Technology News
Roads Bridges Transit
Iowa Transportation Center
Iowa State University
November 1993

Iowa battles back from flood

By Larry Mendenhall
Editor, *Technology News*

For one of the first times in our country, an entire state was declared a disaster area. Satellite photos of the Midwest showed enough surface water to rival the Great Lakes. The Flood of 93 may be over, but it did so much damage repair efforts will continue into next year.

County and city street and highway departments spearheaded efforts to hold back the water and helped coordinate emergency action. Now they are trying to repair damage done by the flood as well as catch up on postponed maintenance work.

Drivers make their way through a flooded street in Ames. This was a common scene throughout Iowa during the Flood of 93. (Photo by The Daily Tribune/Mark Davitt)

The final tally for repairing streets, highways, and other infrastructure isn't complete yet. But by mid-October the FHWA estimated $18.5 million of damages had been done to Iowa streets, highways and bridges eligible for federal highway funds. For Iowa roads, bridges, and other infrastructure not eligible for federal funding, $9.5 million had been requested from the Federal Emergency Management Agency (FEMA) through mid-October. The FHWA estimates that the nine-state Midwest area sustained close to $950,000,000 in damages to roads and bridges.

"We don't have it all tallied up, but that $18.5 million is going to be close," Jim Hogan, mobility and traffic operations engineer for the FHWA, said. "There are still some locations where the water has finally receded enough to get a good look at."

The FHWA and the Iowa DOT helped local agencies evaluate flood damage. FHWA teams inspected 425 eligible sites. By the time the final evaluations are finished, Hogan thinks the number of inspected sites will be closer to 500.

"We don't have set teams for this. At our busiest time, we had as many as

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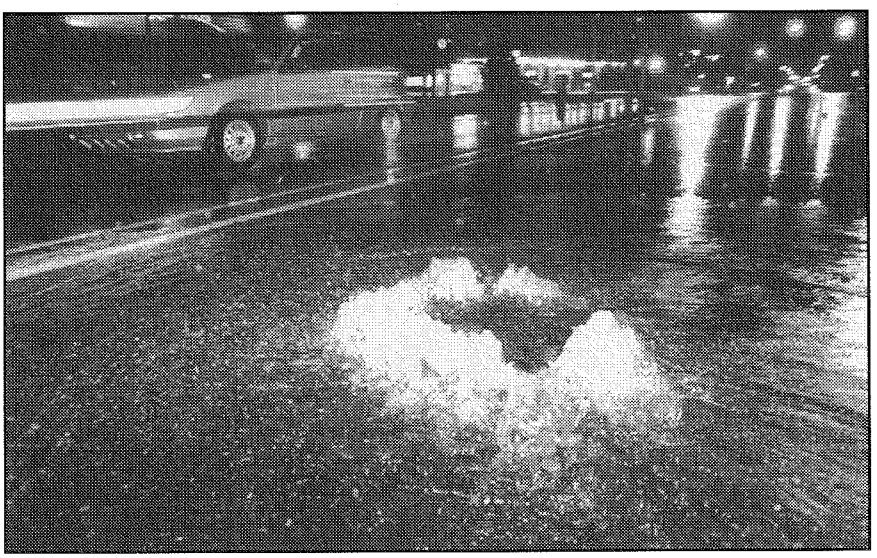
Inside pages

Flood damage amounts to millions

eight teams out at once," Hogan said. "Everybody took off the hat they normally wear and put on their flood hat. It's been a major effort by everybody."

Despite the massive dollar amount, some expected the damage to be considerably more.



Another common sight this summer – overflowing storm sewers. (Photo by The Daily Tribune/Mark Davitt)

"Considering the extent of the flood, it could have been worse," Hogan said. "We had very few bridges that were wiped out. The primary reason for that is we've done a lot of bridge replacement on high volume roads. These replacements were designed to the latest hydraulic specifications."

Locally, cooperation and communication between affected agencies also helped keep damage to a minimum.

"I think one lesson people learned from all this is that you get more accomplished through cooperation than through competition," Ray Childs, public works director for the City of Muscatine, said. "I'm talking about business entities, railroads, industry, government, individuals – everybody."

The cities of Spencer and Davenport had emergency committees that met frequently – if not everyday – during the emergency. People sitting on these committees represented police departments, public works departments, utilities, businesses, industry, and the private sector. These meetings allowed the different agencies to keep each other informed and to share resources as needed.

"For us, it was particularly important for my department and the police department to communicate. We had to tell them which streets we were closing so that they could reroute their vehicles in case of an emergency," City of Spencer Public Works Director Chuck Fisher said. "Cooperation and communication is the key."

Dee Bruemer, public works director for the City of Davenport, agreed. During the two floods that hit Davenport, one in April and the other in July, that city's disaster committee met everyday.

"Communication is having a plan before the disaster hits and having resources in place, including a communications system," Bruemer said. "We met once a morning with 25 people to share resources, give

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

Iowa Transportation Center

IOWA STATE UNIVERSITY

Auto ID improves data collection

By Dr. Edward J. Jaselskis
Assistant Professor of Civil and Construction Engineering

A dramatic improvement in field data collection techniques can now be achieved using automatic identification (Auto ID) technologies. Current field data collection methods involve the collection and processing of large quantities of information on standard forms which are filled out in the field and brought back to the office where someone keys the information into a computer. This approach is often times labor-intensive, creates a lot of paper work, and requires more time to manipulate, analyze, and report results. Timely corrective actions may not be possible because of the delay between initial data gathering and final determination of appropriate actions.

Auto ID technologies are a relatively new approach to streamline the data capture process and are defined as "different ways of automatically identifying objects, people, and places using computers to help people make better business decisions." Auto ID technologies include: bar coding, radio frequency identification, radio frequency data communication (RFDC), voice recognition, optical character recognition, magnetic stripes, smart cards, touch buttons, and digital imaging. These technologies are typically used with portable computers that can use touch screen or pen-based capabilities.

Most people are probably familiar with bar codes as they see them being used in grocery stores. In the transportation industry, bar codes could be used to inventory road signs, fire hydrants, bridges, guard rails, office furniture, and warehouse items. They can also be used to improve the timekeeping process and assist with field data inventory such as making real time condition assessments on, for example, pavements, signs, and traffic congestion. Portable computers with light pen or laser gun attachments can be used to scan in bar code labels attached to inventory on the street and information on that item can be brought up from the computer's database al-

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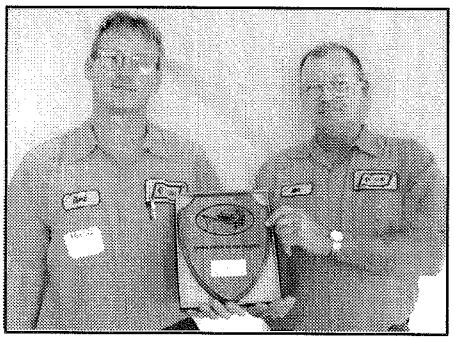
Clive teams win APWA Snow Plow Roadeo divisions

Driving teams from the City of Clive dominated the 1993 APWA Snow Plow Roadeo held in Des Moines, Iowa October 6.

Bart Weller and Ron Crecelius won the Class 1 Division and Tom Herold and Steve Pringle were the Class 2 Division winners. Don Buswell from the City of Carrol kept Clive from making a clean sweep of the contest by beating Clive Public Works Director Williard Wray in the Celebrity Division. The two tied in points and Buswell was declared the winner on the basis of a faster time through the course. Pringle and Crecelius won the Class 2 division last year.

Even though the APWA Roadeo has been open to all teams, this was the first year that teams from counties and from the Iowa DOT competed. Teams from Johnson, Mills, and Des Moines counties competed for the first time.

This year's contest consisted of a written test, spotting safety defects, and a five-event driving course. The driving course simulated situations commonly found while clearing streets, such as backing into an alley, negotiating serpentine curves, driving through narrow clearances, avoiding parked cars, and stopping the plow on a precise spot. Contestants competed in teams of two and combined their abilities in the 300-point competition. The participating teams were divided into two classes according to their vehicles' wheel base dimensions.



Class 1 winners: Bart Weller (left) and Ron Crecelius

Class 2 winners: Tom Herold (left) and Steve Pringle

GIS for transportation in the Midwest

Microtechnology

By Reginald R. Souleyrette, ISU and Peggi Knight, Iowa DOT

Interest in geographic information systems (GIS) as a tool for mapping and spatial analysis is growing rapidly among state and local government agencies. With GIS, the engineer or planner can generate maps and conduct analyses of spatial data using an office PC or workstation.

GIS software combines the capabilities of a relational database (such as Oracle or dBASE) with geocoding (spatial referencing). A GIS is capable of storing, manipulating, and presenting geographically referenced data, and facilitating processes that previously would be considered too timeconsuming, if considered at all (e.g. overlaying jurisdictional areas, land parcel boundaries, and elevation contours).

Because these capabilities are applicable to a number of purposes, cities and counties are using GIS for many purposes. GIS is well suited to analyze typically spatial and data-intensive transportation problems. It can also map locations of public facilities such as fire stations, utilities, and individual parcels of land along streets. Zoning maps can be superimposed as well as physical features such as rivers, drainage patterns, and flood plains. Data files on population or property values can be merged with maps to produce a large number of useful products. For example, the spatial analysis features of GIS allow a determination of population within a given distance of a highway, or within a given radius of an emergency-response facility. Combining a data file on assessed property values with a map of parcel locations allows the tax base along highways to be determined. GIS can be especially useful for examining the impacts of proposed facilities.

Many agencies implementing GIS report start-up times of two or more years. There are primarily three reasons for such long start-up times: 1) GIS software has extensive hardware and communications systems needs that require considerable computer expertise to set up; 2) the software's modules and associated macro programming languages may take months to become proficient in; and 3) datasets are typically very time consuming to create or difficult to obtain. However, in many cases, datasets may already exist at other agencies. When building a GIS, data may be obtained from other agencies at little or no cost, but it is important to consider the magnitude of such a request. Even if the data already exist, "simple" transfer may consume significant resources.

The recent Midwest flooding made clear the need for up-to-date information on the condition of public infrastructure (roads, water and sewer systems, dams and levees, etc.). In the future, a GIS with a database linked directly to data sources (meters, gauges, traffic counters, video surveillance equipment, etc.) may be capable of providing clear, easy-to-interpret information on the status of such systems. While some GIS packages are hardware, software, and personnel intensive, some packages are available (albeit with less features) which will run on standard desktop microcomputers. And, during events such as the recent floods, the issue is not only the need for information, but access to the information. For example, road conditions and closure information may be available to some, but information on alternate routes are needed which consider the value of travel time and ultimate destination. To this end, there seems to be promise for making GIS and related technology available at almost any location (passenger vehicles equipped with navigational computers, kiosks conveniently located in shopping areas, work centers and bus stops, etc.).

Who's using GIS for transportation and related subjects in Iowa? The following is a partial list of GIS activities or programs in the state:

Cedar Rapids Water Department
Contact: Dave Barrett, GIS SIG Chairman for Intergraph User's Group
The Cedar Rapids water department is currently working on a joint project with the United States Geological Survey. The project involves digitizing USGS quadrangle maps for the Cedar Rapids area. These maps include contours, transportation, hydrology, and other features.

Central Iowa Area Mapping (CIAM)
Contact: Steve Gast, Polk County Auditors office
City and MPO Planimetric data mapped to +/- 2 ft. for a 230-square-mile area. This data includes street centerlines, power poles, building footprints, street edges, and driveways, etc. Currently this data is being edited and will be distributed to CIAM member agencies when completed. Mapping includes all roads in the area (primary, secondary, and local).

continued on page 6

Help us serve you better

We want to improve the practical value of our newsletter, services, and workshops. We are very interested in your input. Please take a few minutes to answer the following questions. Then fold and TAPE this page with the return address facing out. (Postal regulations prohibit the use of staples!) The postage is prepaid. Thanks from the Iowa Transportation Center.

1. What type of agency do you work for? Check one.
___Municipality ___County ___State agency
___Association ___Consultant ___Contractor
___Supplier ___University/college
___Other_____

2. What is your job title? _____

3. How do you rate Technology News?
___Valuable ___Very Useful
___Useful ___Somewhat useful
___Not very useful

4. Which subjects are of the most interest to you? Check each that apply.
___Transit ___Bridge maintenance, rehabilitation
___Safety ___Equipment maintenance
___Management ___Highway or bridge design
___Computers ___Roadway maintenance
___Regulations ___Event coverage
___Others_____

5. Technology News attempts to run articles that are balanced between technical subjects, general information, and articles on regulatory requirements. In your opinion, articles should be . . .
___more technical, less general, same regulatory.
___more technical, less general, no regulatory.
___more technical, no general, same regulatory.
___less technical, more general, same regulatory.
___should continue as before.

6. How often do you attend transportation workshops or conferences at Iowa State University?
___5 or more times per year ___2-5 times per year
___1-2 times per year ___Occasionally
___Never

7. Have fees ever prevented you or staff members from attending a workshop?
___Never ___Rarely ___Sometimes ___Often

8. How would you rate the transportation-related workshops or conferences that you have attended at ISU?
___Very useful ___Useful
___Somewhat useful ___Not useful
___Programs by other organizations are more useful
___I never go to workshops or conferences

9. Have you ever requested and received publications, tapes, or audio-visual materials from the ITC lending library?
___Yes ___No

10. Do you have easy access to a shop or office VCR for training purposes?
___Yes ___No

11. Do you want more programs, like the Safety Circuit Rider, that bring training programs directly to your city or county?
___Yes ___No

12. Your input will help us plan future programs. Please rate your interest in the following programs: 3 for very interested; 2 for somewhat interested; 1 for slightly interested.

	Rating		Rating
Traffic studies for technicians		Supervisory management	
Manual on Uniform Traffic Control Devices		Pavement management	
Tort law and legal liability		Pavement maintenance	
Transportation management systems		Sign management	
Roadside design		Pavement design	
Geometric design		Pavement rehabilitation techniques	
Traffic signal timing design		Pavement recycling	
Traffic signal maintenance management		Maintaining granular surface roads	
Traffic site impact analysis		Bridge rehabilitation	
Microcomputer traffic/transportation planning models		Equipment maintenance management	
Snow and ice control strategies		Computer estimation of urban drainage	
Work zone safety		Hazardous waste regulation	
Construction inspection		Construction contract management	

Additional comments_____

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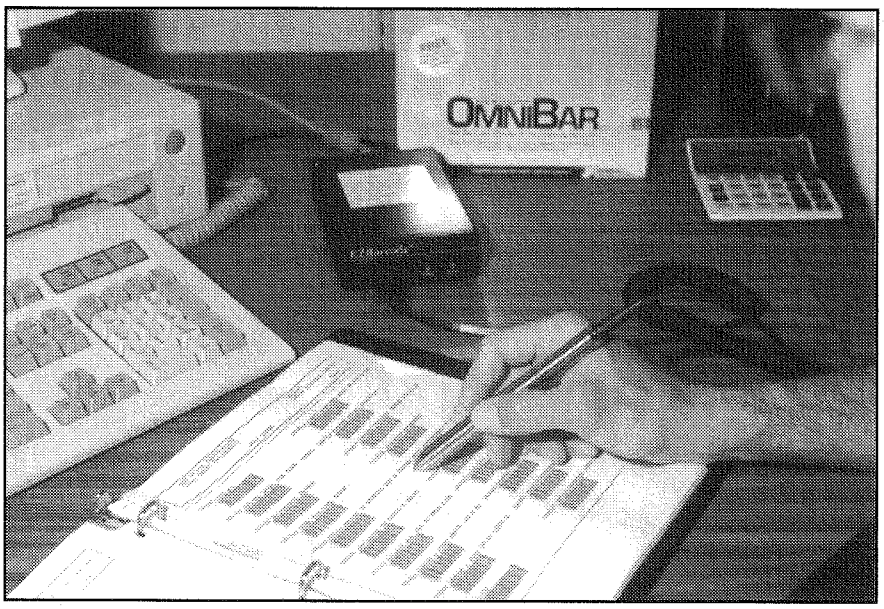
Auto ID technology from page 3

lowing for easy modification to the condition of the inventory feature.

Other noteworthy Auto ID technologies include advanced imaging technologies, global positioning systems, geographic information systems, and radio frequency identification (RFID). Bridge inspections can be made using portable computers or pen-based computers with touch screens or voice recognition to make it easier for field crews to enter inspection report information. It is possible to store picture images of defects found on a bridge with the use of advancing imaging technologies. Global positioning systems can be used to accurately pin-point the location of each defect on the bridge and record it in a geographic information system.



A pen-based reader scans bar-coded information on labor costs into a computer. (Photo by Perre Pedersen)

Radio-frequency identification tags are capable of storing information about an object on a small computer chip that can be accessed using radio signals. As an example, RFID tags can be placed in vehicles or equipment and can record their maintenance histories. As you can see, there are many applications for these advanced information collection technologies—your imagination is the limit.

As an example of using Auto ID technologies, the Weitz Company and Iowa State University have partnered to develop a more efficient labor cost reporting system using bar coding techniques. Currently on a typical construction project, daily time sheets are filled out at the site level, consolidated, and input into a central payroll system; this approach is typically mistake-prone and requires processing by several people at the construction site and main office. The enhanced labor reporting system uses bar coding techniques that allows field personnel, with the aid of a light pen, the capability to input information regarding worker names, cost codes, time expended, quantities of work put-in-place, and memos into a personal computer. Data stored in the personal computer is up-loaded to the computer in the home office where the data are processed (labor burdens are added). Processed data are sent back to the field office where an assortment of tabular and graphical reports are generated, providing field management with fast, reliable information. On remote jobs, this system has reduced costs by 67 percent and for local jobs the improvement is approximately 40 percent. The pay back for such a system is less than one year (Anderson,1993).

Auto ID technologies can benefit the transportation industry. To assist in implementing these technologies, a research project has been funded by the Iowa Highway Research Board to provide a description of the various Auto ID technologies and determine how they can be applied to the various transportation agencies in Iowa. An advisory committee has been formed consisting of representatives from the state, cities, and counties to help provide guidance to the ISU research team. This committee meets once a month to review progress and learn about the various Auto ID technologies. For more information about this project, please call Edward Jaselskis at 515/294-0250.

Reference

Anderson, Mary Rose (1993). "Company's Internal and External Operations Shortened Through Auto I.D." The Electron, a publication of Cleveland Institute of Electronics, September/October, 1993, Vol. 20, No. 5.

Tips From The Field

Quick and dirty sandbag filler

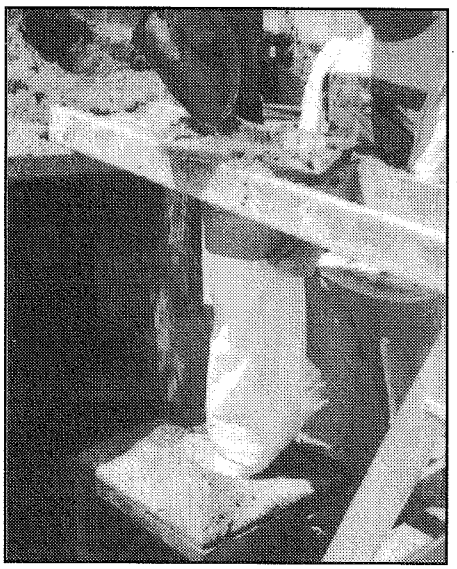
A lot of Iowans discovered what a back-breaking job sandbagging could be this summer. Several *Technology News* readers came up with different ideas to make the job easier and faster.

This one is from Dave Chamberlain, street superintendent for the City of Atlantic. This is one tip that won't cost a cent.

Chamberlain's crews use a pair of 2x4's and a worn-out traffic cone to fill about 1,500 bags an hour. Chamberlain cuts about 12 inches off the cone and nails it in place between the 2x4's which are about five feet long. One end of the 2x4's is placed on the back of the truck carrying the sand and the other braced on a ladder.

A sandbag is slid up over the cone and rests on a bench. One person shovels the sand in from the truck while another puts the bag over the cone.

For more information contact: Dave Chamberlain, Street Superintendent, West Highway 83, Atlantic, IA 50022 or phone 712/243-1918.



This tip makes filling sandbags quicker and easier on the back.

GIS and transportation continued from page 4

Des Moines MPO Contact: Mike Roberts
The Des Moines MPO will be collecting data for an eight-county area. It is utilizing census socio-economic data, and will eventually utilize GIS for construction permits to see graphically where permits are going. Eventually, CIAM will maintain data for Polk County and the Des Moines MPO will maintain the rest of the data that it needs.

Iowa Department of Transportation Contact: Peggi Knight
In July 1991 the DOT began a pilot project with the Office of Project Planning to use GIS to geographically locate additional information to be used in route location. Procedures to automate collection of inventory information by integrating Global Positioning Satellite (GPS) technology with videologging data collection activities are currently being developed. GPS technology will also be applied to the environmental analysis of highway corridors and alignments. Positional data will be obtained on environmentally sensitive areas so that a sufficient database is available for the evaluation and comparison of alternative highway corridors or alignments during the project development phase. Also under development at the DOT are a new pavement management information system and an oversize/overweight truck permitting system.

West Des Moines – Contact: Don Callendar
The city mapped all of the traffic ordinances for the city (i.e. speed limit zones). Now the city can ask the system to display on a map the locations of all 35-mph speed zones. This system will eventually be put on a network so that other departments will be able to access the information. They have a working pavement management system using ITX software, and hope to have a sewer management system using Hanson software's sewer package within six months.

Black Hawk County – Contact: Harold Jensen
Black Hawk County intends to begin its GIS efforts with aerial photography and a GPS survey of the county. Once the GPS and aerial photography are completed, the county anticipates it will be several years before the auditor's office will be able to create property maps.

For More Information

The videotapes and publications listed in this column are available on a loan basis by contacting Stan Ring, Iowa State University, Iowa Transportation Center, 2521 Elwood Dr., #125, Ames, Iowa 50010-8263 or by calling 515/294-9481 Monday, Wednesday, and Friday mornings.

Videotapes

Various Snow and Ice Control Videotapes

- **Snow Plow and Spreader Operations** Request #63V, 48:00 minutes.
- **Snow Removal on Iowa's Secondary Roads and Snow Fighters** Request #90V, 43:00 minutes.
- **Snowfighting from A to Z** Request #262V, 73:00 minute.
- **Effective Snow Fences** Request #266V, 21:00 minute.

Rehabilitation of PC Concrete Pavements Using Hot Mix Asphalt Overlays This videotape discussed the problem of deteriorated portland cement concrete pavements and describes various methods used to reduce reflective cracking in the hot-mix overlay. **Request #323V, 17:35 minutes**

Your Ticket to Safety: Blood Borne Pathogen Awareness for Transit Professionals This videotape explains the dangers associated with contaminated blood and body fluids that might be encountered in a transit incident and explains the biohazard kit and its use. **Request #324V, 15:50 minutes**

Asphalt Crack Treatment This videotape explains how cracks develop and the differences between routing and sawing. The techniques for sealing a joint are discussed. **Request #326V, 15:06 minutes**

Publications

Ice Detection and Highway Weather Information Systems This summary report concerns research conducted by eight agencies to determine the usefulness of ice detection and weather information systems. For loan only. **Request #930**

Guide to Safety Features for Local Roads and Streets This 1986 guide was prepared to provide local transportation agencies with safety information intended to use on roads and streets in rural and small urban areas. Multiple copies available. **Request publication #79**

Local Highway Safety Studies This 1986 users guide provides a practical step-by-step procedure to identify, analyze, and correct safety deficiencies on relatively low volume roads. Multiple copies available. **Request publication #220**

Guidance for Controlling Friable Asbestos-Containing Materials in Buildings This 1983 EPA publication provides information on asbestos control. **Multiple copies available. Request publication #461**

Transverse Joint Sealing with Improved Sealants Final Report IHRB project HR-276, September 1991 by Gary Harris. This study evaluated eight sealants over a six year period. Multiple copies available. **Request publication #777**

Publication order form

To obtain the materials listed from the ITC, return this form to the Iowa Transportation Center, 2521 Elwood Dr., Suite 125, Ames, IA 50010-8263.

	Title	Index No.	No. of Copies
Name _____	_____		
Address _____	_____		
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Phone (___) _____	_____		

___**Please send a complete listing of all publications from your office.**

___**Please send a complete listing of all audio visual materials available.**

Flood

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information, and work out problems from the previous 24 hours."

It was different in 1990, the last time Davenport was hit by heavy flooding.

"We weren't prepared and there were a lot of snafus," Bruemer said. "We had some public meetings where our people were severely criticized. That didn't happen this year. I think we fulfilled the expectations of the people in the flood plain. They saw us everywhere and they had no fear of coming up and asking us questions."

Excessive moisture during 1993 is contributing to make conditions ideal for more flooding next spring. In addition to catching up on maintenance work, local agencies may want to review how well their flood control plan worked this past year and look for ways to improve it.

Conference Calendar

ASCE Structural Design Conference November 15 – Scheman, ISU This conference is designed for persons involved in the structural design and evaluation of new and existing structures. To register contact Connie Middleton at 515/294-6229.

47th Annual Iowa County Engineers Conference December 7-9 – Scheman, ISU This conference offers continuing education courses designed for county engineers and technicians as well as featuring exhibits from manufacturers and suppliers. To register contact Connie Middleton at 515/294-6229.

Iowa DOT Specifications Update Conference December 15 – Scheman, ISU At this conference contractors and consultants will have the opportunity to view recent changes in Iowa DOT specifications. To register contact Connie Middleton at 515/294-6229.

National Committee on Uniform Traffic Control Devices January 5-6 – Arlington, Virginia The topic for this meeting will be revisions to the present Manual on Uniform Traffic Control Devices. To register contact Woodrow Rankin at 202/857-1224.

1994 Transportation Research Board Annual Meeting January 9-13 – Washington, D.C. This meeting will offer groups a chance to discuss topics which include transportation systems planning and administration, and the operation, safety, and maintenance of transportation facilities. To register call Angelia V. Arrington at 202/334-2934.

And justice for all

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