

roads bridges transit technology

news

Local Transportation Information Center
Iowa State University Engineering Extension Service

October 1988

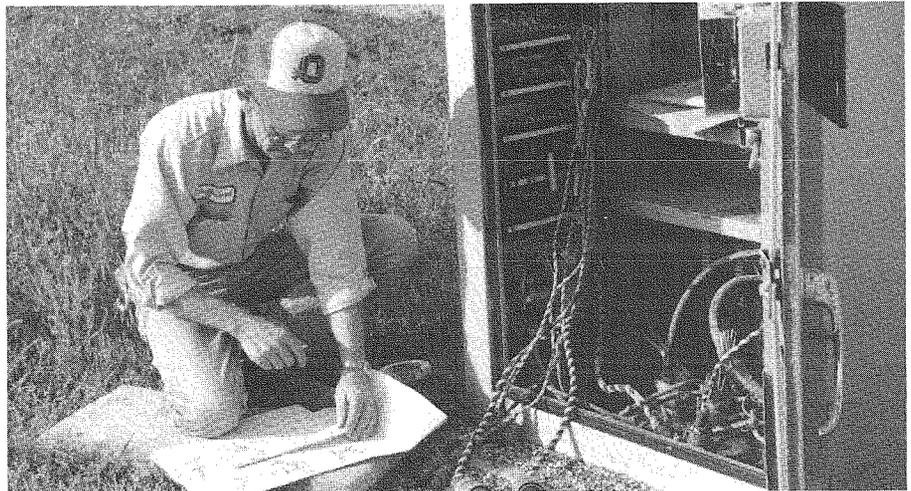
DOT/DNR program signals the future

Nineteen communities across Iowa are taking part in a \$3 million program designed to modernize traffic control systems.

By updating traffic signal systems, these towns and cities keep their traffic flowing smoothly with minimal delays. Drivers save gas, avoid unnecessary stops, produce fewer air pollutants, and experience less stress.

DOT proposed the traffic signalization program to the Iowa Department of Natural Resources in 1986 when DNR took charge of the state's Exxon oil overcharge refunds. Earmarked for Iowa energy conservation programs, the funds repay consumers illegally overcharged by Exxon between 1973 and 1981.

The traffic signal improvements funded by the program ranged from the simple to the complex. In some towns, 30-year-old, outdated, electromechanical controllers were replaced by modern, solid-state controllers. In other communities, wire detectors embedded near intersections made signals more responsive to current traffic demands. In some cities, master controllers and computers synchronized signals on main arterials.



Our new system is much more efficient. It's noticeable!" said Bob Engstrom, Director of Public Works in Algona. The city of 6,289 replaced a pre-timed signal at a busy intersection with a new signal system that responds to current traffic.

The town's old signal used a fixed timing plan. Such pretimed control assigns the right-of-way at an intersection according to a predetermined schedule. When traffic patterns change, the signal is unable to respond.

To respond to current traffic, detectors must be placed in the pavement at approaches to the intersection. The detector senses oncoming vehicles

and triggers the controller to activate the signal switch to green.

Such a traffic-responsive system can be either semi-actuated or full-actuated. In a semi-actuated signal system, detectors are embedded only on the side streets. This type of system works well when the arterial traffic is heavier than the side street traffic.

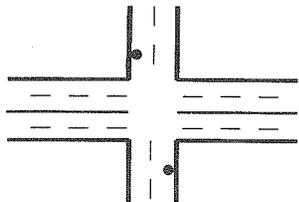
In a full-actuated system, detectors are embedded in both the arterial and side street intersections. This cuts down the delay in all directions because it responds quickly to traffic as it occurs.

Like Algona, the communities of Bettendorf, Monticello, and Des Moines are also participating in the program. **Continued on page 2**

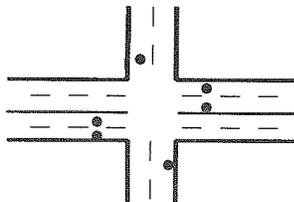
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In a semi-actuated signal system, detectors are embedded only on the side streets.



In a full-actuated system, detectors are embedded in both the arterial and side street intersections.



Moines installed traffic-responsive systems to update pretimed, isolated signals not connected or synchronized with other signals.

Des Moines converted signals at 28 isolated intersections. Some were upgraded from pretimed to full-actuated, others from semi-actuated to full-actuated.

"There's no doubt in my mind this will benefit our community," said James Thompson, Des Moines Traffic and Transportation Director.

"Motorists are saving five or ten seconds at each intersection. They may or may not even notice the difference. But all in all, that adds up to a big difference," said Mike Ring, Des Moines Senior Traffic Engineer. "Whenever cars are moving along more quickly, there's a fuel savings, a savings on wear and tear, less idling, fewer exhaust fumes, and reduced driver tensions."

Thompson believes these electronic signal systems will also lower the risk of traffic accidents. "While we can't really measure how many accidents did not happen because of these

systems, I believe fewer accidents will be a benefit," he said.

Although the systems are expensive to install, maintenance costs are about the same as with electromechanical systems, Thompson said. "There are fewer breakdowns, but when a breakdown happens, it costs a lot more to repair," he added.

For communities considering the pros and cons of modernized traffic signals, maintenance could be the main deterrent. Algona proposed their new system after making contact with a traffic signal company in the area. In 1976, Algona installed a modernized traffic signal, but later converted back. High tech parts were hard to come by and long-distance maintenance was costly.

"When you have such advanced equipment in a town this size, you'd better be able to get good service from a private contractor because you can't afford to hire your own traffic signal technician," Algona's Engstrom said. "For major problems, all we do is make a phone call and ninety percent of the time we get service within three hours."

The technology and the services are available to all Iowa communities today. It is now feasible for many cities to modernize their systems because the state has good private contractors and equipment vendors.

"Many small towns in Iowa should consider following in the footsteps of these 19 communities. But traffic signal modernization isn't for everybody," said Tom Maze. Maze heads ISU Business and Engineering Extension's traffic signal technology transfer and awareness program.

Through workshops and training materials, the ISU program will help communities assess the feasibility of signal improvements, select the appropriate system, and develop a maintenance policy.

"A maintenance plan is critical to the long-term effectiveness of any traffic signal system. Otherwise, even the most sophisticated equipment becomes outdated and inefficient," Maze said.

"ISU Extension will be training technicians to handle routine maintenance and emergencies requiring immediate action. Having good maintenance records and routine preventive maintenance programs are particularly important to protect yourself and your jurisdiction from legal liability," Maze said.

The training workshops and other informational programs will begin in December. For more information, contact Jan Graham, (515) 294-8082.

Technology News is published by the Local Transportation Information Center, Iowa State University, ISU Extension--Business and Engineering, EES Building, Haber Road, Ames, Iowa 50011

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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.



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Federal Highway
Administration



**IOWA STATE
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EXTENSION**

Slick surfaces lead to negligence claims

by R.L. Carstens, Professor Emeritus of Civil Engineering

When a serious motor vehicle accident occurs, a claim of negligence and a lawsuit against a public entity almost inevitably follows. This has been especially true in recent years when the road was covered with ice, snow, or frost. Although most of the claims within the writer's experience have been against a state, there have been several against cities and counties.

The specific allegations vary, but it often is alleged that the highway agency should have rendered a surface non-skid by plowing to the bare pavement or by appropriate application of chemicals and/or abrasives. If an effort was made to do this, it will then be alleged that the effort was done negligently and was ineffectual. If there was a blockage by drifting snow, it will be alleged that it should have been removed more expeditiously or prevented by effective use of snow fences.

For example, the accompanying photograph was taken following a fatal accident at a location subject to drifting. The area had been plowed several times and abrasives had been applied the day of the accident. Three rows of temporary four-foot snow fences were used upwind of the location. An expert witness testified that use of a high permanent snow fence probably would have prevented the accident.

A case against a small city arose when a child on his way from school darted out in front of a city truck and was

killed. The truck had plowed the street and, without its blade, was traveling from intersection to intersection to apply abrasives. The plaintiffs in this case have alleged that the city was negligent for operating such large equipment (a six-ton dump truck) in the vicinity of a school when children would be expected to be present.

A fatal accident in a larger city occurred early one morning as a result of a spot freezing following the snow melt of the previous day. The plaintiff's expert in this case maintained that the city should have applied enough chemicals to assure a bare pavement.

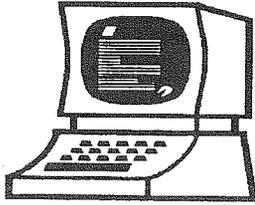
What can be done to afford protection for the public entity in such cases? Perhaps the best defense is to have a snow removal policy that is carefully prepared and scrupulously followed. The Iowa DOT has a policy to restore a bridge deck to reasonably near normal surface conditions within an hour after first notice of frost.

Consequently the litigation for accidents of this type tends to focus on arguments as to whether this policy was followed. By contrast, most counties in Iowa have policies that specifically exclude treatment due to the formation of frost. This at least causes plaintiffs to seek other approaches to prove negligence if an accident occurred on a frost-covered surface.

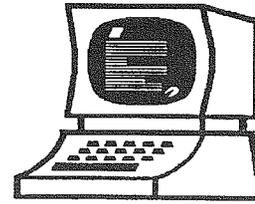
If your jurisdiction does not have a written policy covering ice and snow removal, you are urged to consult with your legal counsel. Your attorney may agree with me that a reasonable policy is better than none.

Update! We mentioned a case in the June, 1988, issue of *Technology News* that had been tried and was awaiting a decision from the court. The case involved a lady who had allegedly tripped at a pavement spall when entering her car. The judge in this case found that the city was not negligent.





micro technology



In the last article, I wrote about how to get started with a microcomputer system. Clearly, buying a system to be dedicated or semi-dedicated to a single activity is a much more complicated task than buying a general purpose system. Examples of common dedicated and semi-dedicated computing systems include hardware and software purchased to do accounting functions, equipment management, pavement management, computer aided design, automated fuel, etc.

The development of a dedicated or semi-dedicated system should always go through five basic steps:

1. Conceptualizing:

This involves defining the system objectives. This is where high level brainstorming takes place.

2. Planning:

This determines exactly what work the system will be used for. Planning should result in a system performance specification.

3. Designing:

Here, the decision concerning the actual system is made. The design should include the determination of the hardware and software required to meet the performance specifications. Issues considered during the design stage include the system organization, agency procedures, and staff training requirements.

4. Implementation:

During this stage the new system is installed. Agency staff learn to use it and the "bugs" are worked out of the system. Remember, it is always important to have more than one member of your staff familiar with system. During a workshop I taught recently, one student related a very sad experience. The only person that understood a computer system died unexpectedly. No one else understood the system and because there was no documentation, the agency had to start the system implementation over again virtually from scratch.

5. Maintenance:

This stage covers the life of the system after implementation. It is important to have good technical assistance during the system maintenance stage. No matter how carefully a system is developed, glitches always appear later, during operation.

Careful conceptualizing and planning are crucial. During the later stages, it may be quite expensive to revise the system. A study was done of the development of information systems for large industries and it found that the cost of correcting a mistake increases exponentially the later in the development stages that the mistake is caught. For example, a mistake that is caught during planning may cost \$100 to fix, but if the same mistake is caught during maintenance it is likely to cost between \$1,500 and \$2,000 to fix.

In the workshop that I teach to equipment managers, I always ask the students with equipment management information systems if they are satisfied with their current systems. Usually only a few are truly satisfied. The ones who are happiest are usually those who were the most involved in the development of the system and who took the time to understand what computer systems are all about.

Tom Maze, program manager, Local Transportation Information Center

New spec guide for asphalt recycling!

The Asphalt Recycling and Reclaiming Association (ARRA) announces the availability of its new "Guide Specifications for Hot In-Place Recycling". This publication addresses both the single pass and multiple pass methods, and includes prebid considerations, project management details, guidelines for asphalt rejuvenating agents, and more.

Copies may be ordered from: Asphalt Recycling and Reclaiming Association, #3 Church Circle, Suite 250, Annapolis, Maryland 21401. The phone number is (301) 267-0023.

The cost is \$3.00 per copy in quantities of 1-25, \$2.50 in quantities of 26-100, \$2.00 in quantities of 101-500, and \$1.00 in quantities over 500.

And justice for all

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

Signs of the past

In the early stages of highway development, the traveler was frequently at a loss for directions. By 1900, an extensive system of more than 100,000 miles of roads, was open to travel in Iowa. (Today, the state has 122,000 miles.) The local, state, and federal governments were not involved in route markings until the 1920s. Thus, private groups provided the signing. Pity the poor motorist of 75 years ago who depended on detailed motor guides with odometer readings to indicate key locations or who had to decipher the conflicting messages from the competitive signs of sponsors.

These private markings eventually were given "official" recognition through registration at the State Highway Commission. In 1922, when the Commission set up route numbers, 57 privately named routes still existed. The Great White Way from Davenport



to Omaha was the first registered in 1913. It was followed by the Red Ball Express, the King's Highway, and the Marshalltown-Colfax Short Line. These were termed Painted Pole Routes by the state. Probably the most famous was the Lincoln Highway.

The Lincoln Highway signing started with painted red, white, and blue

bands on poles, rocks, and posts. Later, 9-inch by 21-inch porcelain signs were made to fit telephone poles. These were followed by concrete posts with colored concrete turn arrows and a bronze medallion of Abraham Lincoln. Three thousand medallions were delivered across the U.S. On one day in 1928, Boy Scouts placed one per mile along the highway.

Removing lead paint from bridges: an update

In the area of steel bridge maintenance, removal and disposal of paints containing lead are critical factors in determining cost and maintenance strategies. Lead pigmented paints were, until recently, the most common coating used to help prevent steel highway-bridge corrosion. Older lead paints included compounds such as lead sulfate or lead acetate; while newer formulations contain "red lead" or lead silico-chromate.

Restrictions on consumer use of lead paints began in the 1960s. However, there were no restrictions on lead paint for highway structures and pavement markings until the 1978 blasting and coating of an approach to Boston's Tobin-Mystic Bridge. An assessment of environmental damage led to the requirement that all abrasive blasting and painting be done in a containing enclosure and that particles be removed from the air before exhausting. Such restrictions greatly increased costs.

Open-abrasive blasting is the cheapest and most common way to remove old paint and prepare the surface for a new coat. Unfortunately, workers may be at risk. One health problem often associated with abrasive blasting is silicosis, a condition caused by inhaling the silica in sand particles and retaining it in the lungs. Because of personal liability litigations due to silicosis, many state and local governments are taking steps to gain control over abrasive blasting. They are developing new regulations and enforcing the older ones more strictly.

With increased public interest in the removal of lead-containing paints from bridges, a National Cooperative Highway Research Program project studied the problems of removing lead-containing paints. It found that for most bridges the removal of lead paint was not a serious hazard, but that it should be monitored closely in some urban areas.

In Iowa, debris from the removal of lead paints has been determined non-hazardous, but the removal of lead paints is still regulated. Iowa DOT's Special Provisions for Repainting Bridges require ground and roadway coverage under the work area, waterway coverage, and the use of straw dams or floating boom devices to collect the scum that forms on the water. In urban and other sensitive areas, special containment and special abrasives may be required. Paint debris and other waste materials must be disposed of at a legal disposal site.

Because of potential for liability problems, the Iowa DOT no longer uses lead-containing paints and is working to repaint all of its bridges with a zinc formulation. For more information, contact the Iowa DOT, Office of Materials, 800 Lincoln Way, Ames, IA 50010; (515) 239-1600.

tips from - the field -

Non-tipping welding carts

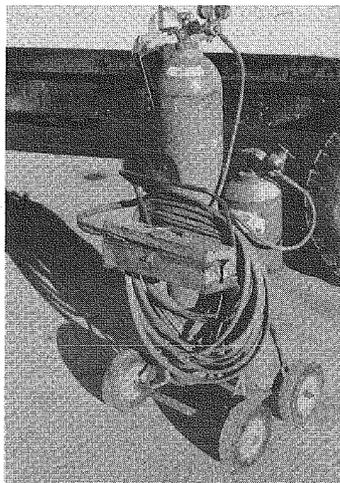
Welding carts are often in danger of tipping over due to poor design. Several cities have come up with new designs for more stable carts that are easy to use and move throughout the shop.

The Public Works Department in Urbandale has designed a non-tipping four-wheel cart for two tanks, which are placed on a platform with a small attached tool box suitable for welding rods. Another model from the City of Windsor Heights Public Works Department features a tilted design with a third "training wheel" in back. The tanks are held by a bracket. The Ames Water Department has a third design, an all-terrain welding cart with a heavy-duty frame, larger tires and a rack for tubing and tools. The tanks are also held by a bracket and the cart is especially useful in shopyards or on the job.

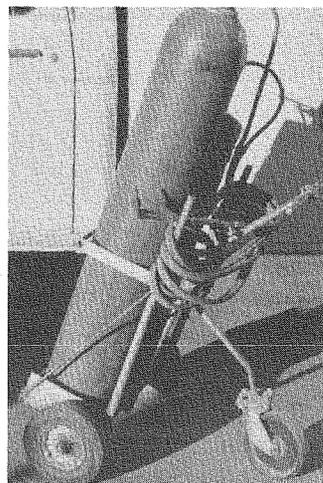
A related tank-holder from the City of Ankeny is designed to hold welding tanks, fire extinguishers and other cylinders in brackets of PVC water/sewer pipe that have been split and mounted to a back frame.

All four designs are adaptations made by shop personnel for the safer use of welding carts.

For more information on specifications, contact John Moody, ISU Extension/Local Transportation Information Center, EES Building, Haber Road, Ames, Iowa 50011-3074; phone (515) 294-8817.



Non-tipping, four wheel welding cart from the Public Works Department in Urbandale.



Windsor Heights Public Works Department's non-tipping welding cart with training wheel.



All-terrain welding cart with large tires and heavy-duty frame used by the Ames Water Department.



Multi-purpose tank holder with sewer-pipe brackets; for welding tanks, fire extinguishers and other cylinders - from the City of Ankeny.



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

Using Precoated Aggregates to Extend Bituminous Seal Coat Projects #209

Does using precoated aggregates with your seal coat improve results? Does it save money? The Ames Department of Public Works project is discussed in this report which lists methods, problems and ways to overcome them, and the results in terms of both road performance and community satisfaction. Tables and charts are included as well as photographs of the project at different stages. (Free)

Great Grader Operators (a poster!) #257

This attractive blue and yellow poster details tips and techniques that operators need to know. Offers suggestions on blading trouble spots, reshaping aggregate surfaces and shoulders, smoothing road surfaces, and surface material components. A great addition to any maintenance area or field office! (Free)

When to Pave a Gravel Road #255

Should you continue to maintain that worn out gravel road as it is, or it is time for a change? This excellent fact sheet from the Vermont Local Roads Program covers the trade-offs between gravel and paved roads and solutions to problems in existing gravel roads. It includes a detailed ten step discussion to help you decide which type of road is best for your community. A brief look at stage construction is also included. There are several tables and many useful references are listed. (Free)

A Positive Approach to Defending Municipalities #244

The author of this manual argues for an aggressive posture in defending municipalities against law suits. He offers extracts of Illinois law and court verdicts concerning about 100 different areas of litigation. These include such topics as barricades, potholes, shoulders, signs, weather related conditions, and traffic control devices. According to the introduction, the author writes columns for the Chicago Daily Law Bulletin, and other publications. (Free)

The following publications are available on a loan only basis. To reserve your copy, use the order form below.

Drainage of Highway Pavements - Circular #12 FHWA-73-84-202 #10

An in-depth publication from the Federal Highway Administration, this includes such topics as storm runoff and gutter flow, and has a detailed sequence of chapters on the location and capacity of pavement drainage inlets. There are copious charts and tables and several references.

State and Local Highway Training and Technology Resources #260

Indispensible! This is a directory (current to 1987) of all the printed and audio-visual materials, programs, workshops, training sessions and the like available from the nation's technology transfer (T²) centers. It includes descriptions, costs and sources and is well indexed and easy to use.

Publication order form

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

	Title	Index #	# of Copies
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Phone (____) _____	_____	_____	_____

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

conference 1 2 3 calendar 4 5 6

Portland Cement Concrete and Asphaltic Concrete Pavement Maintenance Workshop

Nov. 2
Waterloo, Hawkeye Tech

Nov. 9
Davenport, Holiday Inn 1.5 miles So. of I-80 on U.S. 61

This workshop is designed for street maintenance crew supervisors and crew members. It defines cost effective methods for maintaining, restoring, and rehabilitating PCC and AC pavements. Contact Connie Middleton (515) 294-6229.

ASCE Transportation Conference

Nov. 9
Scheman Bldg., ISU

This annual conference will address the design, construction, operation, and maintenance of transportation systems. Contact Connie Middleton, (515) 294-6229.

ISU Conference on Engineering Ethics

Nov. 17-18
Scheman Bldg., ISU

Topics include engineering negligence, whistle-blowing, suppression or falsification of data, and misrepresentation in advertising.

Contact Connie Middleton, (515) 294-6229.

ASCE Structural Design Conference

Nov. 29
Scheman Bldg., ISU

The 17th annual meeting of this conference will consider welding, prestressed precast concrete connections, bridge strength evaluation, and loss prevention procedures. Case studies will be examined. Contact Connie Middleton, (515) 294-6229.

Railroad/Highway Grade Crossing Improvement Program Workshop

Dec. 6-7
Iowa DOT

The course is designed to provide highway agencies with practical information on the programmatic improvement of railroad crossings. Contact Ray Callahan (515) 239-1678.

The 42nd Annual Iowa County Engineers Conference

Dec. 6-8
Scheman Bldg., ISU

This conference offers continuing education courses planned especially for county engineers and technicians, presentations by the association, and

special technical sessions. There will also be more than 30 exhibits from manufacturers and suppliers. Contact Connie Middleton (515) 294-6229.

Iowa DOT Specifications Update Conference

Dec. 15
Scheman Bldg., ISU

An opportunity for contractors and consultants to learn about recent changes in Iowa DOT specifications. Cosponsored by the Iowa Department of Transportation. Contact Connie Middleton (515) 294-6229.

Arterial Analysis Package Workshop

Dec. 13-15
Scheman Bldg., ISU

The Arterial Analysis Package is a set of computer programs used to design energy efficient traffic signal phasing and timing. The course features hands-on use of microcomputers for the development of signal timing plans. For more information contact Connie Middleton (515) 294-6229.

21st Annual Iowa DOT Conference

January 19-20
Scheman Bldg., ISU

Contact Jim Cable (515) 294-2862

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