

September 1992

## Pavement, sewer management systems work well together

By Kim Shelquist  
Editorial Assistant

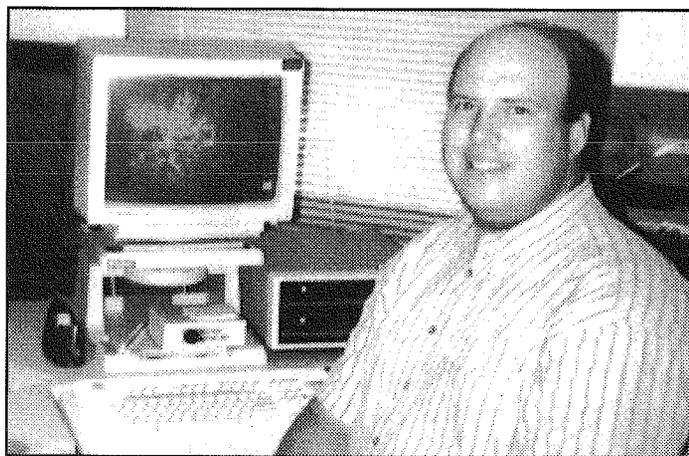
Dwindling funds and an increasing need for maintenance are forcing many local governments to find new ways to stretch their resources. One approach many agencies are taking is using pavement management systems to allocate resources more efficiently.

Omar Smadi, a research associate at the Iowa Transportation Center, defines a pavement management system (PMS) as an integrated set of systematic procedures designed to help and assist highway engineers and managers in making consistent, cost effective, and reasonable decisions regarding pavement planning, design, construction, maintenance, and rehabilitation.

Local agencies adopt a PMS for many reasons, most

commonly to provide a basis for allocating and distributing funds. Equally important is the ability to make consistent decisions regarding pavement maintenance and rehabilitation and

planning future maintenance strategies. A PMS also provides a starting point for other maintenance programs, such as signs, bridges, and sewer systems.



Clark Hopp, an engineering technician for the City of Council Bluffs, poses in front of a computer screen showing a map of the city's street.

An example of how these management systems can be used together can be found in Council Bluffs, Iowa. When a new one cent sales tax provided the city with \$4.6 million for repairing its sanitation system, the city implemented a PMS in late 1991 in an effort to combine needed road maintenance with sewer repair.

By using two separate systems designed by a Missouri firm, city engineers are able to evaluate which sewers and which pavements are most in need of repair. The results are compared and

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# Written safety policies necessary

By Ed Bigelow  
Safety Circuit Rider

A written safety policy should be the foundation of any county or city safety program. It's particularly necessary in street and road departments, which must consider the safety of its employees as well as the motoring public.

Safety policies should specify procedures and training needed to establish a safe working environment. It should include a person or people responsible for seeing that all safety requirements are met; either within the entire agency or within an individual department. It should include a statement that all regulations, like those listed by OSHA or the Code of Iowa, will be followed. This policy should be enacted by the governing body (city council or county board of supervisors) to cover all departments within a city or county. Each department would then have written work rules to meet the needs of their specific department.

If a written safety policy is not written to cover an entire agency, then approval should be sought for a safety policy covering just the street or road department. That policy should be the starting point for all training, safety committee activities, and work

rules within the department. Street and road agencies should be particularly concerned about safety as work in those departments has a high risk of accidents.

Any safety program developed for street and road departments needs to include traffic safety – for employees and motorists. Three items to emphasize are:

- **Work Zone Traffic Control**  
Training of road employees is essential. Every street or road department employee needs to know how to set up proper and safe traffic control for maintenance and construction and how to flag traffic. The plan should provide for annual training in traffic safety in work zones for every road employee.
- **Traffic Signs, Inspection, Analysis, and Replacement**  
The plan should provide for annual daytime and nighttime traffic sign inspections. These inspections are needed to make sure the signs comply with the Manual on Uniform Traffic Control Devices and to check for worn and damaged signs that need replacement.

- **Traffic Accident Records and Analysis**  
The plan should provide for timely inspection of the roadways where a traffic accident has occurred; and for prompt action to repair any damages to the roadway or traffic control devices. The plan should provide for an annual review of the candidate list of traffic accidents for the local jurisdiction; with an analysis, and action to be taken for locations which are found to be high accident locations.

Some may feel that a written safety policy is a document that might be used against an agency during possible litigation. Actually, if strictly followed, a written policy may act as a defense in a liability suit. A safety policy is an agency's plan on how it will perform its duties. Policy developments are legally viewed as a discretionary act. In other words, so long as the safety policy is reasonable, is developed by qualified individuals, and – most importantly – is strictly followed, the procedures used to meet safety duties are decided at the agency's discretion. If these qualifications are met, the agency may be protected through the doctrine of discretionary immunity. Having no policy leaves the agency with

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**Iowa Transportation Center**

# County engineer study progresses

**By Kathleen M. Waggoner**  
**Interdisciplinary Research**  
**Associate**

Many county engineers note with pride that there are few professions that offer the challenge that the office of county engineer does. Yet many counties, particularly those in rural areas, face current and projected difficulties in their efforts to attract people into positions being vacated by the growing ranks of retirees.

A year ago, researchers at Iowa State University began a two-year study to examine the responsibilities and challenges facing those in charge of secondary road systems. The research project involves an effort to understand the value of the contributions county engineers make in maintaining these systems. In order to attract qualified persons into this facet of county government, it will be important to know the scope and magnitude of skills demanded by the office.

The county engineer position currently demands far more than technical or engineering skills. In an era of declining resources, it is likely that county engineers will continue to be faced with less flexible budgets, increasingly complex public and political pressures, tort liability concerns, environmental regulations, and personnel issues ranging from gender equity and diversity to drug and alcohol use in the work place. The county engineer position requires both technical skills as well as organizational and administrative skills.

Also involved is the ever-increasing demand for expertise in handling and prioritizing equipments needs as well as human and technical resources.

These demands require organizational and administrative skills. As their "engineering" and "non-engineering" responsibilities become more interwoven, it is likely that county engineers will become more involved in making long range and sometimes controversial recommendations to their governing boards.

The study began by conducting in-depth interviews with county engineers in the eight participating states – Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska,

In the responses, a common thread involved a sense of pride in accomplishments and an eagerness to meet challenges head on. Many respondents pointed to difficulties presented by increasing numbers of state and federal regulations – particularly environmental regulations – and "Just too many lawyers," making tort liability a problem. They also say if they had it to do over again, they would make the same career choices. More than half indicate political pressures are sometimes discouraging, yet nearly all ranked their relationships with

**Job titles and responsibilities reported by respondents are as varied as the requirements qualifying people for the job. One respondent noted his title is "Weed Control Officer."**

Ohio, and Washington State. Nearly 70 county engineers participated in open-ended interviews. These interviews were critical because they provided insights into the issues that were most important to the profession. From these interviews, a draft questionnaire was developed and mailed to 40 county engineers who agreed to serve as "expert advisory group members." With in-depth feedback from 30 of these individuals, a final questionnaire was generated and mailed to a random sample of 400 county engineers in the eight participating states. Two-hundred and forty responses have been received.

their boards as good to excellent. Other areas commented on included:

- Job titles and responsibilities reported by respondents are as varied as the job requirements qualifying people for the job, ranging from one respondent who noted his title is "Weed Control Officer" to the "P.E., L.S." requirements for county engineers in Ohio. In Ohio, county engineers are elected to four-year terms and are required to be both registered professional engineers and registered land surveyors.

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# Sewer, pavement systems continued from page one

repair priority is assigned to sewers which are located underneath streets also in need of repair.

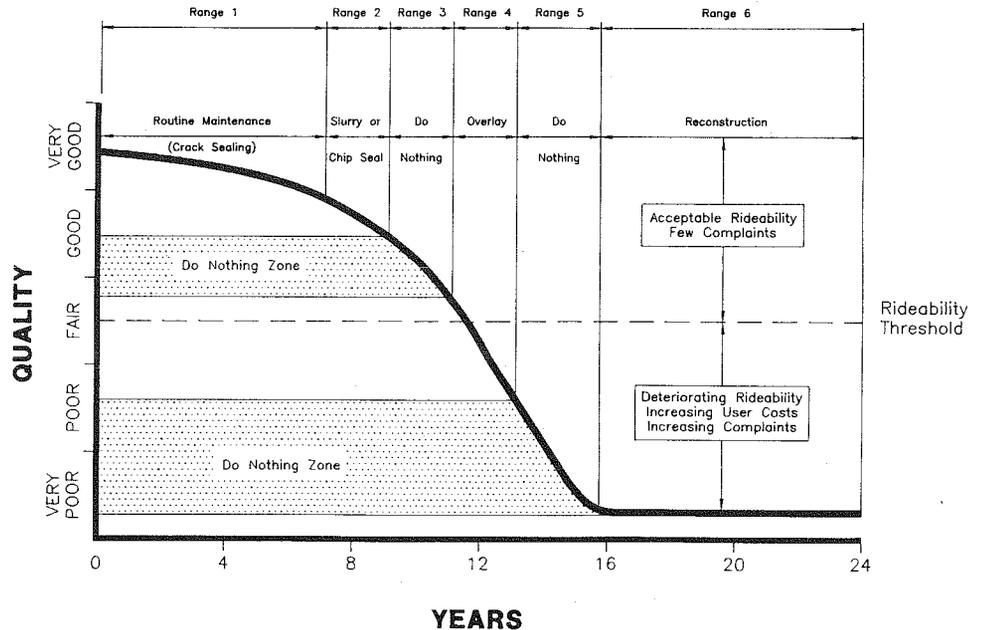
Council Bluffs City Engineer Greg Reeder says before implementing the system the city relied on visual inspections and public comments to determine its maintenance priority. He feels that the system is effective and provides the city an efficient and objective method to determine repair priorities, despite a few problems.

Reeder says one of those problems is the system's inability to use budget limitations in determining job priority. The computer may list 20 priority jobs while the budget allows for only 10. The task of choosing which 10 then falls to city officials, who must apply other criteria to determine the list.

In spite of these minor problems, Reeder and Council Bluffs' Director of Public Works, Mike Wallner, see real possibilities for the system and feel that the program will result in better roads. Wallner says the pavement management system provides objective and quantifiable information about the roads that aid in establishing repair priority. He can also use the information to explain to either the city council or private citizens why the streets selected for repair were chosen over other streets.

The information in Figure One shows that the expense of routine maintenance through the life a pavement segment, is less costly than ignoring the pavement until it is to be reconstructed. A street regularly maintained costs less and generates fewer public complaints than if the road is allowed to deteriorate and then reconstructed. To put it simply,

**Pavement Life Cycle**



**Figure One**

minor damage can be repaired relatively inexpensively. Repair work for major deterioration can swallow a large amount of budget resources. Pavement management systems can also be used to:

- Identify needs to plan future activities and expense budgets
- Support requests to policy boards for additional maintenance dollars
- Support decisions as to project priorities
- Provide a basis for allocating funds among different wards or districts

- Help select the best rehabilitation measure or strategy for different pavement sections

Many different pavement management systems are available. Managers and engineers should select one that is best suited to their individual needs. A PMS may simply evaluate road conditions based on specified criteria or it might be used to link road conditions to other management systems, such as sewer management systems, in order to make the most effective use of scarce funds.

The first step in implementing a PMS is to develop a system of maps of

various pavement sections categorized by pavement type, thickness, base type, subbase, and subgrade. Next, a qualified inspector should perform a thorough condition survey, noting all problems and conditions. Causes of deterioration should be examined and a decision should be made on what, if any, action should be taken. The last step is developing an economic analysis and to make priorities for the maintenance or rehabilitation.

Although personal computers aren't strictly necessary for a PMS, they make running a PMS much easier. Software systems can be created or adapted to meet the needs of most users. Many of these systems are

based on available database software packages and are used to evaluate information entered into the computer by a data entry specialist.

While these computer systems make the evaluation process more efficient, they don't eliminate the need for human expertise. In order for the system to work, the pavement must be inspected and information entered on a data chart. The information is then entered into the computer, which organizes it according to the specific needs of the agency. Lastly the information must be evaluated by expert personnel in order to determine the final priority of maintenance.

State and local governments all across the country are experiencing higher repair costs and tightened budgets. It is important to make the best possible use of funds. It is equally important to be able to look into the future when planning maintenance budgets. A good PMS can help with these decisions as well as with many others.

The Iowa Transportation Center offers a course on the use of the Iowa State Pavement Management System. The course is offered next in October. For more information contact The Iowa Transportation Center (515/294-8103) or Jim Cable (515/294-2862).

## Safety policies

continued from page two

little protection in a negligence suit. However, the agency does have the discretion to plan how it intends to meet its duties.

An employer has a legal duty to its employees to provide a safe working environment. Similarly, a public agency has a legal duty to provide streets and roads that are reasonably safe for prudent travelers and to eliminate hazardous conditions. The public agency has no choice as to whether it will perform these duties or not. Not fulfilling them can lead to legal liability in the event of an accident.

A good safety program requires a lot of planning. But a good safety program is worth the investment of effort. A good safety program for street and road departments not only protects employees from injuries, it makes for safer travel and reduces the chances of litigation.

## County engineer project

continued from page three

- Work weeks frequently reach or exceed 60 hours, including evenings and some weekends. Nonetheless, job diversity, the opportunity to make a contribution to public service, and personal satisfaction, far outweigh problem areas. Even in rural counties where projected shortages are expected to be the most severe, the quality of rural life generally offsets compensation and other issues by a wide margin.
- There were many comments on salary, many made by those between 56 and 65 plus years of age. This age group indicated more satisfaction with the levels of their salaries than did some of their younger colleagues. Nonetheless, they indicated that ad-

equated compensation is a consideration in attracting new people into the profession. This could mean that if the profession expects to attract younger people, salary may become an issue that needs to be more carefully addressed.

The project's second phase will focus on identifying strategies that can be used by state associations and by NACE to encourage individuals to select county engineering as a profession. The goal is to develop a pilot program to attract people to fill the void that will be left by retirees.

If you are interested in receiving a summary report on the results of the first phase of the research, please contact Kathleen Waggoner at the Iowa Transportation Center at 515/294-8103.

## Tips From The Field

# Paddle sign follows work zone

Several local agencies in Iowa have modified versions of this stop/slow paddle and stand for use in work zones. This version comes from Harley Meader, the maintenance supervisor at the Manchester IDOT Shop.

This style of stand for the stop/slow paddle offers several advantages. First, by putting the stand on wheels it's easier for the flagger to keep moving as work progresses. Second, using PVC and black pipe protects the wooden sign pole from breaking as easily in the wind.

The wood pole of the stop/slow paddle slides inside a 62-inch long section of 1 1/4" black pipe. The black pipe is welded to the cart frame made of 1/8 x 1 x 1 angle iron. Braces are made from 3/8-inch bars. Wheels on this particular stand are 10 inches in diameter and two inches thick. See Photo Two.

The upper end of the sign pole is encased by two sections of Schedule 40 PVC pipe. One section is 10-inches long and is 1 1/2 inches in diameter. That fits inside the second piece, a 17-inch long piece of PVC pipe that is two inches in diameter. (See Photo One.) The wood pole fits inside of the 1 1/2-inch PVC pipe and the entire assembly is bolted to the stop and slow sign.

A pin placed 55 inches from the ground on the black pipe ensures that the sign is the proper height when the sign and pole are inserted. The bottom of the sign has to be at least six feet high.

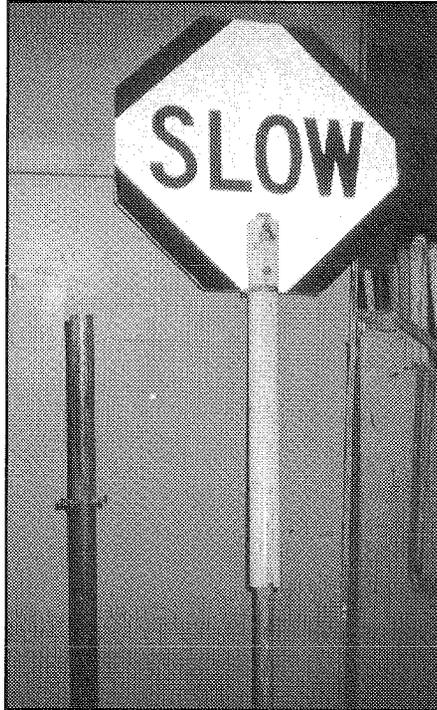


Photo One

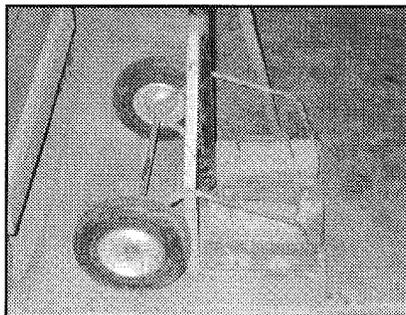


Photo Two

To keep the wind from blowing the sign over, a pair of 50-pound lead weights poured from melted head wheel weights are placed on the stand's frame. These weights measure 11 inches long by 5 1/2 wide and 2 1/2 inches high and each weigh 50 pounds for a total of 100

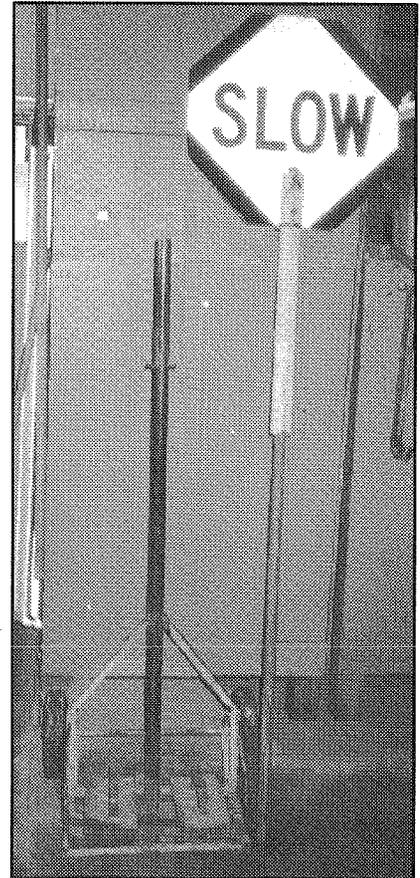


Photo Three

Photos one and two show details of the stop/slow paddle is made. Photo Three shows the sign ready to be assembled and used.

pounds. A handle is encased in each weight to make it easier to move them on and off the cart.

For more information call Harley Meader, Maintenance Supervisor, at 319/927-2397 or write to him at Manchester IDOT Shop, Box G, Manchester, Iowa 52057.

## For More Information

The videotapes and publications listed in this column are available on a loan basis by contacting Stan Ring, Iowa State University, Iowa Transportation Center, 194 Town Engineering, Ames, Iowa 50011 or by calling 515/294-9481 Monday, Wednesday, and Friday mornings.

**SI Metric-English Converter** The U.S. Department of Transportation and the Federal Highway Administration have given the Iowa Transportation Center several English-metric slide rule converters to distribute. The rule allows English measures to be quickly converted into their metric equivalents. **Request SI Metric-English Converter.**

**The Thin Orange Line** shows the major items on inspector checks to ensure compliance with the traffic control plan, state or local requirements, and the MUTCD. It emphasizes the need for proper placement and maintenance of the traffic control devices in a work zone. **Running time: 32:00 minutes Request #210V**

**To Warn, Guide and Protect** takes the viewer through a step-by-step discussion with demonstration of the

proper approach to warning and guiding the motorist through a work zone with emphasis on protecting the worker. **Running time: 22:00; Request #270V**

**SHRP – New Work Zone Safety Devices** is a report on the SHRP study for innovative work zone safety devices. A national contest brought forth numerous devices – some practical and some not. The results are demonstrated on the videotape. **Running time: 17:00; Request #279V**

**Work Zone Safety for Rural Agencies** illustrates what could happen when improper or misunderstood signing is used. There is a summary of the proper approach to adequate and safe signing in work zones. **Running time: 42:00; Request #242V**

**A number of copies are still available for free distribution for the following publications:**

- #10 "Drainage of Highway Pavements" FHWA Hydraulic Circular #12
- # 31 "Hydrology" FHWA hydraulic engineering circular #19

- #202 "Culvert Inspection Manual" FHWA Report FHWA-IP-86-2
- # 51 "The Engineer's Pothole Repair Guide" U.S. Army Corps of Engineers
- # 83 "Standards for Work Zone Traffic Control" Part VI of the Manual on Uniform Traffic Control Devices
- # 85 "Flaggers' Handbook" Iowa DOT

**A Compilation of Iowa Hourly Rental Rates and Specifications for Public Works Equipment** provides the Iowa average hourly rental rates with specifications for the equipment. This report was prepared by the Iowa Chapter of the APWA. A limited number of copies are available. **Request #826**

**Wind Tunnel Analysis of the Effects of Plantings at Highway Grade Separation Structures** is a research project report. It provides an in-depth review of the snow drifting phenomena and the state of the art in snow drift control. It reports on types of plantings and their configuration to reduce snow drifting at overhead bridges on highways. A loan copy is available. **Request #825**

### Publication order form

To obtain the materials listed from the ITC, return this form to the Iowa Transportation Center, Iowa State University, 194 Town Engineering, Ames, IA, 50011-3233.

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

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## Conference Calendar

**ASCE-Iowa Sectional Annual Meeting September 11-12, Iowa Memorial Union, Iowa City** Some of the topics at this year's meeting include "Americans with Disabilities Act - Administration of the Act as Related to Transportation Funding," "National Advanced Driving Simulator Update," and an update on the cable stay bridge project in Burlington. For registration information call 319/335-3231.

**17th Annual Iowa Traffic Control and Safety Conference September 17-18, Iowa State University** Safe and efficient transportation is the focus of the annual fall conference co-sponsored by the Iowa Traffic Control and Safety Association. Contact Janet Gardner 515/294-5366.

**Traffic Issues for Local Governments September 22 - Ankeny; September 29, - Cedar Rapids; October 1 - Council Bluffs** the course is designed to train attendees in the proper use, placement, and maintenance

of traffic control signs. The workshop covers regulatory, warning, and guidance signs as well as other devices. Contact Carole Seifert 515/294-1400.

**Management for Street and Road Maintenance Supervisors October 6 - Ankeny; October 8 - Cedar Rapids** This one-day seminar covers basic supervisory and management techniques, which will assist the supervisor in planning, directing, and motivating in an efficient manner. Numerous videotaped experiences as well as case studies are used. Experiences of the participants will be stressed in open discussions. Contact Barbara Holden 515/294-3781.

**12th Annual Western Snow and Ice Fleet Management Conference Equipment Show and Snow Roadeo October 13-15, Sheraton Hotel, Lakewood, Colo.** This conference is designed to meet the informational needs of administrative,

supervisory, and operational level personnel involved in snow and ice control and fleet operations. For conference registration call Chris Jacobsen 303/235-6705.

**1992 Fall MOVITE/CPA Annual Meeting October 14-16, Lincoln, Nebraska** The theme of this conference, sponsored by the Missouri Valley Section of the Institute of Transportation Engineers and the Central Plains Parking Association, is "Pioneers in 1992 and Beyond." Contact Larry Worth 402/471-7841.

### And justice for all

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