whole," says Bob Lohberger. "But it is cleaner, dust free, and only requires one operator." Negatives are parts availability, distance to get emulsion, and the slowness of the patching operation.

### Slurry Trailer

Sections were tried on Highways 22, 83, and 60. Because of the cure time, the four-lane roadway worked best. If used on a two-lane road, the crew often would outdistance the flaggers. The crew also found the operation to be very messy, as the unit dumped batches of liquidy slurry onto the road. The crew recommended some ways to change this. Obtaining aggregate and emulsion were again a problem with this unit, just as it was with the Minimac. Also, with this machine there was no

control on the size of the batches being mixed. In some cases, there was too much material and in others not enough.

The test areas used for all three equipment types will be looked at closely and monitored.

[Condensed with permission from Mn/DOT District 7 Technical Times, fall 1996.]



*Using the microsurfacing machine is a relatively slow operation.*

## Who You Gonna Call? Ice Busters!

Late in the winter of 1996 the city of Mankato purchased an "Ice Buster" attachment for its motor grader to break up compacted snow and ice. Workers mounted the Ice Buster attachment on the front of the grader, although the attachment also can be mounted behind the front wheels. This is a relatively new piece of equipment available to Minnesota. Mn/DOT has only one in its system (at Bemidji), which was purchased on an experimental basis.

The Ice Buster is raised and lowered by a front hydraulic cylinder which has enough down force to raise the front end of the grader. As the grader moves forward, the teeth push into the compacted snow and ice and pop out chunks. This breaks up the compact enough that the blade is then able to remove the compacted snow and ice from the roadway.

The Ice Buster has a side cylinder that will tip the outside third of the rotating Ice Buster head. This enables the operator to match the angle of the gutter

*Ice Buster continued on page 8*

## WORKSHOPS & TRAINING

# Van Program Shares Winter Maintenance Techniques

by Kathy Baker

The Circuit Rider Van Program completed its second year of activity last fall with a 14-stop tour of Minnesota. The latest sessions, held from Virginia to Winona, focused on snow and ice control issues. Approximately 250 maintenance personnel from county, city, township, and state road maintenance shops participated.

The program facilitators, Kathy Baker and Larry Martini of Mn/DOT, were accompanied by John Scharffbillig, who was part of a Mn/DOT-Finland exchange program last year. Scharffbillig spent a winter in Finland looking at Finnish maintenance equipment, management styles, technologies, and highway maintenance techniques. One hour of each four-hour van session was spent in discussion of Finland and how Scharffbillig's firsthand learnings could benefit agencies in the United States. This brought technology exchange at an international level to bottom-line workers in Minnesota. This portion of each session drew a large amount of interest and many questions throughout the state.

The remaining three hours of the sessions covered a variety of snow and ice control related topics. Some of the topics were sander calibration, chemical/sand placement, prewetting, alternative chemical usage, plowing and winging methods, salt/sand storage, innovative cutting edges, and new and common equipment used throughout the state and the world. The sessions were designed both to educate and

## Coming T<sup>2</sup> Attractions

### Construction of Hot Mix Asphalt Pavements

St. Cloud, February 24-26

St. Paul, February 26-28

Duluth, March 31-April 2

St. Paul, April 2-4

### Gravel Road Maintenance and Design

Brainerd, February 25

Minneapolis, February 26

Mankato, February 28

### CTS Transportation Expo and Job Fair

Minneapolis, February 26

This event is designed for students and others interested in exploring a career in transportation. It will include panels of transportation practitioners and faculty discussing transportation career preparation, placement, and networking opportunities. Cosponsors are the Women's Transportation Seminar and the LRRB. Call Catherine Ploetz, (612) 626-2259

### Registration

Unless noted otherwise above, to register or for further information, contact Bev Ringsak, 206 Nolte Center, 315 Pillsbury Dr. S.E., Minneapolis, MN 55455; (612) 625-6689; fax (612) 626-1632; e-mail bringsak@mail.cee.umn.edu

### Minnesota Pavement Conference

Minneapolis, February 27

Call Catherine Ploetz, (612) 626-2259

### Asphalt Pavement Rehabilitation Techniques

Mankato, April 1

St. Paul, April 2

Detroit Lakes, April 3

### Spring Maintenance Expo

St. Cloud, April 9-10

### Preventive Maintenance Techniques for Public Works Equipment

Owatonna, April 15

St. Paul, April 16

St. Cloud, April 17

### CTS Eighth Annual Conference

Minneapolis, May 13-14

Call Catherine Ploetz, (612) 626-2259

### LTAP National Conference

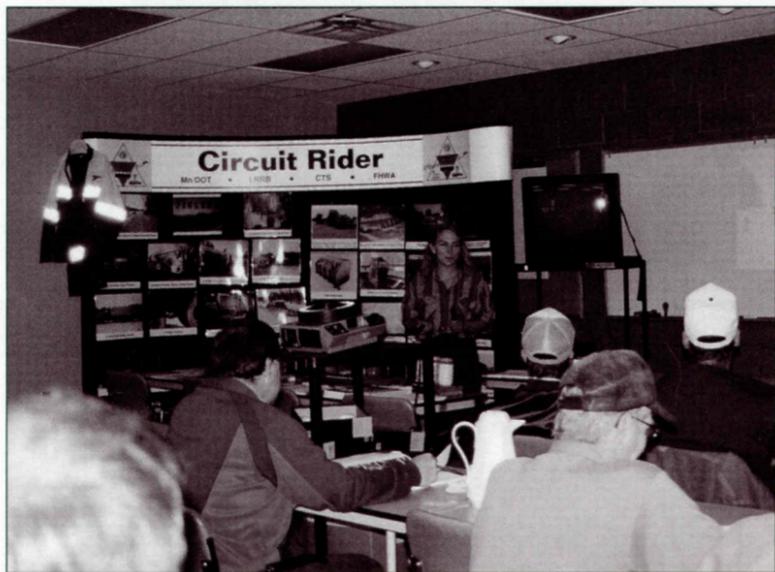
Duluth, July 27-30

Call Lori Graven, (612) 625-9023

exchange ideas on how groups did their winter maintenance work. In every session a variety of ways to do the same job were exchanged, and differing uses of equipment and often some cooperative work efforts were arranged. Many of the different government agencies in Minnesota are sharing facilities, equipment, and personnel as a way of improving customer service and holding down costs.

The van program is sponsored by the Minnesota Local Road Research Board, the Minnesota Department of Transportation, the Federal Highway Administration, and the T<sup>2</sup> Program.

[Ed. note: See p. 1 for plans for the 1997 program.]



Kathy Baker at the fall sessions on snow and ice control.

## Come One, Come All: National T<sup>2</sup> Conference in Duluth

As we announced in the last issue, Minnesota T<sup>2</sup> is hosting the 1997 National Technology Transfer (T<sup>2</sup>) Center Conference on July 27-30 at the Duluth Entertainment and Convention Center. Cohosts are the LRRB, Mn/DOT, and FHWA Region 5.

The planning committee, led by Cheri Trenda and Lori Graven, has met several times to determine the schedule and other arrangements. Possible session topics include strategic planning, the value of international exchange, T<sup>2</sup> evaluations, building support, needs assessment, and partnerships. Additional attractions are a breakfast for new attendees; a "best practices" display; and social activities such as an excursion on the North Shore Scenic Railroad.

If you have suggestions for the conference, please complete and mail the Reader Response form on the back page of this newsletter or contact Lori Graven, T<sup>2</sup> conference coordinator, at (612) 625-9023.

Conference materials will be mailed this spring, and the April-June issue of the *Exchange* will have further details.

## Intelligent Transportation Systems (ITS) Update

### ITS Information Exchange Forum

Minnesota Guidestar and ITS Minnesota are hosting the Third Minnesota Intelligent Transportation Systems (ITS) Information Exchange Forum on March 12 at the Sheraton Inn Metrodome in Minneapolis.

The event will include the ITS Minnesota Annual Meeting, a luncheon, displays, presentations, and a featured talk by Hal Kasoff, who began a new position as executive vice president of ITS America last

November after serving 12 years as the Maryland state highway administrator.

The forum will provide transportation professionals with information about the Guidestar NOVA program, an emerging state partnership initiative applying ITS to improve the quality of life in greater Minnesota. Next quarter's *Exchange* will include a major article describing the NOVA program and other ITS activities in the state.

For more details about the forum, please call Catherine Ploetz, (612) 626-2259.

### Call Issued for Rural ITS Conference

The Western Transportation Institute (WTI) and the Intelligent Transportation Society of America invite all interested parties to submit papers on advanced technologies (intelligent transportation systems) to be considered for publication and presentation at the

1997 Annual Meeting of the ITS America Advanced Rural Transportation Systems Conference. General subjects of interest will be national and international planning and deployment, with focus on safety and security.

The conference will take place on August 12-15, 1997, at the Huntley Lodge in Big Sky, Montana. Abstracts are due by **March 30, 1997**. For a submittal form or further information, please contact **Traci Ulberg** of WTI, (406) 994-6114; e-mail TraciU@coe.montana.edu.

## Publications and Videos

### Minnesota T<sup>2</sup> and Mn/DOT Library

Newly released publications available through the **Minnesota Transportation Libraries (MTL)** partnership are described below. For further information contact Laura Dale Bischof, CTS/Minnesota T<sup>2</sup>, phone (612) 626-1023, fax (612) 625-6381; or Anne Mack-ereth, Mn/DOT Information Services, phone (612) 297-4168, fax (612) 297-2354.

**Transportation Research Records 1995.** (TRR CD-1) This is a CD-ROM of the papers presented at the 1995 Transportation Research Board Annual Meeting and published in the *Transportation Research Records* 1472-1516.

**Public Involvement Techniques for Transportation Decision-making.** (FHWA-PD-96-031) This report describes numerous public involvement techniques as well as the building blocks of a public involvement program.

**Quality Assurance Software for the Personal Computer.** (FHWA-SA-96-026) This software package allows the user to analyze both pass-fail and pay adjustment acceptance procedures, construct operating characteristic curves, plot control charts, experiment with computer simulation, perform statistical comparisons of data sets, demonstrate the unreliability of decisions based on a single test result, and explore the effectiveness of stratified random sampling.

**Retroreflective Sheeting Handbook.** This handbook provides field inspectors with a reference source for retroreflective sheeting materials. It can be used to compare sheeting materials on a project with the contract provisions.

**Read Your Road.** Developed by the Federal Highway Administration, this guide covers the built-in safety features of our roads and teaches drivers to read, understand, and respond to pavement markings, signs, and signals.

**Tire Noise and Safety Performance.** (FHWA-SA-96-068) This report recommends the Portland Cement Concrete (PCC) pavement surface textures that will reduce noise frequencies without compromising safety.

### New Research Report Catalog Published

The *Transportation Research Reports Catalog* will be published in February, a little later than we had announced earlier.

The production and publication of the catalog was funded by the LRRB, with assistance from Mn/DOT and Minnesota T<sup>2</sup>.

The catalog lists almost all of the published and many of the unpublished Mn/DOT and LRRB research project reports completed through June 1996.

For a copy contact Mn/DOT's Office of Research Administration (ORA), (612) 282-2274, e-mail ora.research@dot.state.mn.us.

### Bike Planning for Your Area

In recent years, the popularity of bicycling has grown as a sporting activity as well as an economical form of transportation. Because of bicycling's popularity, many communities are starting to incorporate bikes into their overall transportation plan.

To help communities formulate their bicycle transportation plans, Dr. Robert Sykes and Trina Driscoll, both of the Department of Landscape Architecture at the University of Minnesota, have developed a planning guide, *Creating Bicycle Transportation Networks: A Guidebook* (Mn/DOT 96-14). This guide presents a practical planning model for bicycle transportation in cities, suburbs, and small towns. Planning guidelines for bicycle friendly zones are presented, along with a step-by-step process that describes how communities can plan for bicycle transportation. Also discussed are planning and design considerations that are important to the success of a bicycle transportation system. These considerations include the needs of cyclists, skill levels, personal safety issues, system legibility, and traffic calming techniques.

The guidebook is intended for use by professional planners, designers and engineers, neighborhood groups, bicycle advocates, and community decision-makers. Copies are available from Mn/DOT ORA, (612) 282-2274.

### Anti-icing Manual Available

Due to the popularity and high demand for this report, the Federal Highway Administration has redistributed the *Manual of Practice for an Effective Anti-Icing Program* (FHWA-RD-95-202). The report should be of considerable interest to highway winter maintenance managers, operators, and other personnel involved in snow and ice control. Earlier distribution was made last June.

The report documents a two-year study of testing and evaluation of various anti-icing technologies that were developed under the Strategic Highway Research Program (SHRP) to determine the conditions under which anti-icing practices would be most effective. The manual provides

information and guidance to winter maintenance managers and operators for successful development and implementation of an effective anti-icing program. It describes the significant factors that should be understood and must be addressed in an anti-icing program. The manual also includes recommendations and guidance for conducting anti-icing operations during specific precipitation and weather events. However, it must be recognized that the development of the program must be based on the specific needs of the site within its reach.

A copy (call number TE220.5.M36) is available on loan from MTL (612-297-4168). An electronic version of the manual is planned for later this year.

### Snow and Ice Control Videotapes For Sale

A videotape of the 1995 satellite teleconference on "Snow & Ice Control—A Review of Innovative Practices," is available from Minnesota T<sup>2</sup>.

The four-hour tape is a review of some of the best and most innovative practices being used around Minnesota, the nation, and the world. It shows how many local governments have moved from reactive practices to preventive practices, saving time and money, reducing complaints, improving performance, and reducing liability.

By reviewing this tape you will learn:

- how local governments are staying out of court while improving safety and performance with new policies, practices, and procedures
- from township, city, county, and state agencies that have successfully implemented cooperative partnerships that reduce costs through the sharing of equipment, materials, labor, and facilities
- about the latest in maintenance innovations, equipment, and technologies being used at the local, state, and federal level. From an inexpensive cutting edge dolly to a sophisticated road weather information system, this workshop contains dozens of examples of labor-saving devices designed to improve safety and performance
- how deicing, anti-icing, and the early application of chemicals are saving many communities money and materials
- practical procedures for salt brine production, prewetting, and the application of sand and chemicals
- how many communities are communicating with the public to reduce complaints and improve service through the use of public meetings, newsletters, written policies, cable TV, and videos
- about the 12 actions for effective snow and ice control

The tape is a professionally produced video of a down-to-earth, practical workshop complete with real-world examples, case studies, and experienced snow and ice professionals with hands-on experience. Much of the footage was shot in the field at local public works facilities.

In addition to the tape, you will receive the 150-page manual, *Snow and Ice Control: A Best Practices Review*. The cost of the four-hour tape plus the manual is \$195. There is a special discount rate of \$95 for residents of Minnesota, Alaska, Missouri, and Nevada because those states downlinked the broadcast at sites in their states.

To order the full tape and manual, or to obtain a free, seven-minute demonstration tape, please contact **Bev Ringsak**, (612) 625-6689, e-mail bringsak@mail.cee.umn.edu.

### Utility Cut Repair: Doing It Right

This video is the ninth completed under the LRRB's research implementation program contracted with Braun Intertec. The main goal of the video is to increase the workmanship quality associated with making and repairing utility cuts throughout Minnesota. It shows supervisors, workers, and public officials how everyone benefits from quality workmanship and the use of research-tested materials and methods. Conversely, the video shows how doing things the wrong way costs everyone money, headaches, and time.

Many agencies require a careful evaluation of the need for utility cuts versus other utility repair/installation procedures that do not require cutting through the pavement. This video provides information with respect to repairing the roadway after an open cut has been made to repair or service a utility.

Enclosed in the video case is a review sheet. On one side of the sheet is information for someone showing the video: objectives, targeted audience, and a brief description of the content. The reverse side is for the audience. Users should make copies for viewers so that they have a written summary of what they have seen.

This video is being distributed to all counties and cities in Minnesota. The LRRB invites you to share this video with your staff, residents, and especially the utility companies working within your agency. Call Minnesota T<sup>2</sup> for a copy.

### Coordinator from page 1

Donahue, who resigned on October 21, 1996, after two years with the program. Donahue contributed to the initiation and growth of many successful T<sup>2</sup> activities, including the Circuit Rider Van and 1995's Snow and Ice Control satellite broadcast. We wish him well.

Duties of the new position will include assessing training, information, and technology transfer needs; developing strategies to meet education and technology transfer needs such as short courses, demonstrations, and information resources; and designing transportation education program plans, course curricula, and materials.

The position is an annually renewable administrative appointment reporting to Cheri Trendera, program director of CTS

education and technology transfer programs. Applications are due **March 15**.

The full position description is available by calling CTS at (612) 626-1077 and is also posted on the Center's Web page at <http://www.umn.edu/cts/>.

### LTAP Battery Jumping Procedures Reference Card

This 3.5 in. x 8 in. plastic laminated reference card is designed to be stored above the sun visor or in the glove box within easy reach.

Reference information includes diagrams for jumping multiple-battery systems, procedures for connecting cables, and precautionary measures.

To obtain a card call the Center for Transportation Studies, (612) 626-1077.

CALENDAR

IF YOUR PROFESSIONAL ORGANIZATION MEETS ON A REGULAR BASIS, LET US INCLUDE THE INFORMATION HERE. CONTACT EDITOR, *TECHNOLOGY EXCHANGE*.

FOR AN UP-TO-DATE LIST OF EVENTS IN MINNESOTA AND NATIONWIDE, PLEASE SEE THE CTS/T<sup>2</sup> EVENTS WEB PAGE: <http://www.umn.edu/cts/Events/calendar.html>

| DATE       | EVENT  | LOCATION                                 | CONTACT   |
|------------|--|--|---|
| Feb. 25    | CTS Winter Quarter Luncheon: "Mobility and the Automobile in the 21st Century," by C. Kenneth Orski, President, Urban Mobility Corp. | Radisson Metrodome, Minneapolis          | Catherine Ploetz, (612) 626-2259                                |
| Feb. 26    | CTS Transportation Career Expo and Job Fair  | Coffman Union, Minneapolis               | Catherine Ploetz, (612) 626-2259                                |
| Feb. 27    | Minnesota Pavement Conference  | Earle Brown Center, St. Paul             | Catherine Ploetz, (612) 626-2259                                |
| Mar. 3-6   | Highway Safety: Steps to the Future  | Washington, D.C.                         | TRB Conference Center, (202) 334-2934, abrown@nas.edu           |
| Mar. 6-10  | Associated General Contractors (AGC) of America Annual Convention  | Washington, D.C.                         | AGC, (202) 383-2765   |
| Mar. 11-13 | Industrial Fabrics Assoc. Intl. (IFAI) Geosynthetics '97 Conference  | Convention Center, Laguna Beach, Calif.  | IFAI, (800) 225-4324  |
| Mar. 12    | Third Minnesota ITS Information Exchange Forum   | Sheraton Metrodome, Minneapolis          | Catherine Ploetz, (612) 626-2259                                |
| Mar. 21    | Hazards of Confined Space Entry - Hands-On   | Minnesota Safety Council Annex, St. Paul | Minnesota Safety Council, Inc. (612) 291-9150 or (800) 444-9150 |
| Mar. 21-27 | National Association of County Engineers (NACE) Annual Meeting and Technical Conference  | Birmingham, Ala.                         | NACE, (202) 393-5041  |
| Mar. 25-26 | "How To" Striping Conference   | Civic Center, Fargo, N.D.                | ATSSA, (800) 272-8772   |
| Apr. 5-9   | American Planning Association (APA) National Conference  | San Diego, Calif.                        | APA, (312) 431-9100   |
| May 13-14  | CTS Eighth Annual Research Conference  | Sheraton Park Place, Minneapolis         | Catherine Ploetz, (612) 626-2259                                |
| July 20-22 | FHWA National Pavement Management Workshop   | New Orleans, La.                         | George Jones, (202) 366-1337                                    |
| July 27-30 | 1997 National Technology Transfer (T <sup>2</sup> ) Center Conference  | Convention Center, Duluth                | Lori Graven, (612) 625-9023                                     |

Directions from page 1

**Control: A Best Practices Review.** Local agencies across Minnesota and nationally responded very positively to this resource and wanted to have other similar resources available. Minnesota T<sup>2</sup> will initiate its **Best Local Agency Management**

**Practices** pilot review this year. Our plan is to create a "one-stop" information resource so that local personnel have the most current, comprehensive, and objective information available on a transportation practice, resulting in more fully informed decisions and

improved service delivery. If you have a preference for a "best practices" topic, please give us a call.

Satellite training is a growing component of the T<sup>2</sup> Program. Offering multiple sites of a single training broadcast is an economical way to make training programs more accessible to greater numbers of local personnel across Minnesota. The "live" broadcast and on-site facilitators help to ensure individual questions and learning needs are addressed. In 1997, the Minnesota T<sup>2</sup> Program, in cooperation with the Minnesota Public Works Association, will offer four satellite training programs which will be announced in a special T<sup>2</sup> mailing and in the next issue of the *Exchange*.

In addition to using satellite technology for our training outreach, more training is becoming available through interactive compact-disc. Minnesota T<sup>2</sup> has several compact-disc players and interactive training programs on three topics—managing snow and ice control, work zone safety practices, and managing meetings. It's easy, fun, and a

convenient way to learn—all you need is your own work space, a video monitor, and our CD-I player. So, if you haven't yet tried our interactive compact-disc training, check it out by simply calling T<sup>2</sup>!

Finally, the 1997 program directions described above support the ongoing, base activities you've come to expect from the T<sup>2</sup> Program including the quarterly *Exchange*, information resource catalogs, technical assistance/referral, and our program of technical workshops and on-site mechanic training held around the state. The T<sup>2</sup> Program Steering Committee, chaired by Pat Murphy of Mn/DOT State Aid for Local Government, is continuously evaluating current T<sup>2</sup> services and exploring new potential programs. So, if you like what the T<sup>2</sup> Program is doing—tell us! If you don't, we particularly want to hear from you. Just phone me directly at (612) 625-5829. Your comments, suggestions, and feedback continue to be important, so please don't hesitate to call.

—Cheri Trenda

Reader Response

Please help the *Exchange* become more effective by filling out this form and returning it to:

Minnesota T<sup>2</sup> Program, Center for Transportation Studies  
 200 Transportation and Safety Building, 511 Washington Avenue S.E.  
 Minneapolis, MN 55455  
 Fax: (612) 625-6381 E-mail: snopl001@maroon.tc.umn.edu

The following is a(n)

addition \_\_\_\_\_ change \_\_\_\_\_ deletion \_\_\_\_\_

Name \_\_\_\_\_

Title/Organization \_\_\_\_\_

Employment

County \_\_\_\_\_ City \_\_\_\_\_ Township \_\_\_\_\_ Mn/DOT \_\_\_\_\_ Supplier \_\_\_\_\_

Contractor \_\_\_\_\_ Consultant \_\_\_\_\_ Vendor \_\_\_\_\_ Other \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone/Fax \_\_\_\_\_

My suggestion for a local innovation to report on is: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

My question for the Q & A column is: \_\_\_\_\_

\_\_\_\_\_

My idea, comment, or suggestion is: \_\_\_\_\_

\_\_\_\_\_

Please send me information on: \_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

Ice Buster from page 5

along the curb, which is an area of high ice buildup in a city.

Maintenance workers found this to be a much faster and less costly method of handling high-depth icy areas, such as an area where a water main breaks and freezes a large amount of water. This year the street department hopes to use the Ice Buster to remove compacted snow and ice from residential streets rather than using expensive chemical applications to improve driving traction.

For more information contact Jerry Eken, Mankato public works superintendent, (507) 387-8644.

[Reprinted from Mn/DOT District 7 Technical Times, fall 1996.]



Shown with optional Tilt Cylinder

The Ice Buster breaks up compacted snow and ice.