

# Technology

Roads Bridges Transit

Iowa State University  
Business and Engineering Extension

Iowa Transportation Center

# News

July 1990

## Timber bridges are here again

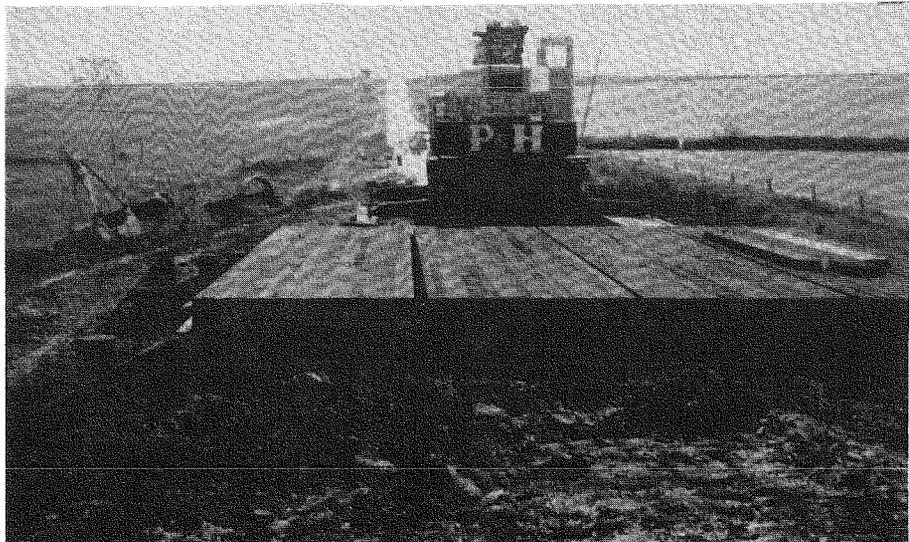
New designs, techniques, and a federal program are giving a new lease on life for an old technology — timber bridges. The U.S. Forest Service's Timber Bridge Initiative, headed by Dr. John Crist, takes timber bridges out of the past and puts them into the future.

The Timber Bridge Initiative is designed to better utilize timber and improve markets for the timber industry. "One goal is to balance the nation's harvesting of its forest area," Crist said. "We were cutting a little heavy in the Northwest of the country and a little less on the East Coast and the rest of the country."

The second goal is to increase markets for state timber industries. Hardwood timbers, usually used in decorative applications, are required in timber bridge construction. The U.S. Forest Service hopes that timber bridge construction will create new markets for timber industries in each state.

"There are very good reasons to be interested in timber for bridges," Crist said. "It's unaffected by deicing salts so maintenance costs are lower. And when timber bridges are properly fabricated and treated they last an extremely long time."

Local Systems Engineer Lowell Richardson of the Iowa Department of Transportation feels that the new



**Prefabricated and pre-treated deck panels, shown here on a bridge in Shelby County, make new timber bridge designs easy to install.**

construction techniques make timber bridges "state of the art." "I think county engineers need to explore these new timber bridge designs," Richardson said. "It's a new approach that turns timber bridges from an old product into a new product."

"We distinguish what we're doing today with timber bridges from what was done in the past by calling them modern timber bridges," Crist said. "They differ from the older style in

**Continued on page 5**

### Inside pages

3. "Tort Liability" author R.L. Carstens bids farewell to *Technology News* readers.
3. The Local Transportation Information Center gets a new name.
4. "Microtechnology" begins an introduction to backing up computer data.

# Iowa roads began as seedling miles

In order to demonstrate the value of a paved road it was the practice of the various highway associations to construct a "seedling mile."

Usually one of the worst sections of dirt road was selected to pave. The idea was to use the miles of unimproved road on each side to demonstrate the value of paving. It was hoped the mile of paved road would be so impressive that money to pave the intervening distances would be forthcoming.

In 1918 the local county council person for the Lincoln Highway Association in Linn County presented Linn County with a proposition — the Lincoln Highway Association would furnish three thousand (3,000) barrels of cement, if Linn County would build a mile of concrete road.



**Seedling miles, like the one under construction in this photograph, were the beginning of Iowa's paved road system.**

## Past Roads

By Dr. Stanley Ring  
Professor Emeritus of  
Civil Engineering

The Linn County supervisors agreed. A mile of road was graded in 1919 and paving commenced. The 3,000 barrels of cement were stored in farm barns and the gravel was shipped from Muscatine by railroad. The ce-

ment was donated by the cement companies. From September 27 to November 6, the contractor paved 4,225 feet of road before closing down for the winter.

The following year the road was completed as one of the first rural miles of paving on the Lincoln Highway in Iowa. This "seedling mile"

illustrated the value of good roads and led to pressure from the travelers for better roads.

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Program Manager — Tom Maze; Assistant Program Manager — Jan Graham; Safety Circuit Rider — Ed Bigelow; Communication Specialist — Larry Mendenhall; Program Coordinator — John Moody; Secretary — Diane Love; Office Assistant — Kirie Draper

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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.



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# Carstens retires for the second time

*Editor's Note: Professor Emeritus R.L. Carstens has written "Tort Liability" for Technology News since May 1984. It has proven to be one of the most popular and well-read features of the newsletter. Professor Carstens retired for the "first time" in 1986 after 22 years at Iowa State University. His column will be missed by us at Technology News as well as by our readers.*

Each of the previous issues of *Technology News* has included an article on tort liability by the writer. This will be the last such article. During the period since early 1984, tort liability has become an issue of greater concern in many states. However, in Iowa its importance has diminished due to changes in the applicable laws. Whereas in the mid-1980s most highway-related lawsuits in Iowa alleged some failure to install a traffic control device, suits of this nature against public entities are substantially precluded since Section 668.10 was incorporated into the Code of Iowa.

## Tort Liability

By R. L. Carstens  
Professor Emeritus of  
Civil Engineering

While many other liability issues remain, the writer's direct involvement in this litigation has ended after over 20 years of participation in accident studies and testimony in lawsuits. Leaving this field leads to a mixture of emotions. The antics of trial lawyers trying to hide or obscure the facts of a case will not be missed. Neither will we miss the opportunities to review the testimony of the many "experts" who, lacking integrity or short of knowledge in the fields covered by their testimony, will testify as to the validity of virtually any fictions suggested by their attorney clients.

What will be missed will be the opportunities for close association with

the dedicated public officials who have represented the defendants in many of the writer's cases. Most of these persons have done outstanding work in carrying out their responsibilities to provide safe and serviceable highway systems despite fiscal resources that were inadequate for the purpose.

The association with city and county engineers and other persons in the highway field has been developed not only in connection with lawsuits. It has involved not only the medium of *Technology News*, but also many face-to-face contacts and countless meetings and conferences regarding highway safety and liability matters. Such contacts hopefully will continue, although diminished in number as the writer pursues other interests. Meanwhile, we will still welcome the individual contacts for discussions of highway safety problems of mutual concern. But I shall not see you in court.

# Changes underway at T<sup>2</sup> center

Several changes were recently put into effect at The Local Transportation Information Center, including a name change and a new staff member.

As of July 1, the name became the Iowa Transportation Center. A desire to shorten the original name was the main reason for the name change. In addition, the word "local" in the original name was confusing since the Center's programs are meant for the entire state.

A new staff member, Diane Love, has joined the Iowa Transportation Center as a secretary. Having worked for Iowa State for almost 10 years, she is familiar with the University system and will be a valuable resource for staff members. She will provide secretarial support for staff members as well as help prepare courses and seminars, make travel arrangements, and help keep project accounts up-to-date.

Additional changes are underway. The Iowa Transportation Center is beginning a remodeling project. Cur-

rently, ITC staff members are scattered among five separate offices on three different floors in the Town Engineering Building. Eventually the entire staff will be housed together on the first floor.

Despite the changes, The Iowa Transportation Center will remain a valuable resource for any highway agency that may need anything from a course in motor grader operation to the latest legal ramifications of tort liability. The ITC will continue to

**Continued on page 8**

# Backing up data prevents disasters

If you use your system daily — especially for work — or if you have a large-capacity hard drive (30 megabytes or more) you should be backing up your data files regularly. But backing up programs and data onto floppy disks can take an excessive amount of time. If you don't have that kind of time to spend look into alternative backup devices. These devices can reduce the amount of time it takes to backup your files and, depending on the backup software, may be able to do it when you're not there.

When I got my first microcomputer, an IBM XT back in the mid-eighties, I was told to regularly backup my hard disk to avoid losing valuable data. Although I did not fully understand the significance of this advice at the time, it was one of the most helpful recommendations I have been given.

My original microcomputer had a small (by current standards) 10-MB hard drive. On an irregular basis I started backing up the hard drive using the DOS Backup command. This would take around 20 to 30 minutes and a few boxes of double density floppy disks.

One day a student of mine asked if he could format a couple of floppy disks on my computer. I left the room for a few minutes and when I returned, the student had accidentally erased my entire hard disk. I am sure that at that point he felt that his future might be in jeopardy; for a few

## Microtechnology

By Tom Maze  
Program Manager

seconds, thoughts of physical violence shot through my mind. Fortunately I had recently backed up the hard drive and replacing the data and programs was relatively easy.

This accident is a lesson I have not forgotten. I regularly backup my hard disk and I try to enforce backing up data amongst the Iowa Transporta-

tion Center's staff. Backing up data as frequently as every working day. For example, transactions on a computerized fueling system should probably be backed up daily. For machines that are primarily used for word processing and financial analysis (spread sheet applications), newly created data files may be backed up less frequently (once a week). I also like to backup new data files on my portable computer every time it leaves the office.

Backing up my hard drive has not been a problem until recently. I have switched from using the DOS com-

mand to backup the hard drive to a backup utility. There are several good utilities on the market.

They are

many times quicker and use fewer floppy disks than the DOS command. With my backup utility, I can backup my 20-MB hard drive using just 15 high density floppy disks. The backup procedure (data and files) takes less than 10 minutes and I can complete a backup while making telephone calls.

Using floppy disks for a backup medium was an excellent method until the Iowa Transportation Center upgraded to microcomputers with larger hard drives (40 MB or more) for several of the staff members. The computers already had the necessary hardware to conduct floppy disk backups (a floppy disk drive) and the cost of the floppy disks is minimal (a

**It is important to plan for the possible loss of data on a hard drive just like planning for the potential of any other disaster.**

tion Center's staff. Backing up data (and sometimes the programs) protects us from accidents, from equipment failures and, to some extent, from viruses (assuming the backup does not contain the virus).

It is important to plan for the possible loss of data on a hard drive just like planning for the potential of any other disaster. The value of the hours of work and information that would be lost if the hard drive failed and the data were unrecoverable, is generally many times more valuable than the cost of setting-up and enforcing a regular backup routine.

How often backups are made depends on the value of data added everyday. Activities that are data intensive in which data integrity is cru-

**Continued on page 6**

# Timber bridge construction continued from page 1

two ways. First, they differ in the way they're fabricated and treated and second, they differ in the way we fashion them."

Iowa has two timber bridge construction projects using new design methods. One is in Centerville and the other is in Harlan. The Harlan bridge will be the object of a timber bridge

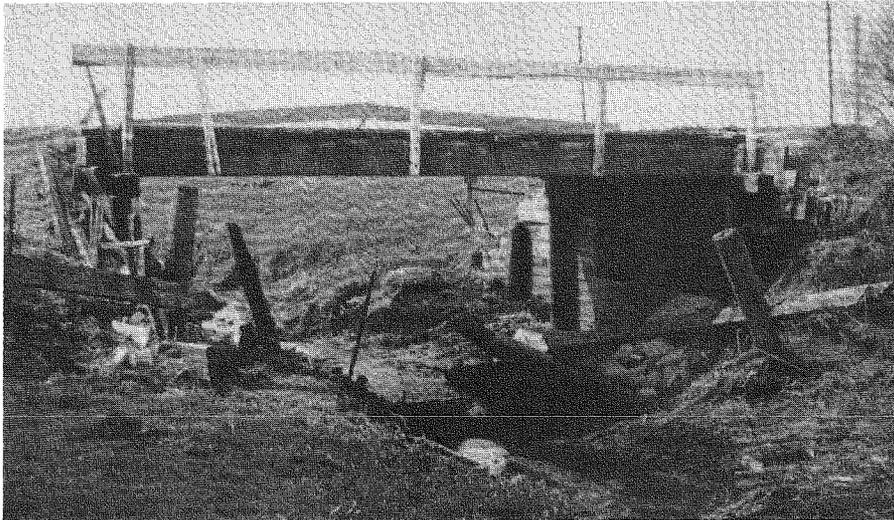
construction demonstration August 2 and 3 in conjunction with the Iowa County Engineers' meeting.

A niche for timber bridges in Iowa already exists. "We have thousands of deficient bridges in this state and a relatively large number of them are short spans, for which timber bridges are a very viable product," Richardson said.

The Federal Highway Administration reports that there are 575,000 bridges in the country and that 42 percent of those are either structurally or functionally deficient, according to Crist.

"Now when you look at the data, 470,000 of those bridges are on rural or secondary roads," Crist said. "Of those, 414,000 are 20 to 40 feet in length. That makes it obvious we have a need for bridges in the size class ideally suited for timber bridges."

Prefabrication techniques allow timber bridges to be assembled on site



Shelby County replaced this bridge with a modern timber bridge.

quickly and also extend the bridge's life span. All the cutting, milling, and drilling is done prior to the timber being treated. This insures that there are no exposed, untreated surfaces, according to Crist.

"Prefabrication allows us to construct a bridge quickly," Crist said. "That minimizes the inconvenience caused by closing the bridge."

Eldo Schornhorst, Shelby County Engineer, said the timber bridge in his county was opened for traffic in a little over a month, including weather delays.

"The advantage of timber bridges is the ease of construction," Eldo Schornhorst said. "Part of the Timber Bridge Initiative is aimed toward making bridge-building something that can be done as a day labor project."

"The deck is 24-feet wide and came in three panels. Once the abutments were built it only took us a day to get the panels in place. It fit together

quite well. I was pleased at how well it went together with no trouble at all."

Fastening techniques make timber bridges structurally solid. The deck is post-tensioned and becomes a structural member of the bridge.

Schornhorst said the deck pieces are stag-

gered and rods inserted through them. Each rod carries 80,000 pounds of tension which gives the 34-foot span demonstration bridge a load rating of H-20.

Other advantages of timber bridge construction, according to Crist, are a minimal of cracking in asphalt overlays because there is no shifting of structural elements underneath. This allows the deck to act as a roof, further protecting the structural integrity of the bridge. Timber bridges also have no thermal expansion, which makes it unnecessary to design expansion joints. That allows a continuous bridge surface which helps both rigidity and maintenance.

The disadvantage is finding the materials. Hardwoods are not cut in lengths needed for timber bridge construction.

"Now we have to develop the whole marketing chain for structural purposes," Crist said. "We're working on it but it's not refined to the point where it is for softwoods."

## Tips From The Field

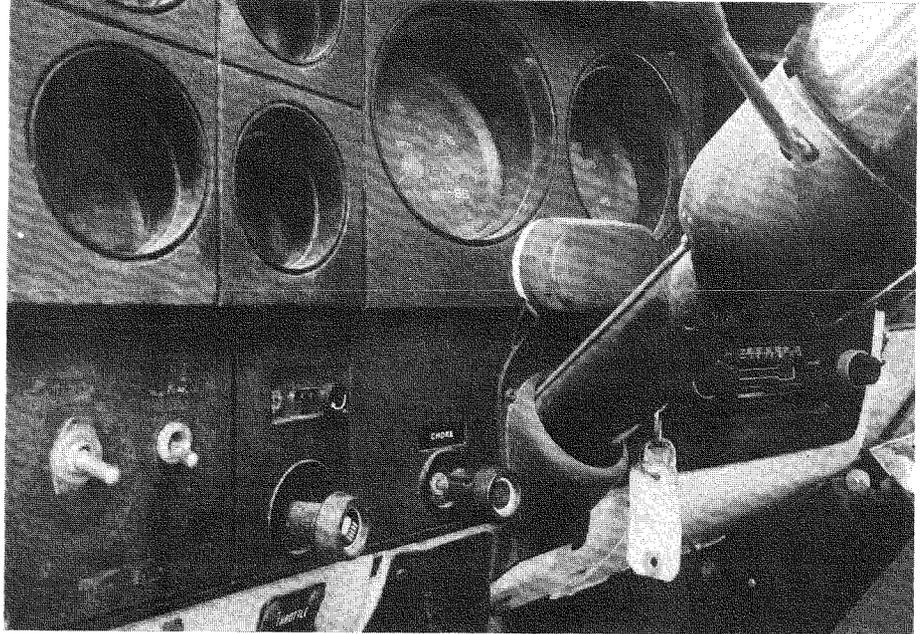
# Warning light gives brakes a break

A yellow clearance light mounted on the dash directly above the steering wheel shaft reminds City of Clive truck drivers to release the emergency brake.

The light is wired to the emergency brake handle system. When the brake is left on, the light reminds drivers to release the brake.

"This light has saved a lot of emergency brake shoe pads," according to City of Clive Public Works Director Willard Wray. "We have an additional need to keep our emergency brakes in good condition because we run all automatic Allison transmissions that do not have a "park" position on the gear shift."

For more information contact Willard Wray, City of Clive Public Works Director, 8505 Harbach Blvd., Clive, Iowa 50053 or call 515/223-6230.



Warning lights that alert a driver that the parking brake is on can reduce the wear on the vehicle's brakes. Warning lights can be installed on the dash as in this photo or on the roof of the cab.

## Microtechnology continued from page 4

box and a half of disks). However, with the larger hard drives (40 to 80 MB drives), a full backup on floppy disks would require 30 to 60 diskettes. It would also require much more time than any of us are willing to spend feeding diskettes into the drive. Therefore, we are looking to find a new method of backing up our larger hard drives.

There are several options available to us. Alternative backup devices include Bernoulli boxes, WORM drives, optical cartridges, adding a redundant hard drive, and boards that let you backup your PC to your VCR.

But tape drives seem to be the most popular way of backing up large-capacity hard drives today. Tape drives and other devices can reduce the amount of operator time it takes to backup your files and data because they store data more quickly and/or they do not require the manual feeding of disks into a drive. Most of the devices mentioned can backup a large hard drive on one or two cartridges.

Backup devices, depending on the technology chosen, can cost anywhere from a few hundred dollars to several thousand dollars. Each tech-

nology has its own media requirements (disks, tapes, and cartridges) which also vary in cost. Each alternative device has its own performance advantages — speed or cartridge data capacity. Buying a backup device also means considering whether a device will be needed for each computer, or if one device can be shared by many computers.

The next "Microtechnology" will discuss some of the hardware options for hard drive backup devices and where their application is most appropriate.

## For More Information

**The videotapes and publications listed in this column are available on a loan basis by contacting John H. Moody, Iowa State University, Iowa Transportation Center, 194 Town Engineering, Ames, Iowa 50011 515/294-9481.**

**Iowa Signals Go (Project Summary)** This 24-page manual reviews a demonstration project which placed up-dated traffic signals in five small cities, six medium-sized cities, five large cities, and three at-large cities in Iowa. The manual contains photographs of installations as well as comments by personnel representing some of the cities involved. **Request index #613.**

**"Guide to Common Road and Equipment Maintenance Procedures" (1989)**  
The FHWA's RTAP program distributed copies of 23 videotapes developed by the International Road Federation to the 44 Technology Transfer Centers located throughout the country. Written supplements were developed by Reta G. "Tinka" Jones to accompany and enhance each tape by clarifying, emphasizing, and expanding upon the information presented in the tapes. This 92-page

manual represents the compilation of the 23 written supplements. The 23 videotapes are available on a loan only basis from The Center's library. **For the manual, request index #642.**

**"Bus Fleet Management Principles and Techniques" (Final Report Nov. 1987)** This 183-page manual, prepared by T.H. Maze for the University Research and Training Program, Urban Mass Transportation Administration, U.S. Department of Transportation, covers several fundamental techniques and principles of bus fleet management. Examples were taken from a detailed case study at the Wichita, Kans., Metropolitan Transit Authority. These examples are intended to help guide bus fleet managers when applying the management techniques described. Key elements are the development of standard maintenance task times (work measurement) and the calculation of a variety of bus fleet performance measures. **Request index #632.**

**Proposed Design Specifications for Steel Box Girder Bridges" (January 1980 Final Report)** This 288-page manual discusses speci-

cations for the design of steel box girder bridges as prepared for the AASHTO Specification for Highway Bridges. The load factor design approach is used. Also given are design rules for tension flanges, diaphragms, cross frames and other members, recommended fabrication tolerances, and erection provisions. Included is a 44-page bibliography and a 63-page "Review of Design Codes." **Request index #612.**

**"Patching Unpaved Roads"** This tape deals with the defects which appear in unpaved roads. It lists methods recommended to eliminate the defects and explains the equipment, tools, materials, and procedures to carry out repair operations. The tape is accompanied by a printed, three-page supplement. **Running time: 11 minutes, 25 seconds. Request index #71V.**

**"Road Management Systems"** This tape was produced by the U.S. Army Corps of Engineers — Cold Regions Research and Engineering Laboratory. It explains in some detail the development of a road management system and provides information on where additional assistance is available. **Request index #144V.**

### Publication order form

To obtain the materials listed from the ITC, return this form to the Iowa Transportation Center, Iowa State University, Business and Engineering Extension, 194 Town Engineering, Ames, IA, 50011.

	Title	Index No.	No. of Copies
Name _____	_____	_____	_____
Address _____	_____	_____	_____
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.

## Conference Calendar

**August 2 and 3, Timber Bridge Construction and Iowa County Engineers Mid-Year Meeting, Harlan, Iowa** This program describes how new designs and fabrication techniques can make timber bridges a viable alternative. The seminar features a field visit to a demonstration bridge site near Harlan. Contact Eldo Schornhorst, 712/755-5954.

**August 5-10, Institute of Transportation Engineers Annual Meeting, Orlando, Florida** Contact ITE, 202/554-8050.

**Legal Liability and Traffic Signing, August 15 Southwestern Community College, Creston, Iowa and August 16 Stouffer's Five Seasons Inn, Cedar Rapids, Iowa (in conjunction with the Iowa Chapter of APWA)** This workshop will introduce maintenance personnel in the proper use, placement, and maintenance of traffic control signs. The workshop

covers regulatory signs, warning signs, and work zone marking. Practical examples of good and bad signing are shown. Changes in the Manual of Uniform Traffic Control Devices are also covered. Contact Jan Graham, 515/294-8082.

**August 15-17, Iowa Chapter of American Public Works Meeting, Cedar Rapids, Iowa** Contact Richard Ransom, 319/398-5141.

**September 8-14, American Public Works Association International**

**Public Works Congress and Equipment Show, St. Louis, Missouri** Contact APWA. 312/667-2200.

**September 24, Bridge Management System Program, Scheman Continuing Education Center, Ames, Iowa** This program introduces local transportation workers to the basics of bridge management systems and the data requirements necessary to make them effective. Contact Connie Middleton, 515/294-6229.

### T<sup>2</sup> center changes continued from page 3

sponsor workshops on campus and throughout the state, publish a newsletter, and maintain a library of transportation related publications, videotapes, and slide shows.

Courses being planned for this fall include programs on liability and

traffic signing, bridge management systems, management for street and road maintenance managers, vehicle fleet management, and Portland Cement Concrete and Asphaltic Cement pavement.

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