Technology News

Roads Bridges Transit

Iowa Transportation Center

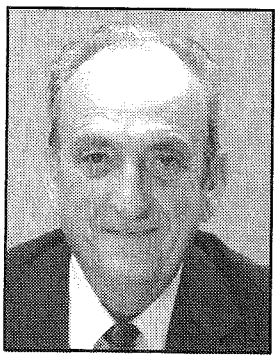
Iowa State University

June 1993

He built roads and friendships

Lowell Richardson, Director of the Office of Local Systems, will end a 43-year career with the Iowa Department of Transportation June 30.

Richardson started with the DOT in 1951 when it was known as the Iowa Highway Commission. Three years later, he became the resident construction engineer in Creston just in time to begin work on the Interstate system in Clarke and Adair counties. After that, he spent 13 years working in what is now called the Contracts Office. He has been doing duties associated with his current job since 1973.



Lowell Richardson

"Working on the Interstate system was a real thrill," Richardson said. "But at the time I didn't have the insight into just how important it would turn out to be. I thought at the time, 'What the heck do we need a four-lane highway for?' "

His career has spanned the time when trucks began to supplant railroads as the major freight haulers to the widespread adoption of computers.

"Those have been two very big changes," Richardson said. "The most exciting part of the computer aspect is that we're working on getting counties onto the DOT system. Among other things once we get everyone connected, we'll be able to review plans electronically."

As Director of the Office of Local Systems Richardson often serves as liaison between local agencies and

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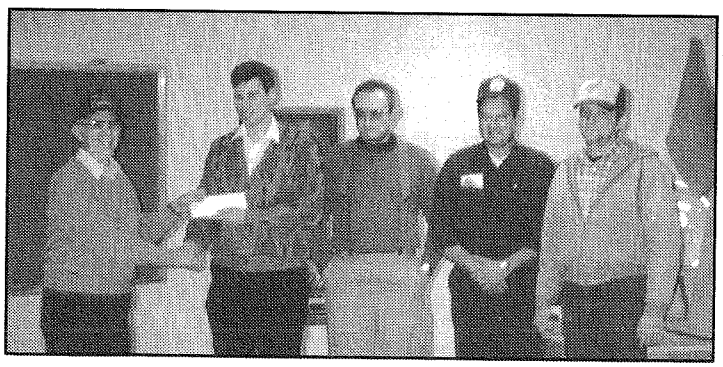
Send us a good "Tip" and we'll send you $100



Ed Bigelow (left) of the Iowa Transportation Center presents a $100 check to Mark Nahra, Rodger Albaugh, John Mellecker, and Mike Steffen for the idea they submitted to "Tips From The Field."

Technology News is looking for a few good tips and is willing to pay good money for them.

At the Iowa Transportation Center, we believe that the Iowans who maintain the state's streets and highways have discovered many innovative ways to do their jobs. *Technology News* is anxious to publish these ideas and will pay $100 to anyone whose tip is accepted for publication.

A good "Tip From The Field" should be something easy to do or easy to construct in a shop. It should not focus on a commercially-available product nor appear to be an endorsement of any specific product.

For more information call 515/294-9480.

ITCBBS offers on-line services

The bulletin board service (BBS) managed by the Iowa Transportation Center is close to celebrating its first year of operation.

The Iowa Transportation Center Bulletin Board Service began in late spring of 1992 with access limited to members of the Iowa County Engineers Association Computer Committee. Since then, access to the BBS has been expanded to include county engineer offices and city public works departments. The BBS is a joint effort of the ICEA computer committee, the Iowa DOT, the Iowa Highway Research Board (Project #345), and the Iowa Transportation Center.

Accessing a BBS is one of the advantages of working with a computer. A BBS is a resource which can provide access to shareware software, other computer users with similar interests, information, and a means to communicate easily with other people all over the world. All that is needed is a relatively inexpensive modem and telecommunication software.

There are many BBS. Many, like the ITCBBS, specialize in one area of interest. Others, like CompuServe and America Online, contain a variety of services and software.

Microtechnology

By Larry Mendenhall
Editor, *Technology News*

The ITCBBS is available to local agency highway departments and carries files related to road and street design, maintenance, and operation. System operator, or sysop, Mike Bugenhagen, says 40 percent of the files are AutoCad related. But there are other files available.

"We also offer administrative software for general office use," Bugenhagen said. "For example, we have a software catalog program that lets you catalog all the software on a computer. We also have some Excel and Lotus 1-2-3 templates that are beginning to come on-line."

Another new feature to the BBS is an on-line program that allows users to browse and download files. Different sections of the BBS are behind "doors." A user enters one of the doors and then can browse through the available files.

A total of 3,500 calls have been logged by the system, 2,000 since January alone. In February, a second phone line was added to handle the increasing number of callers.

"We're averaging 15-20 calls per day," Bugenhagen said.

Signing on to the system is easy once a modem has been connected to a computer and the appropriate software installed. The BBS is able to handle any modem setting, but Bugenhagen advises for the best downloads of color and graphic files, a user's modem should be set to 8 databits, no parity, and 1 stop bit. The user should also chose VT100 emulation and ANSI in the modem settings.

First time users can log on to the service by calling 515/294-9784. Once connected, a short survey has to be completed and then the user is in the public area where there is an opportunity to leave a note for Bugenhagen. Shareware and read-only files are available in the public area. To gain access to other parts of the BBS, leave a note for the sysop.

Bugenhagen will be describing the benefits of the BBS at three meetings this year. Those meetings are the ICEA Mid-Year Meeting July 15, the APWA Mid-Year meeting August 5, and the ICEA Office Organization annual meeting October 7-8.

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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

Doubts linger on crumb rubber use

By Kim Shelquist
Editorial Assistant

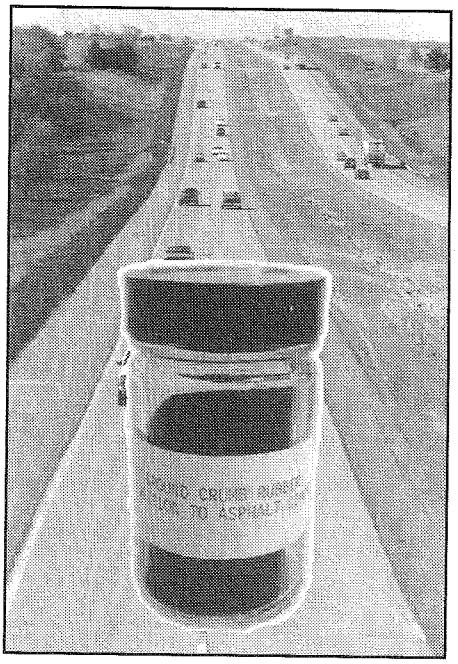
An estimated 242 million tires are thrown away in the United States each year, posing both health and environmental risks. In addition to causing many other problems, tires dumped in large numbers provide a breeding ground for disease-carrying mosquitoes and create a dangerous fire hazard.

In an effort to find alternate uses for these tires, Congress has enacted legislation designed to reuse a percentage of scrap rubber in asphalt paving. The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, requires that five percent of federal-aid asphalt paving contain crumb rubber in 1994. The percentage increases by an additional five percent each year until 1997, when it becomes fixed at 20 percent.

While no one can argue about the value of reducing the number of tires in landfills, concerns about using crumb rubber in roadways do exist. These concerns include increased cost, performance questions, and possible adverse environmental effects.

One major objection to using crumb rubber is the cost. Prices for asphalt rubber concrete paving can be as much as 100 percent more than conventional asphalt concrete according to a study done by the Iowa DOT's Chris Anderson. Anderson used figures from the IDOT's rubber asphalt paving project in Dubuque County to complete the study.

Before ISTEA, demand for crumb rubber was relatively low, limiting the need for production facilities. Because of this, most of the crumb rubber produced today must be transported long distances to the site where it will be used, accounting for a large part of the increased cost. To date, asphalt rubber concrete in Iowa has been used primarily in small test patches and this type of limited use hasn't justified the construction of new facilities.



Using crumb rubber in asphalt is mandated beginning in 1994.

Even with the increasing demand generated by ISTEA, costs are likely to remain high. According to Vernon Marks, Research Engineer in the Office of Materials at the Iowa Department of Transportation, open bidding and increased use could bring the price of asphalt rubber concrete down to about 40 percent above conventional asphalt, but he doesn't envision prices falling much below that figure. He feels that the cost of collecting, processing, and transporting the rubber will keep prices high. In the end, Marks said, how the material performs will be the biggest factor in its use.

Recent Iowa DOT test patches using asphalt rubber concrete show comparable performance to conventional asphalt paving and long–term testing in California and Arizona has achieved positive results. But Marks has some reservations about how rubber asphalt roadways would endure in the Midwest's climate.

"I'm not sure how it's going to perform under the extreme hot and cold temperatures we have here. It may not do as well," he said.

Don Jordison, executive vice–president of the Asphalt Pavement Association of Iowa, said several other issues still need to be addressed about crumb rubber asphalt. Those issues include the effect processing the tires may have on the environment and whether the ability to recycle the asphalt is compromised when the rubber is added.

"There's a real concern about toxic fumes being released during the processing. That could pose a threat to the health of workers as well as to the environment," he said.

This concern has lead the National Asphalt Pavement Association (NAPA) to request that the U.S. Environmental Protection Agency and the U.S. Department of Transportation delay implementation of the mandatory use of crumb rubber in asphalt paving until tests can determine whether a hazard exists.

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Proper clear zone widths vary

By Joseph L. Henderson
Transportation Specialist

Beginning in the early 1960's, as more miles of interstate highways and other high speed roadways were opened to traffic, the type of rural highway accident began to change. Before the construction of high speed roadways, most accidents were head-on collisions with other vehicles or accidents involving trees near the roadway. After high speed roadways were built, accidents began to increase where drivers were running off the road and hitting man-made objects such as bridge piers, sign supports, culverts, ditches, and other hazards along the roadway.

In 1967, a report titled, Highway Design and Operational Practices Related to Highway Safety, was published by the American Association of State Highway Officials (AASHO). This organization is now called the American Association of State Highway and Transportation Officials (AASHTO). The report became known as the "Yellow Book" and its standards were widely used for highway construction projects. A second edition of the Yellow Book was published by AASHTO in 1974. Results of studies conducted for the report concluded that as much room as possible should be provided on the side of the road for motorists so that they can regain control of their vehicle if they leave the road. The studies showed that on high speed roadways, a width of 30 feet or more from the edge of the traveled way will allow most motorists to regain control of their vehicles. This recovery area on the side of the road became known as the clear zone.

Road designers soon learned that in some locations where the clear zone has a steep down slope, a motorist may require a clear zone that is wider than 30 feet. In the case of a low volume or low speed roadway, a 30 foot clear zone distance was too large. Figure 1 shows a nomograph developed by AASHTO for determining the required clear zone width.(1) The calculation of the clear zone width is dependent on the rate of the foreslope, roadway design speed, and the amount of traffic on the roadway. If a variable foreslope exists, use a weighted average of the slopes.

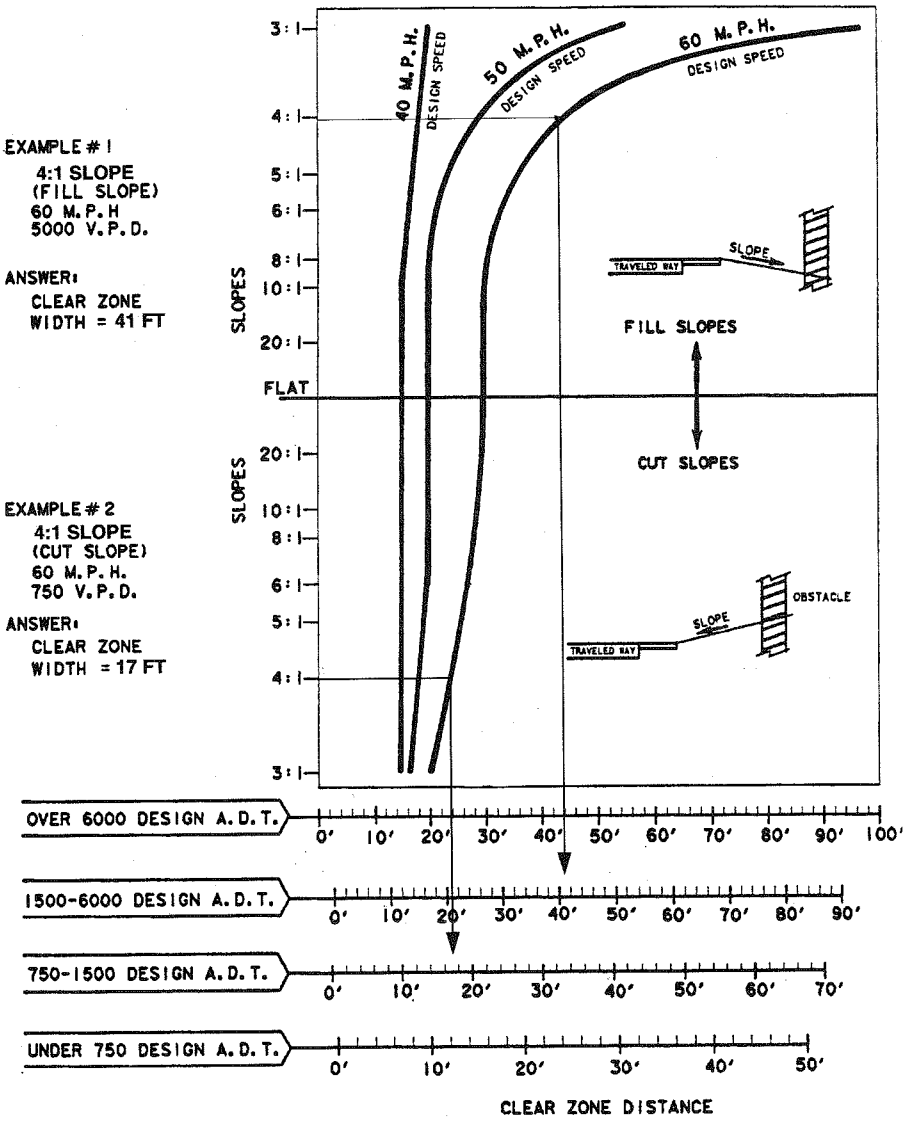


Figure 1: Nomograph for determining clear zone distance.

Single vehicle run off the road accidents involving fixed objects are a predominant vehicular accident type in Iowa, as well as in other states. From 1979 through 1988, about 19 percent of all traffic accidents in Iowa

were fixed object accidents.(2,3) That amounted to an average of 12,608 fixed object accidents per year. During that same period, about 1.5 percent of all of the fixed object accidents resulted in fatalities. Figure 2 shows the proportion of fixed object accident occurrence during the 10 year period. Ditches accounted for the majority of the fixed object accidents with poles (luminaires and utility poles) being involved in the second most occurrences of this accident type. The category title "Other" includes buildings, fences, mailboxes, and impact attenuators.

There are five options that can be used for treating hazards located within the clear zone. In order of preference, these are:

- Remove the obstacle or redesign it so it can be traversed safely.
- Relocate the obstacle to a point where it is less likely to be struck.
- Reduce impact severity by using an appropriate breakaway device.
- Shield the obstacle with a traffic barrier and/or crash cushion if it cannot be eliminated, relocated or redesigned.
- Delineate the obstacle if the above alternatives are not appropriate.

Making the clear zone safer is important for a safe roadway. There are a number of roadside features that need to be maintained or improved to make the clear zone safer. They include the shoulders, foreslopes, and ditches.

First, shoulder maintenance is important because motorists who stray onto the shoulder need to be able to get back on the roadway safely. Shoulder drop-offs and ruts in the shoulder near the edge of the pavement are two common deficiencies that will cause a motorist to loose control. Second, gentle foreslopes are vital to prevent vehicles from becoming airborne so that motorists are able to bring their vehicle to a stop. Creating gentle foreslopes is an expensive process, therefore, guardrails may be required to shield motorists from a hazard.

In addition, foreslopes must be clear of objects such as large rocks, trees, utility poles, and culvert headwalls. If these objects are not traversable or breakaway, they will stop a vehicle suddenly possibly causing injury or death. Finally, ditches are involved in the highest number of fixed object accidents. Ditches need to be made traversable so that they don't suddenly stop vehicles. Again, shielding with guardrail may be required for non-traversable ditches.

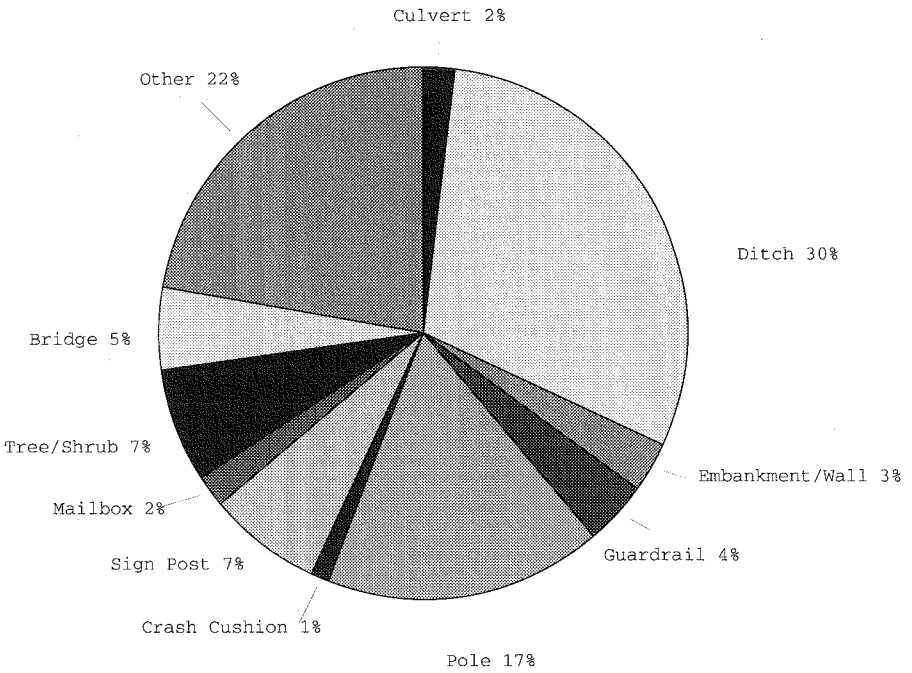


Figure 2: Fixed object accidents in Iowa during 1989, 1990, and 1991

References

1. American Association of State Highway and Transportation Officials. Roadside Design Guide. October 1988.

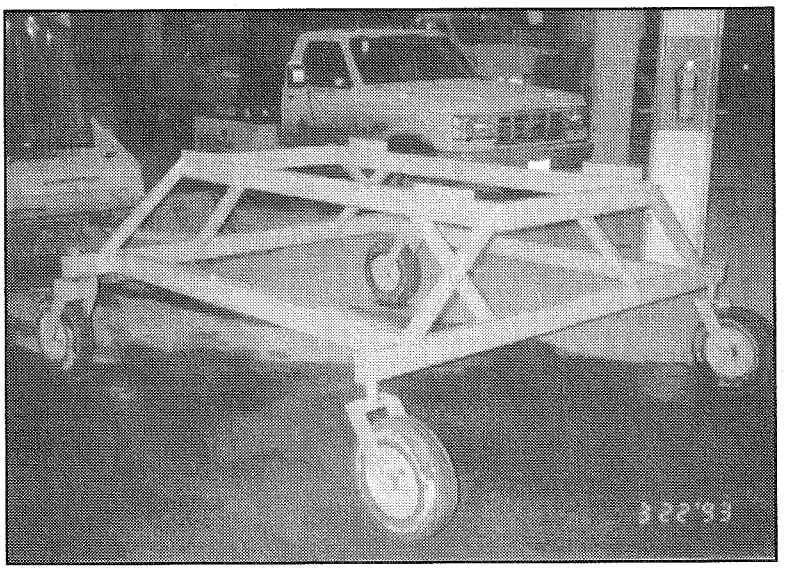
2. Iowa Department of Transportation. 1990 Accident Facts.

3. Fauver, Kirk D. An Update on Iowa Fixed Object Accident Data (1979 - 1988). Federal Highway Administration. July 18, 1990.

Tips From The Field

Cart eases moving v-box sanders

Jim Brown, assistant crew chief for the City of West Des Moines, developed a cart that makes moving v-box sanders to summer storage a snap.



Putting a v-box sander on this cart makes storage easy.

Brown and his crew made the cart with 2x4 and 2x2 tubing, four-inch I-beams, and tires that the city had removed from its snowplow blades.

The tubing is used as supports for the I-beams which make up the main frame of the cart. Holes are bored in the I-beam to accommodate the wheels. The back set of wheels are fixed while the front ones are allowed to rotate 360 degrees for better maneuverability.

Brown said his shop uses an overhead crane to remove the v-boxes from the sanders onto a frame. However, an end loader will work as well.

"We built one of them just to see how it would work and it worked so well we built three more," Brown said.

For more information contact Brown at City of West Des Moines, Department of Public Works, P.O. Box 65320, West Des Moines, IA 50265-0320 or call 515/223-3231.

Crumb rubber use mandated by ISTEA continued from page 3

Marks agreed that these are legitimate concerns and said that testing is currently being done to determine what toxins, if any, are released. He said to date asphalt rubber concrete appears to be safe and researchers have not been able to identify any toxic releases. As for recycling, Marks said it's been done in Canada with very few problems.

Marks said the Iowa DOT has applied for an exemption under one of the conditions for non–compliance allowed by ISTEA.

ISTEA allows minimum use requirements to be waived or revised under certain conditions. For example, if the use of crumb rubber in asphalt poses a threat to the health of workers or the environment, if the asphalt rubber concrete can't be recycled to the same degree as conventional asphalt concrete, or if asphalt rubber pavements do not perform adequately as a material for roadway construction.

According to Marks, ISTEA also allows exemptions in states where scrap tires are unavailable because they're being used in other recycling efforts. He said that three agricultural processing plants in Iowa have announced intentions to power their plants with tire–derived fuel.

"By burning tires at a very high temperature, energy is generated and the tires are used more effectively than they would be in crumb rubber," he said.

In order to use tire–derived fuel, said Marks, the plants would require an estimated five million tires per year.

"On the average, Iowans discard one tire per–person, per–year. That's a total of three million tires a year, leaving us short about two million tires," he added.

For More Information

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

Publications

The ITC library has a few sets of the three volume **"NACE Action Guide Series"** available for free distribution. These guides are an excellent resource covering the administration, planning, and operations of a road department. **Request #198, 199, and 200**

For those of you who have the **NACE Action Guides**, we have a number of free copies of the 1992 replacement chapters II–2, III–1,5,7, and 8. **Request #1**

"Maintenance of Drainage Features for Safety" This pocket-sized handbook illustrates typical drainage situations and structures that may be unsafe, with explanations of remedies and tips for traffic control and maintenance practices. Multiple copies available free. **Request #871**

"Protection of Structural Concrete Substructures" This publication by the Iowa Highway Research Board – HR220 reports on a research project that evaluates the effectiveness of commercially available products in preventing chloride intrusion into concrete substructures. For loan only. **Request #872**

"Safety Effectiveness of Highway Design Features" This FHWA publication includes six volumes: access control, alignment, cross sections, interchanges, intersection, and pedestrians/bicyclists. It reports on the probable safety effects of design features. Limited copies available free. **Request #885**

Videotapes

"Maintaining Asphalt Roads: Blade Patching" This videotape demonstrates how to program an area, clean, tack, place premix, and compact a patch for a large area using a motor grader. For loan only. **11:45 minutes Request 298V**

"Looking Back" This videotape contains graphic examples of construction accidents. It illustrates the events leading up to the accident, and discusses the results. It is for equipment operators and foremen. **17:54 minutes Request 303V**

"Harmful Materials Awareness: 309V for Design Workers – 310V for Construction Workers – 311V for Maintenance Workers" These videotapes should make an individual aware of commonly encountered hazardous materials on the job and once aware of these dangers how to protect oneself. For loan only. **21:00 minutes Request #309V 24:15 minutes; #310V 22:45 minutes, #311V**

"Testing and Field Inspection of Roadway Delineation" This videotape was prepared to assist highway agencies in testing and inspection for roadway delineation systems, with an emphasis on pavement markings and signs. Examples cover a wide range of materials, applications, and types of roads and streets. For loan only. **35:43 minutes Request #286V**

Publication order form

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

	Title	Index No.	No. of Copies
Name _____	_____		
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City/state/zip _____	_____		
Phone (___) _____	_____		

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

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

Richardson continued from page one

the DOT. He works with local agencies in developing projects for federal funding. His office also provides some training and functions as a liason between local, state and federal concerns.

It's been a job that he's enjoyed because of the opportunity he's had to work with different people and organizations.

"One of the most satisfying things is that I've been able to work with different entities like Iowa State, the Iowa State Association of Counties, and others that have had the interest of the people at heart. It's been great working with these groups because we have the same goals in mind," he said.

The Iowa DOT enjoys what is probably one of the best working relationships with other organizations in the country, due in part to the efforts of Richardson and his staff.

"I think we're number one in our relationship with other groups and I think it's probably a unique situation in the country," Richardson said. "The approach I took in building our staff is to get people who were cooperative and willing to work with outside groups."

But Richardson noted that the relationship is a two-way street.

"All those other organizations gave us a lot of resources, a lot of different talents that we've enjoyed making use of," he said.

Which makes it only natural that Richardson will miss the people he's been working with when he retires. He'll also miss the challenge of making new procedures run smoothly.

"I read somewhere that retirement is like your first kiss," Richardson said. "You feel a little nervous about it, but you're really looking forward to it."

Calendar

"Seventh Annual UNI Roadside Conference: Roadside Ideas and Experiences." August 19–20 Fayette County This conference is designed for county and city road maintenance personnel and others who are interested in integrated roadside management. Enrollment is limited. To register call 319/273-6885 or 800/782-9519

Iowa County Engineers Association Mid–year Meeting July 15 Starlight Village Motel Ames Topics for the meeting are computer use and management systems. Registration will be from 8:40–9:00 a.m. the day of the meeting.

And justice for all
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