

# roads bridges transit technology news

Local Transportation Information Center  
Iowa State University Engineering Extension Service

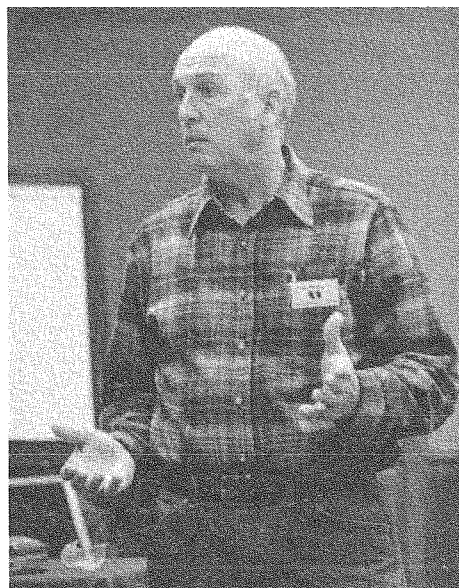
December 1988

## Nebraska motorgrader course a hit in Iowa

A program to increase the skill of Iowa motorgrader operators got off the ground with the help of Nebraska Technology Transfer instructors during an October training session in Audubon County. Lowell Richardson, Office of Local Systems Director for the state Department of Transportation, wants the state — through the T2 program — to develop a similar training program for state motorgrader operators.

"The goal of the program was first, set up a pilot program to see how well it would work in Iowa and, two, to form a nucleus of trainers to branch out and get the program started in Iowa," Richardson said. "What we need to do now is to try to find someone who could direct this program and this should be done through T2.

"This has been going in Nebraska for three or four years and they've developed it and refined it to the point where it's very successful. I thought it would be beneficial for Iowa to get something like this started. One of the weaknesses of T2 is that we haven't given enough attention to the basics.



**Ed Wootton**

We need to divert more attention to it in the next few years."

The program brought in by Nebraska Assistant Director of Technology Transfer, Ed Wootton, lasts three days. The first day is to "train the trainer," where more experienced operators are taught and encouraged

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## Readers rate 'Tech News'

A majority of readers — 80.8 percent — rated *Technology News* as either "very useful" or "useful," according to a questionnaire in the June issue.

Overall, *Technology News* was rated "very useful" or "useful" by 28.4 percent and 52.4 percent of the respondents, respectively. Individuals from cities found *Technology News* more valuable than the average and county personnel were even more positive.

The most popular regular feature of *Technology News* is Tips From The Field, followed by the tort liability articles. The general subject of most interest is roadway maintenance followed by management topics.

Of those that attend Iowa State University transportation workshops, 25 percent found them "very useful" and 57 percent found them "useful." Again, staff from counties and cities found the workshops more useful than the average. Forty-two percent of the respondents from counties attend two to five workshops each year.

Well over half of the respondents preferred one-day

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## Inside pages

3. The tort liability article discusses court cases where maintaining a sign functionally was an issue.
4. Data flow diagrams discussed in this month's MicroTech article can help plan computer systems.
5. Three Iowa towns find Time-Base Coordinators work best to update their signal systems.
6. "Tips From The Field" details how to make a dual wheel remover and a boot drier.

## Motorgrader continued from page 1

to help less experienced operators. The second day is spent in the classroom learning new techniques. On the third day, operators take what they've learned in the classroom and apply it out on their roads. Instructors from the program visit each operator to see how the techniques are working and to answer any questions.

"One of the best features is that it does have a trainer work one-on-one with an operator," Richardson said. "And it's not a slick college professor coming out to teach them something. It's just someone who's been operating a motorgrader and willing to pass on their skills."

A program in Iowa — similar to Nebraska's — is needed, Richardson said, because operators often don't get advanced training. Wootton agreed.

"You better believe they do (need more training)," Wootton said. "The thing that happens — and I've been an operator since 1938 — is we get new machinery from a supplier and they

really don't show the people what it is capable of doing. There are things like the articulation of a machine, lateral shift, and pitch control that is not understood by the operator. Those are some of the things we'd like to touch on because if the operators don't have the knowledge, they can't utilize it.

"These guys are good operators, I'm not knocking them," Wootton added. "They're willing to learn and we feel that we do a lot of good, and hopefully, they feel the same way."

Increasing the skill level of operators pays off in two ways, according to Richardson and Wootton. First, the roads are in better condition which makes the public happy and second, considerable savings can be realized.

"If operators understand the operation of their machine, you can save thousands and thousands of dollars per year in aggregate cost, fuel consumption, and ease of operation," Wootton said. "To give them an idea of how much a county can save, normally it's in the neighborhood of \$50,000."

## Readers rate continued from page 1

workshops and the most popular days for workshops are Wednesday and Thursdays, followed by Tuesday. The most popular workshop topics are those that deal with road surface maintenance and maintenance management topics (management of equipment and road surface).

To continue to serve the desires of our readers, we will continue to print the features they said they liked. To

better suit our readers' training interests, courses that deal with road surface management and pavement maintenance have been scheduled (see Conference Calendar). Further, this past fall and continuing into the winter, we have been working on a simple road surface management system and computer software. A course on the management system will be offered in the spring.

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Program manager--Tom Maze; Coordinator--John Moody; Editor--Larry Mendenhall; Computer layout--Deborah Faul

The preparation of this newsletter was financed through the Technology Transfer T2 Program. The T2 Program is a nationwide effort financed jointly by the Federal Highway Administration and individual state departments of transportation. Its purpose is to translate into understandable terms the latest state-of-the-art technologies in the areas of roads, bridges, and public transportation personnel.

The opinions, findings, or recommendations expressed here are those of the Local Transportation Information Center and do not necessarily reflect the views of the Federal Highway Administration or the Iowa Department of Transportation.

## New safety program needs a 'circuit rider'

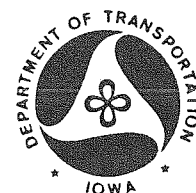
The Iowa State University Local Transportation Information Center has planned to start a new transportation safety training program. The program is being sponsored by the Iowa Department of Transportation, Bureau of Transportation Safety and the Federal Highway Administration.

The program involves a new emphasis on safety and a transportation safety circuit rider will be hired. The circuit rider will be an engineer experienced in transportation safety. His or her main objective will be to present training programs to maintenance workers, operators, and other workers that maintain and build Iowa's local road system, although some programs will focus on professional level issues.

These programs will be presented by the circuit rider in breakrooms, court houses, libraries, and other places that are accessible to the staffs of local governments. This is an effort to reach-out and provide technology transfer at the most basic and practical level.

The circuit rider's responsibilities will also include visiting with local agencies and providing them with appropriate written materials or video tapes. Also, the circuit rider will be responsible for providing assistance in generating peer-to-peer transfer of technology between local agencies.

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U.S. Department  
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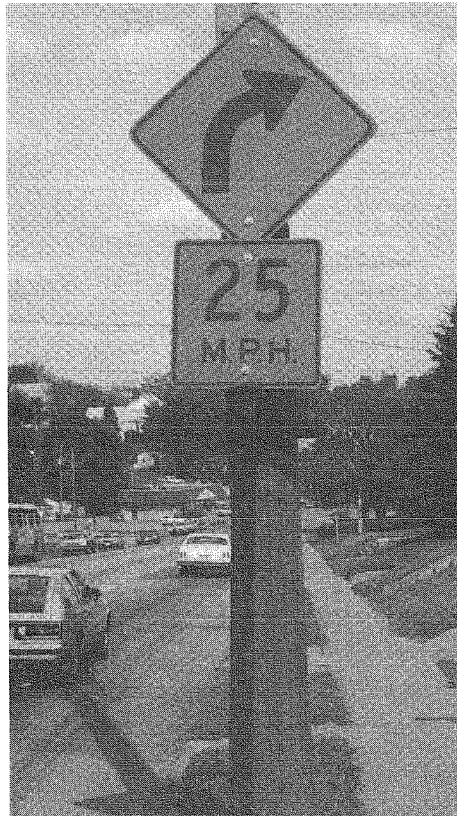
IOWA STATE  
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# Maintain those signs (functionally)

By R.L. Carstens Professor  
Emeritus of Civil Engineering

A recent change in Iowa law attempted to preclude the liability of a highway agency for failure to install a traffic control device. This has led to some interesting challenges to the correctness of use of devices that have been installed. The code section in question states that "once a regulatory device has been placed, created or installed, the state or municipality may be assigned a percentage of fault for failure to maintain the device." Plaintiffs, in seeking to circumvent the code, have relied upon Section IA-2 of the Manual on Uniform Traffic Control Devices (MUTCD) that states "In addition to physical maintenance, functional maintenance is required to adjust needed traffic control devices to current conditions . . ." A deviation from usual practices has often been alleged in accident cases to constitute failure to maintain a sign functionally.

The Iowa Supreme Court has limited somewhat the viability of this argument in their decision in *Saunders vs. Dallas County*. Nevertheless similar cases continued to be filed. We addressed one aspect of functional maintenance, the longitudinal spacing of warning signs, in an article in the



**A sign with contradictory messages like this one can lead to confusion and court.**

August 1988 issue of *Technology News*. Other claims relate to the lateral spacing and mounting height of signs. In one pending case a sign was

installed at less than half the five-foot mounting height specified for a sign in a rural district. The same sign measures 30 inches where the standard size is 36 inches. Even though the plaintiff still must show that these deficiencies were a proximate cause of an accident, the deficiencies noted will help perplex a jury in their consideration of this case.

Perhaps the most common irregularity in signing practices is illustrated in the accompanying photograph. The two signs are inconsistent. We know that a curve sign infers a recommended speed of greater than 30 mph. The use of a 25-mph advisory plate conveys a contradictory message. Although this point has been raised in a number of lawsuits, it probably has served only to embarrass some engineers and contribute to the perverted pleasure of some attorneys rather than to decide cases.

Avoid such embarrassment. When you install or maintain traffic control devices, use the MUTCD as a guide. Follow its provisions faithfully so you can avoid contributing to an attorney's jollity.

## Your good idea could win a free registration

If you've made an improvement at your agency, chances are others could benefit from hearing about your experiences. By writing about your successes, you could win a free registration to a workshop, conference, or course presented by the Local Transportation Information Center or civil engineering extension.

All you need to do is write a brief (two to four page) description of your success story, and agree to answer our telephone questions regarding your experience. Based on selection by the Center's advisory board, we'll publish a 'success story' article in *Technology News*. If it's yours, you'll receive a free registration (worth

between \$25 and \$250) to the workshop of your choice.

Send your success story to Tom Maze, ISU, Local Transportation Information Center, EES Bldg., Haber Road, Ames, IA 50011.

## Safety program continued from page 2

During the first year, the circuit rider will be focusing on three programs: 1) Instruction on federal and state programs that are available to assist in reducing potential safety risks (including the use of available accident statistics), 2) A work zone flagger

instructional program, and 3) A program outlining methods used to inventory and assess signage needs.

Pending the approval of the program and permission to hire from the university's personnel office, the

Center will be conducting a search for the a person to be the transportation safety circuit rider. If you are interested in the position and are a Professional Engineer, call Tom Maze, Program Manager at 515/294-6777 for more information.



In the last MicroTech article, I covered the five stages of developing a computing system: conceptualization, planning, design, implementation, and maintenance. This article examines an aide to proper planning, data flow diagrams.

Often new software forces a new structure for data collection and preparation. For example, suppose an agency controls the equipment parts inventory by reordering specific items when only one or two remain on the shelf. The introduction of an automated inventory system and an equipment information system will require new data collection procedures to reconcile the inventory quantity files and permit the charging

of the part to a specific maintenance job (to a work order).

Let's suppose that in the new system, we wish to have mechanics request parts from a clerk. The clerk will find and dispense the part and key into the computerized inventory system the part's identity (part number), the piece of equipment the part is to be used on (loader number 8), and the serial number of the maintenance work order.

The system should conduct some logic checks to ensure that the data are entered correctly (for example, is the loader number valid?). Next the system will update the inventory quantity records. The inventory system should automatically post the part number to the equipment management information system and charge the cost of the part against the work order.

New procedures should be planned to fit your organization and to ensure that you get the system you need. Data Flow diagrams are used to help

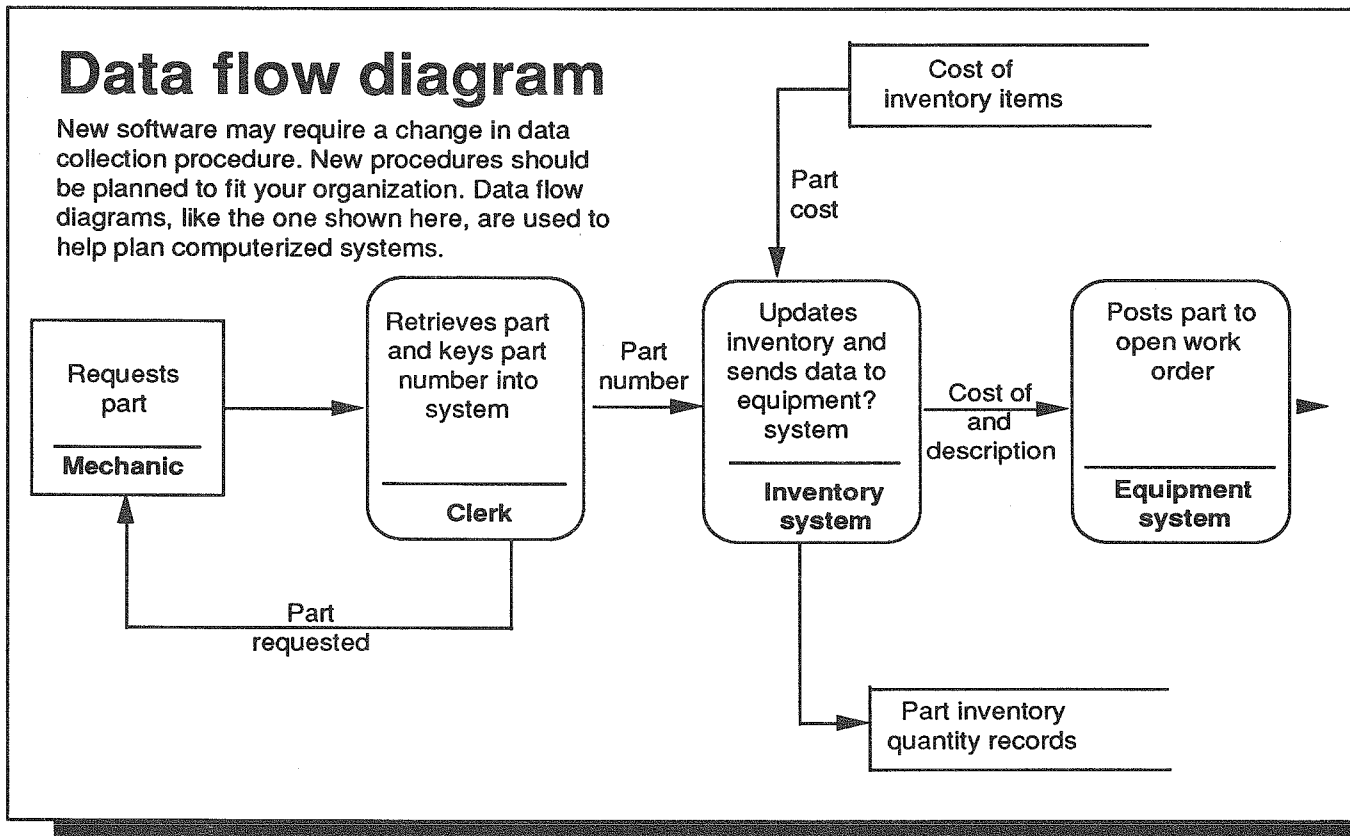
plan computerized systems. The data flow diagram shown here illustrates the parts inventory process just explained.

The diagram has only four symbols: the arrow indicates a data flow, rounded rectangles indicate a process, the squares identify an entity beginning (or ending) a data flow, and open rectangles identify a data store. The diagram is much simpler than a computer programmer's flow chart. Simple data flow diagrams may contain even fewer symbols and sometimes only two.

Data flow diagrams are fairly simple to understand. The ease with which people can interpret the diagrams permits wider participation in a formalized planning process. This is an important step in getting the system you want.

For more about data flow diagrams, write to me and I will send you a more thorough example.

**Tom Maze, program manager, Local Transportation Information Center**



# Three cities find TBCs help modernize signals

In an Iowa DOT demonstration project, Indianola, Storm Lake, and Webster City found Time-Based Coordinators (TBCs) to be a good choice for modernizing signal systems on arterials.

There are two ways to coordinate arterial traffic signals to create a progressive flow of traffic. One method connects signals at each intersection with a wire. The other coordinates the time relationship between green signals using clocks. The "super-accurate," solid-state, electronic clock in the traffic signal's controller is called a TBC.

In the three demonstration towns, progression is provided by solid-state controllers at intersections that are coordinated by TBCs. The microprocessor-based controller for each signal uses that TBC to ensure that correct time relations are maintained at adjacent signals. The resultant progression of green signals reduces delays and stops.

TBCs can be used in conjunction with timing plans which change with the time of day. They also can be used in conjunction with traffic detectors on minor streets (semi-actuated). At a semi-actuated intersection, the progressive movement along the arterial is given priority. When a car is present on the minor-street approach, it is given the green when there is no interference with the arterial traffic flow.

The TBC technology has practical advantages. It does not require laying hardwire. In locations with driveways, parking lots, streets, and other structures along the right-of-way, laying connecting lines can be expensive. Long distances between wire-connected signals also increases the cost of laying wires.

However, TBCs have a minor drawback. It may be more complicated to



**Charlie Abbott (left) and Marty Duffy of Webster City with a new controller**

conduct routine checks to see if the individual controllers are maintaining the preselected time relationships. In hardwire systems, the coordination is maintained with a physical connection that ensures the time relation is maintained. The accuracy of TBC systems can only be checked through observation. This becomes complicated when the system includes semi-actuated intersections.

By using mechanical clocks, electro-mechanical systems can provide similar coordination between intersections. However, the clocks are generally believed to be less reliable than electronic clocks. And mechanical clocks lose the time relationship between intersections when the power

supply fails. Because TBCs include a battery, their internal clocks stay in time through power failures.

TBCs can be used to work with modern, microprocessor-controlled intersections to override other options when progression is desired in the direction of the major flow. The controller also can abandon the time relationship with other signals and work independently in response to calls from cars at detectors.

For more information on traffic signal training, call Jan Graham at the Local Transportation Information Center, 515/294-8082.

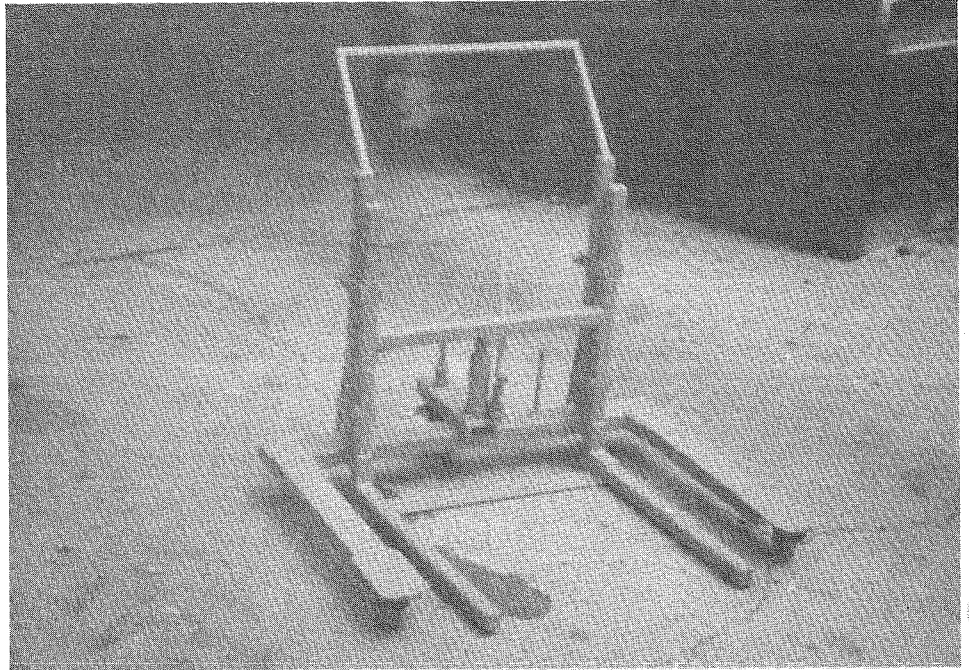
# tips from the field

## Dual wheel remover

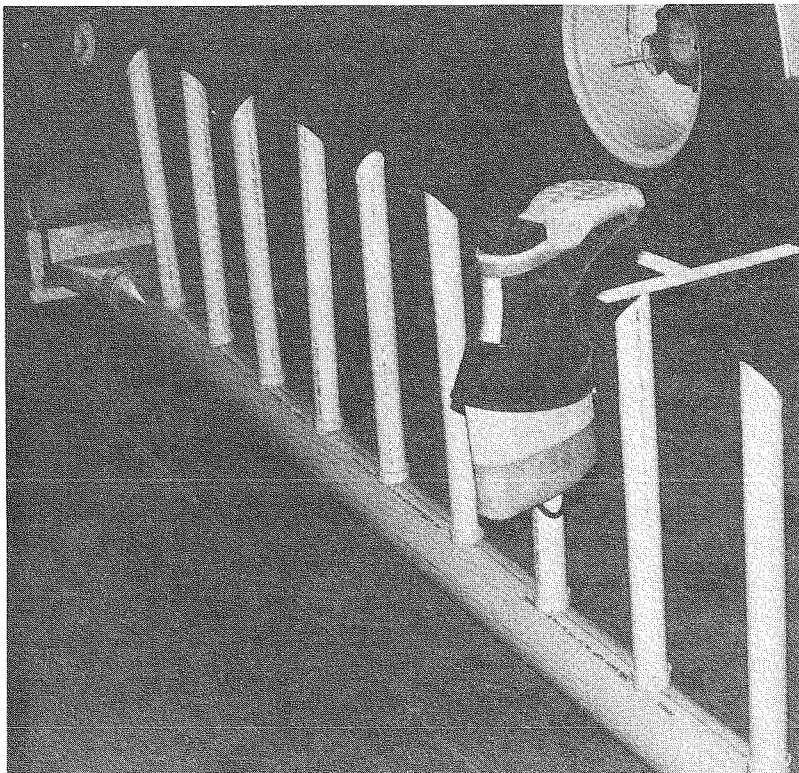
Because of the number of times it's had to fix brake or axle problems on dual wheel vehicles, Ankeny's Public Works Department designed a dual wheel removal cart that lets them work with two wheels at a time.

A close look at the photograph will show the tire remover sets on three wheels, allowing the device to turn 360 degrees for mobility.

A hydraulic jack can also be seen at the rear of the device. It's that jack that lifts the interior forklift design.



## Boot drier



The Iowa State Fire Extension Service has come up with a unique way to keep the firefighter's boots clean and dry between use. It has developed an easy to make boot drier where the boot is hung upside down on a pipe stud until full dry.

The base is made of a PVC pipe approximately four inches in diameter and 75 inches long. A small exhaust fan is placed at one end of the base pipe to force air toward the boot.

Attached to the base pipe are 22 -inch pieces of one-inch PVC pipe. The pipes are placed about nine inches apart on the base and their tips are cut at a 45 degree angle to allow air to escape into the boot.

For more information or specifications, contact John Moody, Local Transportation Information Center, Haber Road, Iowa State University, Ames, Iowa 50011.



The following publications are available through the Local Transportation Center. Please complete the order form below.

**"Compilation of State Laws and Regulations on Matters Affecting Rail-Highway Crossings" (No. 25 — published April 1983)** This is a compilation of state laws, ordinances, and regulations pertaining to rail-highway crossings organized by state, key words, and subject. This document is intended as a reference tool for those persons working in the rail-highway crossing safety field. It is not a legal document and is written in everyday language for use by laymen. (May be kept, but supply is limited)

**"Pavement and Geometric Design Criteria for Minimizing Hydroplaning" (No. 75 — published December 1979 by B.M. Gallaway, D.L. Ivey, G. Hayes, W.B. Ledbetter, R.M. Olson, D.L. Woods, and R.F. Schiller, jr.)** A comprehensive literature review, multistate question-

naire, mathematical modeling, computer simulation, field testing, and data correlations were used to establish criteria relating to geometric and pavement surface characteristics to minimize highway hydroplaning. A summary of criteria to reduce hydroplaning is presented along with recommendations for construction of flexible and rigid pavements to minimize hydroplaning. (May be kept, but supply is limited)

**"Maintenance of Pavement Crack Repair Using Asphalt Roll-Roofing Material" (No. 89 — reprint of a special study by Temple R. Kennedy of the Texas State Department of Highways in 1979)** The study details the procedures and materials employed in the repair of cracked sections of pavement utilizing asphalt roll-roofing. This is intended as a temporary treatment until permanent repairs can be made. (May be kept, but supply is limited)

**"Flaggers' Handbook" (No. 95 — A pocket-size, illustrated handbook**

**by the Bureau of Transportation Safety of the Iowa DOT in cooperation with the Federal Highway Administration published in June 1987)** The handbook covers in detail the flaggers' rules of conduct, equipment, positions taken when flagging, and flagging to slow, stop, and release traffic. It covers flagging at haul road intersections, pilot car operation, and nighttime flagging. (May be kept)

**"A Synopsis of Municipal and County Snow and Ice Removal Policies and Procedures" (Prepared in 1985 from questionnaires returned by 24 cities and 11 counties in Iowa)** It contains a table indicating methods, materials, and equipment employed in snow removal. Also, the policies used for snow removal in nine counties and two cities. (May be kept)

**"Reference Booklet to the Twenty Most Used Tables in Highway Maintenance" (No. 118)** This is a handy little book of 20 tables covering Area and Rates of Application, Volumes and Weights, and Conversion Factors. (May be kept)

**Publication order form**

To obtain the materials listed as available from the Local Transportation Information Center, return this form to the Local Transportation Information Center, Iowa State University Extension, EES Building, Haber Road, Ames, IA 50011.

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- Please send a complete listing of all publications available from your office.
- Please send a complete listing of all audio visual materials available from your office.

# conference 28 29 30 1 2 3 calendar 4 5 6

**21st Annual DOT Conference**  
January 19-20  
Scheman Building, ISU  
Contact Jim Cable (515) 294-2862

**Transportation Research Board Meeting**  
January 23-26  
Washington, D.C.  
Contact TRB (202) 224-2934

**National Asphalt Pavement Assoc. Meeting**  
January 22-26  
San Francisco  
Contact NAPA (301) 779-4880

**Asphalt Paving Conference**  
January 31  
Scheman Building, ISU  
Contact Jim Cable (515) 294-2862

**40th Annual Better Concrete Conference**  
February 7  
Scheman Building, ISU  
Contact Jim Cable (515) 294-2862

**NEMA Microprocessor Controller Training Course**  
February 7-9  
Scheman Building, ISU  
This course is designed to give participants an understanding of the entire process of designing, installing,

and monitoring NEMA Traffic Signal Control systems.  
Contact Jan Graham (515) 294-8082

**Traffic Signal Maintenance and Maintenance Management Workshop**  
February 14, Iowa Lakes Community College, Spencer  
February 27, Southeastern Community College, West Burlington  
February 28, Hawkeye Technical Institute, Waterloo  
March 3, Iowa Western Community College, Council Bluffs  
March 9, Scheman Building ISU, Ames

This workshop is designed to give traffic signal technicians working knowledge of the importance and fundamental elements of a planned maintenance program for traffic signals. Course is a hands-on program taught by instructors experienced in traffic signal operations and maintenance.  
Contact Jan Graham (515) 294-8082

**Iowa Concrete Paving Association Meeting**  
February 15-17  
Des Moines  
Contact ICPA (515) 278-0606

**Motor Vehicle Equipment**

**Management**  
February 21-22  
Minneapolis  
Contact APWA (312) 667-2200

**Legal Liability and Traffic Signing**  
March 1, Mount Pleasant  
March 2, Carroll  
This course covers the MUTCD and signing as well as the legal liability implication of proper signing. This is intended to be a practical course on maintenance for crew members, supervisors, and local highway professionals.  
Contact Tom Maze (515) 294-8815

**Rehabilitation of Beam Bridges**  
March 22 & 23, Starlite Village, Ames  
This workshop covers low cost methods for and the feasibility of rehabilitating beam bridges. The course features Iowa examples of practical bridge rehabilitation techniques.  
Contact Tom Maze (515) 294-8815

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## And justice for all

Appointment, promotion, admission, and programs of extension at Iowa State University are administered equally to all without regard to race, color, creed, sex, national origin, disability, or age. Call the Affirmative Action Office at 515/294-7612 to report discrimination.

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## Technology News

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