

Technology Roads Bridges Transit —

Iowa State University
Business and Engineering Extension

Local Transportation
Information Center

July 1989

News

New staff members join T² program

Three new staff members, including a Safety Circuit Rider, have been added to the Local Transportation Information Center during the last year.

The members include Safety Circuit Rider Ed Bigelow, program assistant Jan Graham, and communication specialist Larry Mendenhall.

Ed Bigelow

The Safety Circuit Rider is a new position just added in March. Bigelow will present programs throughout the state on accident analysis, signing inventory and analysis, and work zone safety. He is currently assembling those programs and polling counties and cities to determine what safety training is needed. He expects to begin his circuit riding in September.



"I took this job because I have always pushed safety," Bigelow says. "And what attracted me the most was working in Extension. It's easy for

cities and counties to send their staff to Extension programs because they know our programs will be practical."

Bigelow's career has been equally practical. He has worked for the Iowa Department of Transportation, was county engineer in Ida County from 1962 to 1970 and again from 1985 until hired as the Safety Circuit Rider earlier this year. Between 1970 and 1985 he worked as a consulting engineer out of Ida Grove.

Jan Graham

Graham's duties include organizing conferences, seminars, and workshops, coordinating efforts between T-square staff and other agencies, and budget planning and management. She also supervises hourly staff, assists program manager Tom Maze, and takes care of the many details that require attention everyday.



Organizing the many LTIC confer-

ences on campus and throughout the state is almost a full-time job itself and, Graham says, is the part of her job she enjoys the most.

"It's actually fun to put on a workshop and then review the evaluations," she said. "Honest comments help us improve the programs."

Previously, Graham worked with the Iowa Motor Vehicle Fuel Reduction Program at ISU.

Larry Mendenhall

Mendenhall will be working full time for the Local Transportation Information Center starting in July as the new editor of *Technology News*. Since November, Mendenhall's time has been split between editing *Technology News* and *Housing Today* for ISU's Energy Extension.



Besides editing the newsletter, Mendenhall will also help other LTIC staff members prepare presentations, write press releases, supervise other editorial efforts and provide desktop publishing support as needed for ISU's civil engineering staff.

Mendenhall has worked as a reporter, photographer, and copy editor for newspapers around the state and in Arizona.

Inside pages

- 2 Signal improvements reduce delays and gas consumption.
- 3 The Local Transportation Information Center wants reader's opinions.
- 4 Exemptions can make plaintiff's tort liability claims hard to win.
- 6 The Local Transportation Information Center offers pavement management workshops and software.

Study shows signal improvements save fuel

By Mary Rose Anderson

The October, 1988 issue of *Technology News* reported on a signal-improvement program sponsored jointly by the Iowa Departments of Natural Resources and Transportation. Funding for the program came from fines paid by Exxon Corporation after a lawsuit determined the company had overcharged for domestically produced petroleum between 1975 and 1981.

The program demonstrates that modern traffic signal technology and up-to-date traffic signal timing plans can save the state a significant amount of fuel by reducing the number of delays at traffic signals. Before and after studies done by the traffic engineering consulting firm of Johnson, Brickell, Mulcahy and Associates determined how much the new signal systems improved traffic flow and reduced fuel consumption.

Time and resources did not allow the calculation of other benefits that the new traffic control systems may be providing. However, it is expected the new systems will reduce traffic accidents, equipment breakdowns and maintenance, and the staff time necessary to update timing plans and monitor signal operations.

The 19 cities selected to participate in the project were Ames, Algona, Atlantic, Bettendorf, Council Bluffs, Decorah, Des Moines, Iowa City, Indianola, Mason City, Monticello,

On the other hand, where prior signals along arterials were uncoordinated, dramatic improvements resulted. For example, the projects in Webster City, Indianola, and Iowa City resulted in

The program demonstrates that modern traffic signal technology and up-to-date traffic signal timing plans can save the state a significant amount of fuel by reducing the number of delays at traffic signals.

Muscatine, Sioux City, Spencer, Storm Lake, Urbandale/Des Moines, Waterloo, Webster City, and West Des Moines.

The program's benefit-cost ratios ranged from 0-to-1 to 55.58-to-1. Generally, the savings were greatest for arterial systems in larger cities. Of course, the amount of benefit gained depended on the condition of pre-existing signals. For example, new equipment was placed along arterials in Storm Lake and Waterloo where the existing systems were already coordinated. Although the new equipment was needed, the traffic flow improvements only resulted in a 1.75-to-1 benefit-cost ratio in Storm Lake and a 0-to-1 ratio in Waterloo.

benefit-cost ratios of 23.72-to-1, 32.87-to-1, and 34.11-to-1, respectively.

The program installed three levels of technology: 1. up-grades of isolated intersections to fully actuated, 2. coordination along arterials using time-base coordinators (TBCs), and 3. using microprocessor masters and office microcomputer monitors to control and monitor arterial systems (closed loop, distributed systems).

The upgrades to fully actuated generally resulted in the lowest benefit-to-cost ratio because the primary purpose of fully actuated control is to reduce long delays. Upgrading to fully

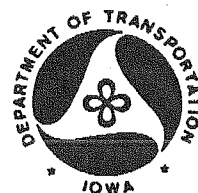
Continued on page 6

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

Program manager--Tom Maze; Coordinator--John Moody; Editor--Larry Mendenhall

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 personnel.

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.



U.S. Department
of Transportation
Federal Highway
Administration

**IOWA STATE
UNIVERSITY
EXTENSION**

Help us serve you better

We want to continue improving the practical value of our newsletter, conferences, and workshops. We are very interested in your input. Please take a few minutes to answer the following questions. Then fold and **tape** this page with the return address facing out. Please do not use staples. The postage is prepaid. The Local Transportation Information Center staff thanks you for your help.

1. What type of agency do you work for?
(Check one)

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> Municipality | <input type="checkbox"/> Consultant |
| <input type="checkbox"/> County | <input type="checkbox"/> Contractor |
| <input type="checkbox"/> State agency | <input type="checkbox"/> Supplier |
| <input type="checkbox"/> Association | <input type="checkbox"/> University/
College |
| <input type="checkbox"/> Other: _____ | |

2. What is your job title?

3. How do you rate Technology News?

- | | |
|--------------------------------------|---|
| <input type="checkbox"/> Very useful | <input type="checkbox"/> Somewhat
useful |
| <input type="checkbox"/> Useful | <input type="checkbox"/> Not very
useful |

4. Which regular features are of the most interest to you? (Check each one that you like to read)

- Highway research reports
- Transportation history articles
- Tort liability articles
- Tips from the field
- For more information
- Conference calendar
- Microtechnology

5. Which subjects are of the most interest to you?
(Check each that apply)

- Transit
- Bridge maintenance, rehabilitation
- Roadway maintenance
- Equipment maintenance
- Management

- Highway or bridge design
- Computers
- Safety
- Others: _____

6. How often do you attend workshops or conferences on transportation at Iowa State University?

- 5 or more times per year
- 2 to 5 times per year
- 1 or 2 times per year
- Occasionally
- Never

7. How would you rate the transportation related workshops or conferences that you have attended at ISU?

- | | |
|--|---|
| <input type="checkbox"/> Very useful | <input type="checkbox"/> Somewhat
useful |
| <input type="checkbox"/> Useful | <input type="checkbox"/> Not useful |
| <input type="checkbox"/> Programs presented by other organizations are more useful to me | |
| <input type="checkbox"/> I never go to workshops or conferences | |

8. What is your preference for the length of a conference or workshop?

- | | |
|----------------------------------|---|
| <input type="checkbox"/> 1/2 day | <input type="checkbox"/> 3 days |
| <input type="checkbox"/> 1 day | <input type="checkbox"/> 4 or more days |
| <input type="checkbox"/> 2 days | |

9. Which days of the week are the best for you to attend workshops or conferences?

- M T W Th F S

Continued on page 4

Exemptions make tort claims difficult to prove

Two attorneys representing opposing perspectives discussed "The Status of Iowa Tort Liability Relating to Public Streets and Highways" at a recent conference of the Iowa Traffic Control and Safety Association. Presenting the plaintiff's point of view was a prominent trial attorney who appears frequently in cases against highway authorities. He has also authored books that provide guidance on how to pursue cases in which it is alleged that a highway was negligently designed, constructed, or maintained.

This attorney decried the several "exemptions" that have become part of the relevant law in Iowa. These "exemptions" make it more difficult to sustain a claim of negligence against highway authorities in the state than when laws enacted in 1965 and 1967 first removed the sovereign immunity of the State of Iowa and political subdivisions.

Three specific "exemptions" were mentioned. The first, the "design exemption" was enacted in Iowa following a decision by the Iowa Court of Appeals (*Butler vs. State of Iowa*) that a highway authority was obliged to retrofit highways and highway appurtenances each time there was a change in design standards. The Iowa legislature enacted this clarification of the law in response to their conclusion that the state and counties would need to expend billions of dollars to upgrade most highways if this ruling were permitted to stand. Sections 25A.14(8) and 613A.4(7), Code of Iowa, now read that "A claim under this chapter shall not be allowed for failure to upgrade, improve, or alter any aspect of an existing highway, secondary road, or street, to new, changed, or altered design standards." The same sections state that

Tort Liability

By R. L. Carstens
Professor Emeritus of
Civil Engineering

what is applicable is "a generally recognized engineering or safety standard, criteria, or design theory in existence at the time of construction or reconstruction." Although the code lists several items that do not constitute reconstruction, exactly when a road was last reconstructed typically is a matter of dispute in most cases involving this issue. Most states have similar interpretations of their tort claim laws.

These "exemptions" make it more difficult to sustain a claim of negligence against highway authorities in the state . . .

The second "exemption" relates to signing and is incorporated in Section 668.10, Code of Iowa. This provides that the state or a municipality shall not be assigned a percentage of fault for "failure to place, erect, or install a ... traffic control device... as defined in the uniform manual for traffic control devices..." A ruling of the Iowa Supreme Court (*Hershberger vs. Buena Vista County*) has created an exception if a sign was negligently installed. Also, a device once installed must be maintained, according to the code. The attorney discussing this topic specifically mentioned loss of reflectivity as an area

that could lead to litigation. Despite these limitations, this provision has had a profound effect on litigation resulting from highway accidents in Iowa. Since most highway accident claims 10 years ago related to the use of signs, removing that as a cause of action has precluded hundreds of claims of negligence.

The third "exemption" relates to winter road maintenance. This provision, also in section 668.10, precludes assigning fault for "failure to remove natural or unnatural accumulations of snow or ice, or to place sand, salt, or other abrasive material on a highway, road, or street if the state or municipality establishes that it has complied with its policy or level of service for snow or ice removal or placing sand, salt, or other abrasive material on its highways, roads, or streets." In the writer's experience, this provision seems to have had a limited effect on the number of claims filed against highway authorities. However, it has served to assure that the focus during litigation is on compliance with a stated policy rather than a comparison with some arbitrary standard of care. Since, most cities in Iowa do not have written snow and ice policies, this legislation has provided a rather clear mandate for them to develop such a policy. The writer is not aware of similar legislation in any other state.

In summary, only one of the "exemptions" seems to be unique to Iowa and to have exerted a significant effect on the number of tort claims filed following highway accidents. None of the "exemptions" has compromised safety, in the writer's opinion, given the highway design and maintenance practices that are typical in Iowa. Readers in states other than Iowa may wish to encourage their legislators to consider enacting such "exemptions."

Center offers pavement management software

The first training workshop on the Iowa State Pavement Management System was conducted in May. The System is an easy-to-use software package that runs in a Lotus 123™ environment. The user is responsible for acquiring the Lotus 123™ computer package, but the Iowa State Pavement Management System is free-of-charge to those that attend a training program.

May's workshop explained the software system and provided background on pavement management principles and techniques. All participants were provided microcomputers to use during the workshop and were taken on a brief field trip to evaluate pavements.

The May workshop was filled to capacity and another is being planned for this fall. Workshop attendance is kept to a minimum to ensure interaction between the instructor and students and between the students themselves.

The Local Transportation Information Center is starting a program to help local governments install the Iowa State Pavement Management System. The Center will install the initial data

Microtechnology

By Tom Maze
Program Manager

and perform initial pavement evaluations at cost. The cost will depend on the size of the highway network and the amount of historical data that has to be generated. However, the cost will generally be quite modest.

Software installation will be supervised by Jim Cable, the software's author, or Tom Maze, the Center's manager. The initial data load will be performed by Civil Engineering students, experienced in pavement evaluation. Installations will be scheduled based on the availability of trained pavement evaluators.

The figure on the opposite page is a data flow diagram of the pavement management system. In a data flow diagram, all externally generated inputs to the process are shown as a square (for example, the pavement manager is considered external to the system), rounded rectangles are functions, and all open-ended, flat

rectangles are data stores (files). The computer program operates with one data flow (like that shown in the figure) for every pavement type (rigid, flexible, granular, or treated surface).

On the figure's left-hand side are the inputs from the pavement manager. Functions 1, 2, 3, and 4 involve processing data, formatting data, and placing data in data stores. Once the data are inputted and stored, functions 6 and 7 calculate the section maintenance or restoration priority and the preliminary treatments, respectively. In function 9, the preliminary treatment list is refined and finalized, and in function 8 the costs of the final treatments are estimated. Functions 10 and 11 summarize and report the results.

The date of the next Iowa State Pavement Management System workshop will be announced shortly and brochures will be mailed before the end of the summer. If you are interested in having the system installed in your community or county and would like help from the Local Transportation Information Center, call Tom Maze or Jim Cable at 515/294-6777.

Signal program findings continued from page 2

actuated may not necessarily decrease stops or average delay.

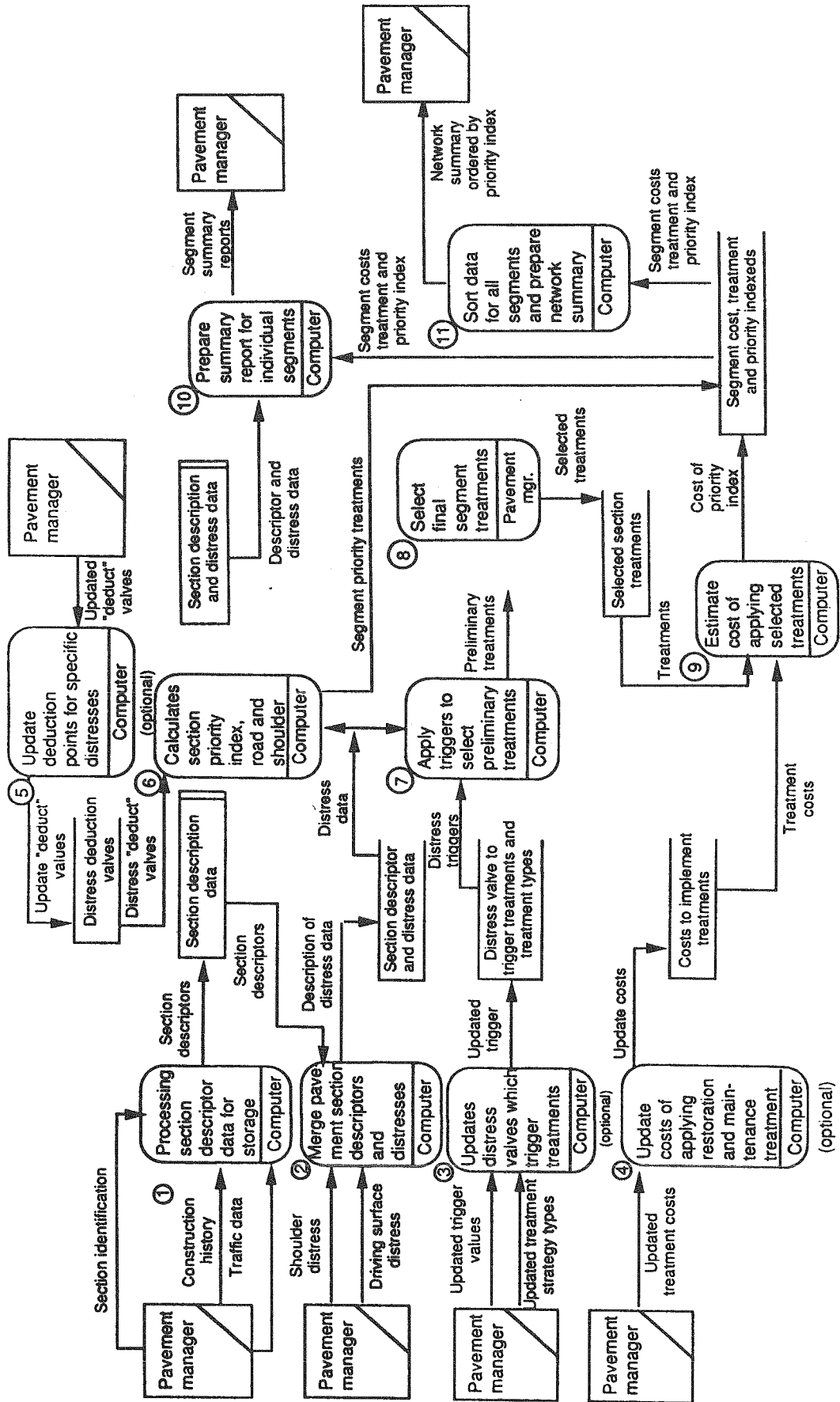
Arterial systems commonly had higher benefit-cost ratios in larger cities. Larger cities usually have higher traffic volumes and thus traffic flow improvements are multiplied by more vehicles. Again, the magnitude of the benefit-cost ratio largely depends on the efficiency of pre-existing signal systems.

Overall, the project saved roughly 149

million stops, 845,000 hours of delay, and 280,000 gallons of fuel. The overall benefit-cost ratio was about 14-to-1, demonstrating the effectiveness of modern equipment and keeping signal timings up-to-date.

The Local Transportation Information Center has produced an easy-to-read booklet summarizing the project and highlighting each of the 19 project cities. The booklet is for readers with and without technical

backgrounds. Also, the Center has completed a technical report on the project which includes a survey made to determine the potential benefits of signal improvements in all Iowa cities. Copies of the booklet and the technical report are available by calling 515/294-8815 or writing to the Center.



Conference Calendar

Management for Street and Road Maintenance Supervisors

August 9, Harlan, Auble Center, Myrtue Memorial Hospital

August 15, Waterloo, Hawkeye Institute of Technology

August 16, Ottumwa, Indian Hills Community College

August 22, Fort Dodge, Iowa Central Community College

The purpose of this course is to train supervisors in management techniques. Covered are leadership, planning, directing, motivating, communications and discipline. The course is a practical course using actual examples.

Contact Janet Gardner 515-294-5366

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.

Iowa Chapter of APWA Annual Fall Meeting

Aug. 9-11, Harlan

Contact Terry Cox 712-755-5137

Liability and Traffic Signing

August 16, Mason City, North Iowa Area Community College

August 17, Sioux City, Western Iowa Technical Community College

The purpose of the workshop is to train maintenance personnel in the proper use, placement, and maintenance of traffic control signs. The workshop covers regulatory signs, warning signs, and work zone markings. It presents practical examples of good and bad signing.

Contact Connie Middleton 515-294-6229

Planning for Aggregate Mining

Sept. 26, Scheman Bldg, ISU

Contact Connie Middleton 515-294-6229

ITE Annual Meeting

Sept. 18-20, San Diego, CA.

Contact Tom Brahms 202-554-8050

APWA International Congress

Sept. 23-28, Orlando, FL

Contact APWA 312-667-2200

ASCE National Conference

Oct. 8-12, New Orleans

TRB National Conference on

Rural Public Transportation

Oct 29 - Nov 1, San Antonio

Contact TRB 202-334-2934

Fourth 'Tips' edition just published

The fourth collection of Technology News' popular feature "Tips From The Field" is now available from the Local Transportation Information Center under the title "Tip Sheet: Tips From The Field #4."

Tips in the latest issue include a hydraulic lifter for storm sewer covers, carbide tips for snowplow blades, and safety tips such as a safety lever for dump truck hoists.

Copies of "Tip Sheet" are available by calling John Moody at 515/294-0787.

Technology News

Iowa State University
ISU Extension
Local Transportation
Information Center
EES Building, Haber Road
Ames, Iowa 50011-3074

Do Not Forward, Address
Correction Requested,
Return Postage Guaranteed

Route to: