

roads bridges transit technology news

Local Transportation Information Center
Iowa State University Engineering Extension Service

September 1986

Attention—Iowa counties, cities, and small towns

For some time now the Office of Purchasing at the Iowa Department of Transportation has shared with other governmental jurisdictions such as counties, large cities, and small towns, the purchasing of supply items, trucks, tractors, and other equipment.

According to Virgil Raymond, director of the Office of Purchasing, this can usually result in a substantial savings to the purchaser because of the advantage realized from quantity buying. Raymond indicated that this does not apply to signs or any other items currently being marketed by other departments of Iowa government.

For shelf items used routinely in office, shop, or highway work, deliveries can be arranged for the nearest highway maintenance garages from where the items can be picked up by the purchasing agency.

To arrange for buying supplies through the I.D.O.T., contact the Office of Purchasing at (515)

*234-1310, or write the Iowa Department of Transportation, 800 Lincoln Way, Ames, Iowa 50010.

*239-1310 (5)

Galvanizing revitalizes county bridges

By Charles E. "Gene" Hales, P.E., L.S., Pottawattamie county engineer

Pottawattamie County is involved in a program to revitalize corroded steel bridge rails. Since 1982, the county has done 30 bridges (10,852 linear feet of bridge rail). Eighteen of these bridges were let through the Iowa DOT and paid for out of the Farm-to-Market Fund; 12 bridges were done by day labor. Five bridges are scheduled (1,460 linear feet of rail) and will be contracted.

Systematically, and one side at a time, the rails are matched-marked, taken down, and hot-tip galvanized. The rails and posts are removed on Monday, shipped via county truck up to 70 miles away for galvanizing, and replaced on Friday. New galvanized fasteners are used for reinstallation. A particular effort is made to reopen the side of the bridge before weekends or holidays. Bridges on paved roads that are salted are receiving attention first. Later, attention will be

given to bridges on more heavily traveled gravel or seal-coated roads. The bridges vary in length from 20 to 300 feet.

In Pottawattamie County, the average cost of reconditioning the rail of the first eight bridges was \$24 per linear foot of bridge (\$12 per foot per rail).

continued on page 2



Gene Hales, Pottawattamie county engineer, examines the maintenance-free bridge guard rails and posts that have been dismantled, stripped of old paint and rust, hot-dip galvanized, and reinstalled.

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, to local and county highway and transportation personnel.

The T2 Center at Iowa State University is sponsored by the Iowa Department of Transportation and provides information and counsel to the municipalities and counties in Iowa. This newsletter is

designed to keep you informed about new publications, techniques, and training opportunities that may be helpful to you and your community. Individuals wishing to receive future copies of this newsletter at no cost may send their requests to: John Moody, Local Transportation Information Center, Engineering Extension Service, Iowa State University, Ames, Iowa 50011-3074.

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.

Galvanizing continued

That includes galvanizing, labor, hardware, and equipment. The average galvanizing cost is \$18 per hundredweight of bridge rail and post steel. These figures are for 20 to 30 years of protection.

There are approximately 2.5 tons of carbon steel per 100 feet of bridge. There is a minimum galvanized coating thickness of 2 ounces per square foot on each side. The hot-tip galvanizing of the rails is done by a Nebraska firm.

The process involves degreasing the steel in an alkaline cleaner and pickling it in a dilute solution of either hydrochloric or sulfuric acid. The steel is then fluxed and immersed in a bath of molten zinc at a temperature of 850°F. When the zinc's temperature is reached by the steel, it reacts to form a series of zinc-iron alloys that are coated by a layer of pure zinc, which is depos-



In the galvanizing process, the guard rail components are cleaned, fluxed, and placed in a kettle of molten zinc. This kettle holds 1.3 million pounds of zinc.

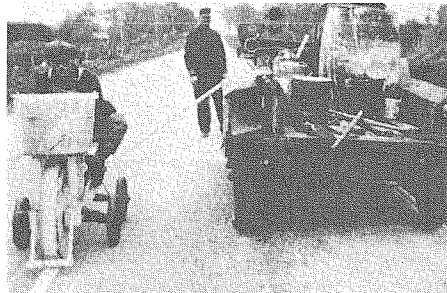
ited as the steel is withdrawn from the zinc bath. It is this metallurgical bond between zinc and steel that distinguishes galvanizing from other coatings. The pure zinc is soft, about 70 Diamond Point Number (DPN), while the harder alloy layers of 179 DPN to a delta layer of about 244 DPN, which is harder than the base steel.

Even if the base steel is deformed by impact during rough handling, the coating will remain intact. These characteristics give hot-dip galvanized steel its durability during transport, handling, and erection, and essentially eliminate the need for field touch-up of the coating after installation.

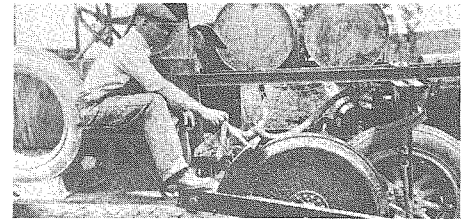
Center lines—fewer accidents

Prior to the 1920s, this nation's new rural asphalt and concrete pavements were narrow and frequently built without any longitudinal joints. Because traffic volumes and speeds were low, the concept of a center line to separate opposing streams of traffic was unknown and usually not needed.

A 1919 issue of the *Iowa State Highway Commission's Service Bulletin* credits a Maryland engineer with an interesting observation and deduction. "Marking a line down the center of a paved road has a strong tendency to prevent auto accidents. The decided advantage of the center line mark was first noticed on the Baltimore-Washington Road where the concrete road was built half at a time. It was noticed that drivers almost universally kept to their own side of the road, whereas on unmarked roads there was an almost universal tendency to drive in the center of the road. Plans are under way to paint a black line down the center of paved roads."



A bucket of paint drips on a wheel that paints the center line.



In this more advanced model the paint is in drums on the truck and the flow is regulated by a valve to place a precise amount on the wheel for painting the black center line.

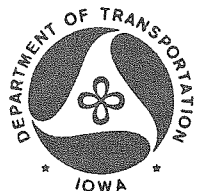
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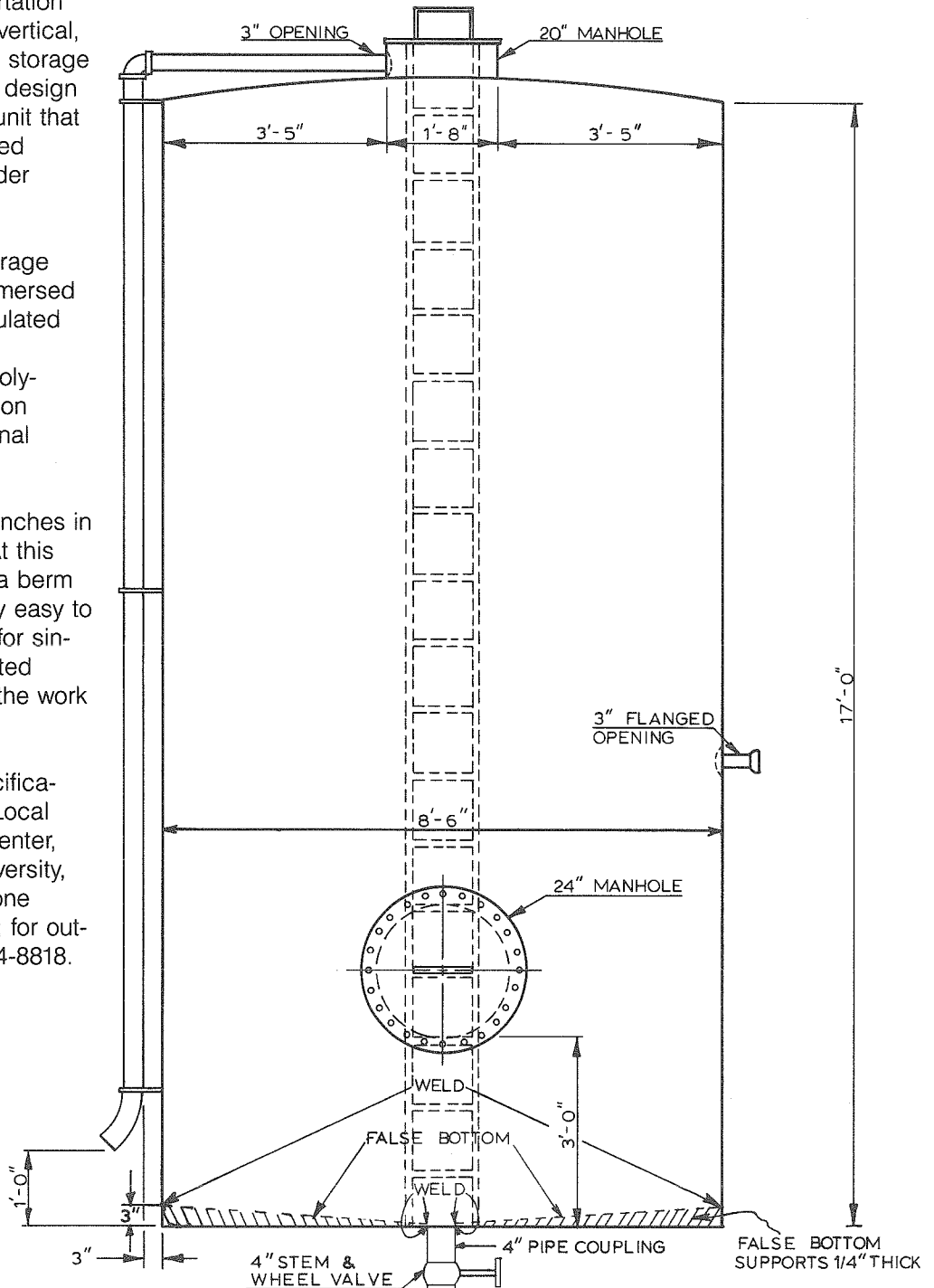
Bituminous storage tank

Iowa Department of Transportation personnel have designed a vertical, bituminous asphalt emulsion storage tank for year-round use. The design calls for an internal heating unit that allows the asphalt to be stored without hardening in the colder winter months.

This 7,000-gallon, tested storage tank is equipped with an immersed electric heating unit and insulated with a 3-inch coating of two-component, spray-applied polyurethane foam. The application process requires a professional fabricator.

The tank measures 8 feet 6 inches in diameter and 17 feet high. At this size, the tank, if erected on a berm or elevated tower, is relatively easy to move when empty, allowing for single transport delivery of heated emulsions to locations near the work site.

For more information or specifications, contact John Moody, Local Transportation Information Center, Haber Road, Iowa State University, Ames, Iowa 50011-3074. Phone 1-800-262-8498 in Iowa only; for out-of-state inquiries call 515-294-8818.



7,000 GAL. VERTICAL BITUMINOUS TANK		
IOWA DEPARTMENT OF TRANSPORTATION		
12-6-85	OFFICE OF MAINTENANCE	BT

Fast track concrete project was a success

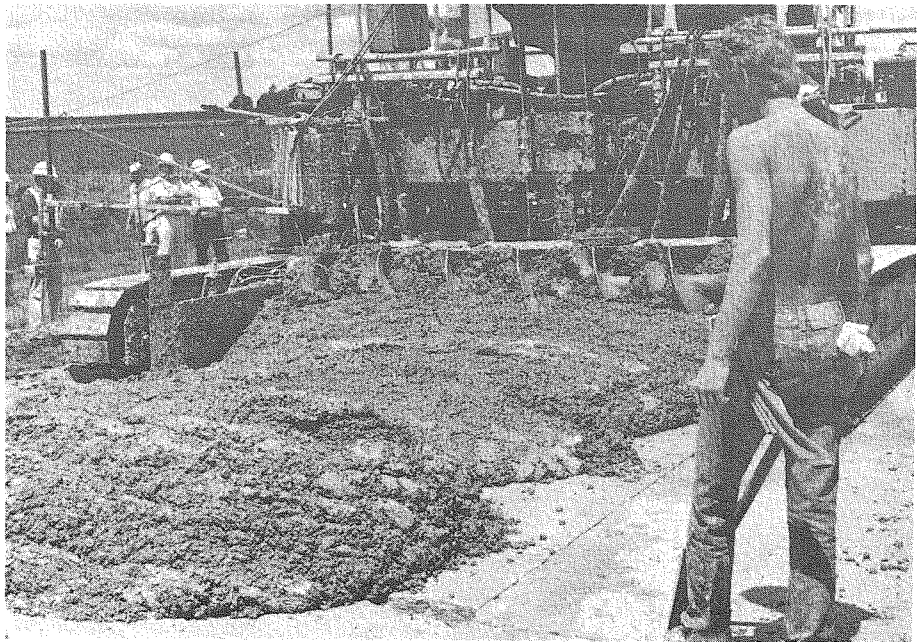
Iowa has been an early adapter of new and innovative transportation technology and the first major "fast track" concrete project was no exception. This new fast track concrete process was demonstrated via two 1-day open houses held on Friday, July 11, and Monday, July 14, near Storm Lake, Iowa. People from all over the United States and Canada, plus a number of local people, attended these two demonstrations. Considerable acclaim for the subject matter of the open houses was expressed by those in attendance as well as the desire to share this new technology with individuals from their local area.

A morning program addressing Iowa's experience with fast track concrete, followed by the opportunity to visit the project site, enabled participants to observe the development of concrete mixes and specialized equipment utilized for such a concrete project. Participants were transported by bus to the project site where they could see how the concrete was cured and cleaned and observe actual construction practices. The installation of dowel bars drilled into the edge of concrete to tie the widening into the road surface was demonstrated and experts were on hand to answer questions. A 4-inch bonded Portland cement concrete overlay with a 2-foot, tied, full-depth widening on each side of the existing pavement was being laid. The intent is that this type of overlay will be sufficiently cured for traffic use after 12 hours.

The open house was sponsored by the Iowa Department of Transportation in cooperation with the Federal Highway Administration, Iowa Concrete Paving Association, American Concrete Pavement Association, Portland Cement Association, and Central Paving Corporation.



Dowel bars spaced about 2 feet apart and anchored into the edge of existing pavement with a 2-component epoxy are being cleaned just ahead of the paver. The surface of the existing pavement is being treated with a water-cement grout to serve as a bonding agent between the old concrete and the new overlay.



Freshly mixed concrete has just been dumped from a truck on the surface of the existing pavement ahead of the paving machine.

conference 1 2 3 calendar

Iowa Traffic Control (ITCSA) Meeting
Starlite Village Motel, Ames
September 11-12

Safe and efficient transportation is the focus of this annual conference cosponsored by the Iowa Traffic Control and Safety Association. Participants represent the engineering, education, and enforcement professions related to safety on streets and highways.

American Society of Civil Engineers-Iowa Section Annual Meeting
Iowa City
September 12-13

American Public Works Association Conference and Equipment Congress
New Orleans
September 20-25

League of Iowa Municipalities Annual Meeting
Des Moines
September 24-26

American Concrete Institute, Iowa-Minnesota Chapter Meeting
Ames
September 25

National Society of Professional Engineers North Central Regional Meeting
Lincoln, Nebraska
September 25-26

Highway Drainage Design
Scheman Building, ISU, Ames
October 7-9

Good drainage design is an important aspect of highway engineering. A hydraulically efficient, cost-effective design requires the application of state-of-the-art design procedures and the analysis of various alternatives. This workshop will provide participants information on how to use microcomputers in drainage design to analyze the alternatives in a relatively short time, promote the use of improved or complex design procedures, and improve design documentation and final report preparation.

Safety Features for Local Roads and Streets
Ottumwa, Holiday Inn—October 9
Mason City, NIACC—October 23
Cedar Rapids, Kirkwood Community College—October 28

This workshop will provide those involved in local transportation with relevant information on highway safety features. It has been developed by the National Highway Institute for use at the local level. Understandable instruction and teaching aids will help personnel recognize, construct, and maintain safer roads.

Iowa Society of Solid Waste Operators Annual Meeting
Des Moines
October 15-16

American Public Works Association—Iowa Snow Conference
Scheman Building, ISU, Ames
October 22

Rural and urban operators, supervisors, and administrators can learn what's new in the area of snow control and removal during this popular conference. Sessions will offer updated information on topics such as equipment, plowing, dirt control, sanding, and chemical applications. An expanded program of exhibits and equipment displays is also planned. This annual event is cosponsored by the American Public Works Association and the Local Transportation Information Center.

Iowa State Board of Engineering Examiners Fall Exam, Principles and Practices
Ames
October 24

Iowa State Board of Engineering Examiners Fall Exam, Fundamentals
Ames and Iowa City
October 25

American Society of Civil Engineers Annual Convention
Boston, Massachusetts
October 27-31

Federal Highway Administration County Road Advisers Meeting
Council Bluffs
October 30-31

Are you a good witness?

By R. L. Carstens,
professor of civil engineering

Witnesses in tort liability proceedings not only must be knowledgeable, but they also must know how to conduct themselves when offering testimony.

Answers to the following three questions will help you determine whether you will make a good witness.

Correct answers are given on page 7 of this issue.

1. You need have little worry about your side losing a court case if the agency that you represent did things properly and followed generally accepted practices.

True False

2. Stretching the truth just a little often may strengthen your court testimony.

True False

3. Answers to an attorney's questions in a trial or deposition should be sufficiently extensive to make certain that you are correct and are not misunderstood.

True False

Know your D.O.T.

This is the third in a series of articles to better acquaint *Technology News* readers with field representatives from the Department of Transportation's Highway Division. This issue introduces field engineers from districts 5 and 6 and some highlights of their major projects.

District 5 projects

A bridge has been constructed on U.S. Highway 136 and spans the Mississippi River between Keokuk, Iowa, and Hamilton, Illinois. The letting for this work was held on July 6, 1983 with a proposed completion date of July 19, 1986. Construction work on the bridge, however, was completed in December of 1985 about eight months ahead of schedule at a contract cost of \$17,311,842.34. The contract was awarded to Shappert Engineering Company of Belvidere, Ill. and terms of the contract provided that work be restricted to that portion of the bridge west of Pier No. 6 during the period from November 15 to March 1 of each year while the bridge was under construction. This restriction was imposed so as not to cause any adverse effect on eagle nesting on the Illinois side of the river.

This plate girder bridge is 64 feet wide (providing for four lanes of

traffic) and 3,340 feet long. It was opened to traffic in December 1985.

Another bridge is scheduled for letting in late 1987, and will be built on U.S. Highway 34 at Burlington. The bridge, which has been designed by the consulting firm of Sverdrup and Parcel of St. Louis, is of the isometrical stayed-cable girder type and is only the second bridge of this type to be built in the midwest. Bridge engineer Bill Lundquist of the Iowa D.O.T. estimates there are fewer than 10 bridges of this type open to traffic in the United States at this time.

Initial work on the bridge will involve the construction of a tower, which will rise in excess of 200 feet above the deck, to carry the stayed-cable girders. The design calls for a width of 77 feet between curbs providing for five traffic lanes and a length of 2,267 feet from the Iowa bank of the river to the Illinois abutment including a 660 foot channel span.

The total cost of this structure, including both approaches, is estimated to be \$36 million. The stayed-cable spans will cost \$16 million. It is expected that about 3 years will be required to complete the project.

District 6 projects

A construction project in District 6 involves the reconstruction of the Coralville Interchange on Interstate 80 in Johnson County.

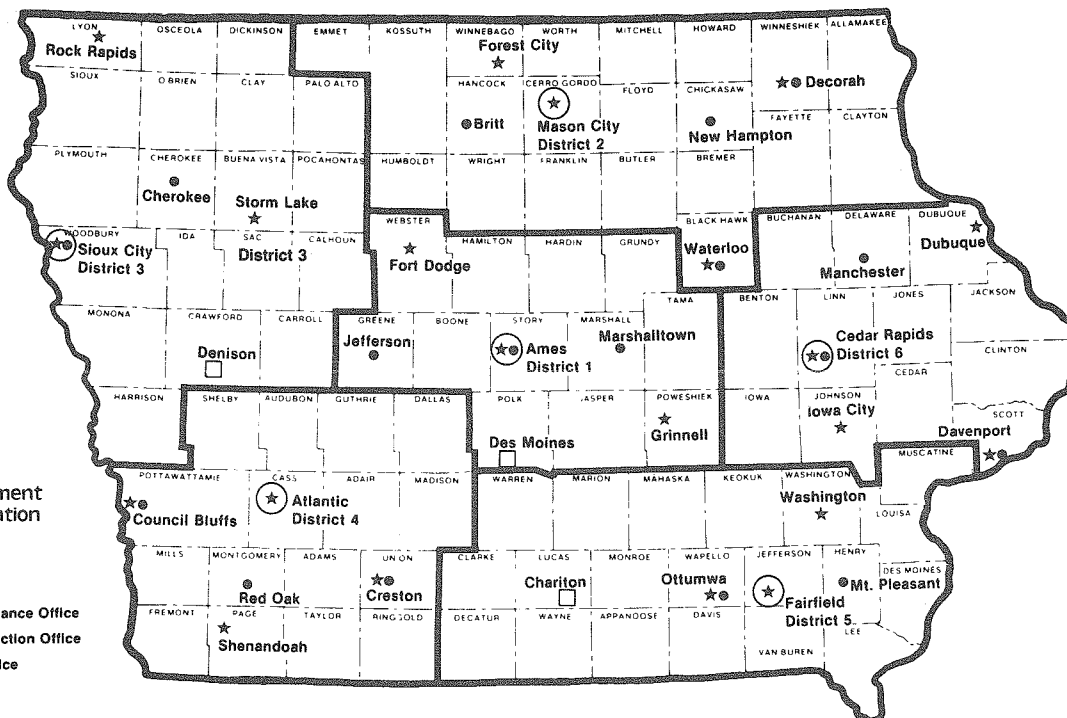
This project was let on April 1, 1986, with a proposed completion date of November 1, 1986. The project includes proposed four-lane divided work including structure over I-80 and left turn lanes. Signals are to be erected at 4 ramp terminals with Coralville Road. Some ramp modification has to be done.

The contract is approximately 75 percent completed and is well ahead of schedule. It is felt this is partially attributable to the early incentive/disincentive clause in the contract which carries a \$2,000 per day price tag. The contract cost of this project is \$1,565,189.45 and the contractor is Metro Pavers, Inc. of Iowa City.

District 5 engineers

Fairfield, 515-472-4171

Bob Percival, P.E., district engineer
 Pete Tollenaere, P.E., district maintenance engineer
 Maurice Burr, P.E., district construction engineer (currently vacant), district materials engineer



Lowell VanderHamm, P.E., local systems engineer
David Ellis, P.E., district transportation planner

Resident construction engineers

Ronald D. Chapman, P.E.
Chariton 515-774-5056

Joseph W. Demeter, P.E.
Mount Pleasant 319-385-2211

Fred Bartos
Ottumwa 515-682-4525

Resident maintenance engineers

Roger Boulet, P.E.
Fairfield 515-472-6142

Larry Jackson, P.E.
Ottumwa 515-683-3331

Ronald Chapman, P.E.
Chariton 515-774-2420

Blinn Sourwine, P.E.
Washington 319-653-3561

District 6 engineers

319-364-0235

Bob Henely, P.E., district engineer
John Saunders, P.E., district maintenance engineer
Leonard Balcom, P.E. district construction engineer

Richard Merritt, P.E. district materials engineer

James Loy, P.E., local systems engineer

Lee Benfield, P.E., district transportation planner

Resident construction engineers

William Crawford, P.E.
Manchester 319-927-2397

(currently vacant)
Cedar Rapids 319-365-6986

Bruce Kuehl, P.E.
Davenport 319-391-2750

Resident maintenance engineers

James Phinney, P.E.
Cedar Rapids 319-365-3558

Kevin Mahoney, P.E.
Davenport 319-391-4643

Ronald Terry, P.E.
Dubuque 319-588-2140

Richard Kautz, P.E.
Iowa City 319-351-8818

Update from the July issue of Technology News

District 4 engineer (add):

Glenn Miller, P.E., district materials engineer
712-243-3357

Workshop on new hazardous chemicals risks right-to-know law

Officials and business people can find out how they comply with a new comprehensive chemical law at a statewide video workshop on September 11.

The workshop, Hazardous Chemicals Risks Right-to-Know, outlines their responsibility to provide information, training, and record keeping for employees, emergency crews, and the community, on the risks of hazardous chemicals in the workplace. These responsibilities are set under the Hazardous Chemicals Risks Right-to-Know Act (Iowa Code Chapter 455D), most of which took effect May 25, 1986, under the jurisdiction of the Iowa Bureau of Labor (now the Division of Labor within the Department of Employment Services).

The 2-hour class will begin at 9 a.m. with an instructional program, followed by a live question and answer format. It will be broadcast simultaneously to numerous sites around the state using the university's satellite uplink.

Registration for the noncredit course is \$7.50, which includes an information packet and ways that a business or agencies can meet the requirements of the law. Persons may register with the ISU Office of Continuing Education, Scheman Building, Ames, Iowa 50011; phone (515) 294-6222. Advance registration is requested, but not required. Viewing site information will be available upon registration.

Answers to being a good witness questions

The three questions on page 5 of this issue suggest problems that most commonly arise among inexperienced witnesses in tort liability cases. Correct answers are as follows:

1. False—An axiom among trial attorneys is that most jurors will have made up their minds on a case after opening arguments and before any evidence is presented. Sympathy for a plaintiff who may be horribly injured often is the decisive factor. Jury members seldom are familiar with accepted standards or practices. This places an increased burden on defense witnesses to appear credible and to describe their activities that were relevant to a particular case. They also must explain how their actions were directed to providing safety for the public.

2. False—A court witness is sworn to tell the truth. Your best testimony will always be consistent with that oath. To do otherwise is immoral, makes you subject to prosecution for perjury, and provides an opening that an experienced trial lawyer can recognize and exploit to weaken your side's case.

3. False—Although an answer should be clearly understandable, almost always the most correct and understandable answer will be a simple "yes" or "no." Another answer that is often most suitable is "I don't know." Too often a witness, after giving such an answer, will compromise himself or herself by expanding into the unknown or unasked. This should never be done. Such an answer always can be made to diminish the respondent's credibility or provide the opposing attorney an opportunity to exploit any weak points in a case. The last deposition that this writer had the opportunity to read was by a highway engineer. It contained about eight times more words in answers than it should have. A witness should answer questions succinctly and should answer only the question that was asked, never volunteering information.

Information exchange

Joint Repair Methods for Portland Cement Concrete Pavements

National Cooperative Highway
Research Report Number 281,
December 1981.

Engineers faced with the maintenance and rehabilitation of Portland Cement Concrete (PCC) pavements will find this study on the repair of joint- and crack-related distress of PCC pavements of great interest. Procedures for evaluating and selecting the appropriate repair and preventive techniques are presented. Detailed design and construction guidelines and guide specifications representing the latest state-of-the-art practices were developed for seven different techniques: (1) full-depth repair of the pavement, (2) partial-depth patching, (3) subsealing pavement slabs, (4) restoration of load transfer across joints and cracks, (5) grinding of the pavement surface to provide smoothness, (6) resealing joints and cracks, and (7) improving support along the pavement slab edge. Documented field demonstrations and void detection procedures using nondestructive deflection testing to locate areas

requiring subsealing are included in separate appendixes. This report can be purchased from Transportation Research Board, Washington, D.C. for \$9.20.

Asphalt Pavement Maintenance

The Asphalt Institute has completely revised and updated this best-selling two-part slide show. The show uses artwork and photographs to depict step-by-step procedures for various maintenance techniques. The program shows the types, causes, and methods of repair for pavement defects. The show, based on the Institute's manual, *Asphalt in Pavement Maintenance*, is intended for those directly responsible for and involved in maintenance programs. It consists of 220 35mm color slides, a narration cassette with audible beeps, a narration script and instructions. The running time is 59 minutes; the price is \$195.

To obtain a copy, contact: The Asphalt Institute, Asphalt Institute Building, College Park, Maryland 20740; 301-277-4258.

Information Exchange columns will continue this audiovisual listing.

Cable to join civil engineering extension

James Cable has been named associate professor of civil engineering at Iowa State University. He will be teaching undergraduate courses in the Department of Civil Engineering, and will be responsible for some of the civil engineering extension and Technology Transfer programs. Cable is a former Iowa DOT engineer and has taught numerous Technology Transfer workshops.

And justice for all

Appointment, promotion, admission, and programs of University 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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