

November 1989

News

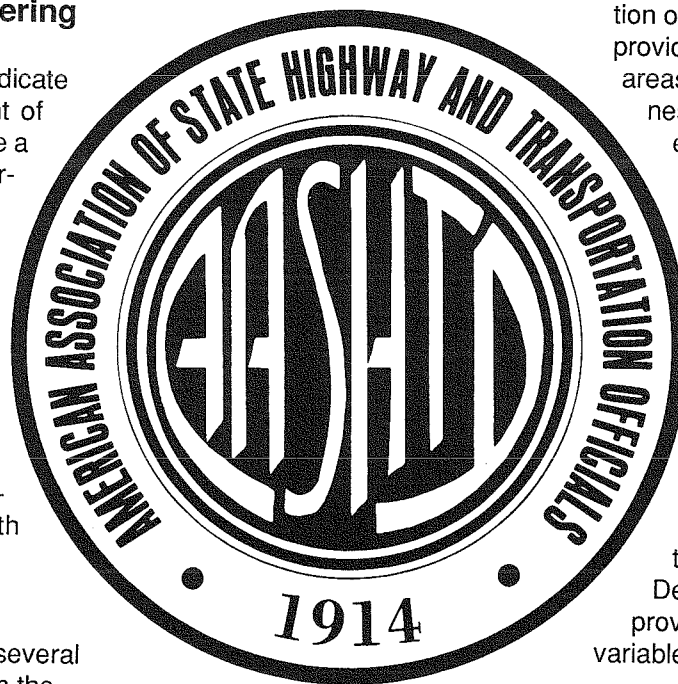
AASHTO updates design guide

By Ed Kannel
Professor, Civil Engineering

Highway accident statistics indicate that approximately 60 percent of fatal highway accidents involve a single vehicle. In about 70 percent of these cases, the vehicle overturned or hit a fixed object off the roadway. The American Association of State Highway and Transportation Officials (AASHTO) is offering a new design guide to assist engineers in developing a safer roadside environment to reduce the fatalities, injuries, and property damage associated with these accidents.

The "Roadside Design Guide" incorporates information from several AASHTO publications and from the most recent research and technology developments. The guide supersedes the 1977 AASHTO "Guide for Selecting, Locating and Designing Traffic Barriers."

Since roadside is defined as the area beyond the edge of the shoulder, the guide emphasizes the need for a forgiving environment for motorists who run off the



roadway. Although design for traversable embankments and removal of obstacles are favored means for reducing hazards, the engineer must also consider other alternatives such

as breakaway supports and redirection of vehicles. The AASHTO guide provides materials in each of these areas as well as a cost-effectiveness selection procedure to evaluate alternative strategies.

The design concepts in the guide are not new. For example, a major concern is providing a clear zone. However, unlike the original interpretation of the 30-foot clear zone, the guide recognizes that alignment, vehicle speed, traffic volume, and embankment slopes all affect the distance needed for safety. Design curves and tables provide basic guidance on these variables.

These design tools and the many other sections dealing with drainage structures, sign and luminaire supports, guardrail length and location, bridge rail, and safety features for work zones make the

guide a valuable reference for the engineer.

The user of the new guide should note that the information

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Inside pages

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- 3** Find out how to avoid work zone liability in the "Tort Liability" column.
- 4** "Microtechnology" begins a series about semi-automatic fuel systems.
- 6** "Tips From The Field" will help local agencies "handle" their snowplow blades.

Jespersen enjoys advisor role

A pipeline from the nation's county roads to the Federal Highway Administration exists in the FHWA's County Road Advisor Board. Story County Engineer Del Jespersen has been a link in that pipeline since 1985 as a representative of one of the board's nine regions.

"The board's purpose is to provide input for the FHWA on how secondary road programs are functioning and to make any suggestions for improvements or changes," Jespersen, who represents Region 7, said.

The board meets in Washington, D.C., once a year. Each board member holds an annual regional meeting, attended by county engineers and secondary road people as well as Federal administrators for the region. Concerns voiced at these regional meetings may then be discussed at the national meeting.

"Our regional meetings turn out pretty good," Jespersen said. "People usually say what's on their mind."

Missouri, Iowa, Nebraska, and Kansas (MINK) make up Region 7. Region 7's new federal administrator is Ken Jensen.



Del Jespersen

"In Region 7, I attempt to provide two to three MINK newsletters a year," Jespersen said. "We attempt to hold a regional conference the last Thursday and Friday in October each year. It's at these regional conferences that we encourage people to discuss concerns they have with the Federal Aid Highway Program as it relates to county activities."

The board has recently spoken out against several ideas at the national meeting. Those ideas included painting pavement markings on any road surface that paint would adhere to,

the degree of slope between intersecting roads or driveways, and higher standards for guardrails on local roads.

"There's only one set of rules about putting guardrails onto bridges - and those are the ones for interstate roads," Jespersen said. "That is, they're set up for high-volume roads. We're trying to convince the (FHWA) that on little county roads with 200 to 400 cars a day just don't need quite the same standard. We put a guardrail on a bridge near Story City and I'm not sure it was that good of an expenditure of our money."

Jespersen opposed the pavement marking proposal because, "we have some roads in Story County that paint would adhere to. But those coatings are more or less a dust control measure and I wouldn't want drivers to think they were on a regular highway."

Jespersen also opposed a proposed rule that would give roads intersecting with driveways and other roads an eight-to-one slope. Most county roads have a two-to-one slope and increasing that to eight-to-one in certain places would create a driving hazard, Jespersen said.

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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 the Iowa Department 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.

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Work zone liability still a problem

In an article in *Technology News* in April, 1988, we discussed liability problems with work zone traffic control. Contractors continue to be tormented with lawsuits involving accidents in work zones.

One case exemplifying the problem was tried to a jury in September, 1989. A contractor installing water supply lines for a commercial development had opened a hole in a busy four-lane arterial street. Backfill was completed during working hours but the hole remained overnight awaiting pavement replacement the following morning. Appropriate warning signs and barricades with flashing lights were installed to warn traffic of the closed curb lane.

Then disaster struck. A windstorm during the night was strong enough to blow over a construction trailer on the job site. It also completely removed all of the signs, barricades, and flashing lights. The same storm wiped out all electric power in the part of the city where the project was located. Hence, there were no street lights or lighting from other nearby commercial enterprises.

The driver who was injured when he ran into the unprotected hole in the darkened street sued the contractor alleging negligence. Perhaps his strongest point was that the contractor had not weighted down the signs or barricades with sandbags even though a sufficient number of sandbags had been delivered to the job. In this case, the jury returned a verdict in favor of the defendant contractor. A similar result cannot be assured if a case involving the same facts were tried to a different jury in another court. The sandbags should have been used.

Tort Liability

By R. L. Carstens
Professor Emeritus of
Civil Engineering

In another case, city forces had removed deteriorated pavement in a two-lane road in a suburban area. The opening was 11 feet wide by 14 feet long. Again, the hole was left overnight awaiting pavement replacement the following morning. Signs and barricades with flashing lights provided motorists with advance warning and guidance around the closed portion of the roadway. Since traffic volumes were very light, there was no concern for the fact that both directions of traffic had to use one lane past the open-

bear the rather considerable expense of preparing their defense.

In one other case settled recently, a rural north-south road was closed to all but local traffic for improvement. The road closure lasted about two years. East-west roads crossing the project were also closed with appropriate signs and barricades. A serious accident occurred when an eastbound pickup attempting to cross the closed road was struck by a northbound dump truck. Of the many allegations of negligence against the contractors on the road improvement, most were without engineering merit although they might have impressed jurors. However, one allegation that was relevant and factual was that weeds partially obscured the barricades

"These cases demonstrate the need to assure that the devices in place are properly maintained and remain in place . . . Checking of traffic control devices must be constant and continuous, day and night, if a contractor is to have a reasonable chance to avoid liability when an accident occurs in a work zone."

ing in the street. City police were alerted to the situation and checked the location approximately every hour. However, during early morning hours vandals moved the barricades across the street effectively closing the open lane and guiding traffic into the hole in the road. The driver and passenger who were injured when they drove into the opening brought suit against the city. Although the plaintiffs dismissed their suit in October, 1989, just before the trial was to begin, the city still had to

and signs on the side road west of the accident location. These weeds should have been cut.

These cases demonstrate the need to assure that the devices in place are properly maintained and remain in place, an admonition contained in the earlier article. Checking of traffic control devices must be constant and continuous, day and night, if a contractor is to have a reasonable chance to avoid liability when an accident occurs in a work zone.

Computer systems monitor fuel use

More local governments are turning to semi-automatic fueling systems to monitor their fuel. These systems use either metal keys, cards with holes punched through them in a specific pattern, magnetic strip cards (like a credit card), personal identification numbers (PIN) entered on a key pad, or a key-like microchip to control access to fuel.

Modern systems use computers to monitor fuel usage. However, some metal key systems may also monitor fuel usage, displaying information on mechanical dials. Computerized systems often interface with computerized fleet management systems, although they may operate independently and provide their own management reports.

At a minimum, all systems automatically keep track of the fuel pumped, the identity of the vehicle that received fuel, and, usually, the date when the fuel was pumped.

Computerized systems can usually report fleet management information on fuel and fluids consumption, schedule preventive maintenance, and even flag exceptional fuel or oil users. Recently developed, hi-tech systems even have the capability to interrogate on-board vehicle diagnostic sensors and report vehicle operating performance (such as, operating temperatures, maximum RPMs, fluid pressure levels, etc.).

Microtechnology

By Tom Maze
Program Manager

Semi-automatic fueling systems are becoming even more popular because of environmental regulations requiring close control of fuel inventory. Most systems will help find leaks and help hold fuel vendors accountable for quantities of fuel delivered.



Magnetic cards control access to fuel pumps.

Semi-automatic fueling systems can also help local governments save money. In equipment management workshops I present for the American Public Works Association, I commonly tell the class that the system will pay for itself within one to two years by reducing unaccounted-for fuel losses and through better fleet management information. During a presentation in Winnipeg four years ago, a fleet man-

ager from Manitoba's central equipment services group told me that they saved around \$400,000 per year in unaccounted-for fuel losses by computerizing many of the Province's fueling sites. In addition, a handful of employees were asked to resign when the system caught them pilfering fuel. Not all examples are this extreme, but most show substantial savings and much better control over fueling data.

When selecting a system, it is important to know your information requirements and plan ahead.

One of the most difficult problems is selecting a system for one fueling site and later realize that your agency should have the same system controlling its other sites. On-site control and control over multiple sites may require very different equipment capabilities. The number of sites controlled by a system and whether a site is independently or centrally controlled depends on how the system is configured.

Another important decision is the method, or combination of methods, used to permit access to fuel. Probably the most popular method employs magnetic strip cards. However, modern microchip technology has provided methods that provide more data collection flexibility and better data integrity.

The next "Microtechnology" columns will be devoted to examining different configurations for semi-automatic fuel systems and the advantages of each. A later column will explore the different technologies for gaining access to fuel.

AASHTO

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The user of the new guide should note that the information provided is only a guide and not intended to be a standard or policy document. It should be used to understand the problems with selected roadside features and to develop a safer environment for motorists. Users must evaluate all factors in light of their own experience with safety, environment, traffic, and resources to weigh and select design improvements. Based on these data, a policy for their own jurisdiction may be formulated.

A complement to the design guide is a computer program, entitled "Roadside," to assist the engineer in making economic evaluations of roadside design strategies. The program extends the economic analysis of the 1977 Barrier Guide by providing additional capabilities to account for curvature, gradients, design speed, accident severity, and traffic growth over the project life. Although the computer program is not needed to undertake the analyses, the user should find substantial time-saving benefits by using the program. A separate appendix in the guide provides several examples of the economic analysis and program output.

The "Roadside Design Guide" is available from AASHTO at 444 North Capitol Street, N.W. Suite 225, Washington, D.C. 20010 or by calling 202-624-5800.

The analysis software (IBM and compatible systems) can be obtained through the McTrans Center, 512 Weil Hall, University of Florida, Gainesville, FL. 32611. To order by phone call 904-392-0378.



Barrels of fun

A snowplow crew from Guthrie Center maneuvers through an obstacle course at the APWA Snowplow Rodeo Oct. 10 at Iowa State University. Fourteen teams participated in the rodeo held in conjunction with the APWA Snow Conference. The City of Clive won a division title and the overall title. The City of Carroll won the other division title. The rodeo challenged teams with drivers' examinations, equipment inspection, vehicle defect identification, and the obstacle course.

Readers rate Center's services

A questionnaire, asking our readers to rate The Local Transportation Information Center's services, was published in the July issue of *Technology News*. The results from 191 responses, with 48 percent from municipalities and 41 percent from counties, have been tabulated

Twenty-five percent of the respondents found *Technology News* very useful and 55 percent rated it useful. Of those that attend ISU transportation-related workshops, 36 percent found them very useful and 56 percent found them useful.

The most popular topics in the newsletter are the "Tort Liability" articles and "Tips From the Field." All respon-

dents rated roadway maintenance as the topic of most interest. Bridge maintenance has the second highest interest among county respondents. General management was rated as the second most interesting topic by municipal respondents.

County respondents were split evenly between favoring one-day conferences and two-day conferences. Municipal respondents were overwhelmingly in favor of one-day workshops. The most popular workshop topics were roadway and pavement maintenance related workshops with traffic safety issues receiving the next most interest. The most preferred day for a workshop is Wednesday.

Tips From The Field

Rack eases blade mounting

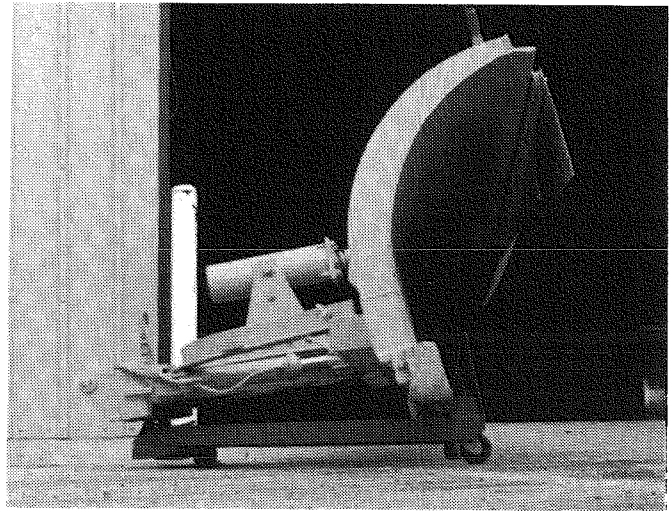
A snowplow rack designed by the City of Clive turns the placement and removal of snowplow blades from a dangerous job to an easy and safe one.

"In the past, we mounted snowplow blades by dropping them on wooden blocks. We then used pry bars to lift them into position when we needed to put them back on," Public Works Director Willard Wray said.

The person mounting the blade in that fashion — between the truck and the blade — is in a dangerous position. Using the rack, a snowplow operator can mount the blade by simply driving into position. The rack may prevent severe accidents and makes handling the blade much easier.

The rack sits on three wheels, each capable of turning 380 degrees, see photo. The wheels make it easy for one person to move the blade out of the way. Each wheel can hold 970 pounds. The total weight-bearing capacity of the rack easily exceeds the 2,100 pound weight of the blade shown.

The rack has other convenient features. Vertical pieces of scrap iron guide the blade into place when it



Wheels make moving a snowplow blade easy.

is dropped and a jack incorporated into the design makes lifting the blade into position easier.

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

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"I think the FHWA listens quite closely to us," Jespersen said. "Just like anything else, you don't see all the suggestions acted on, but I think we've made some difference in how programs are administered."

At the national meeting last spring, trends in the Federal Aid Highway Program were discussed. Bridge programs, pavement management, highway safety programs, and changes in MUTCD and AASHTO design guides also were discussed.

The County Road Advisory Board was formed in 1945 by Thomas H. McDonald, then Commissioner of Public Roads. Its purpose, McDonald wrote, was "to promote a better understanding and dissemination of viewpoints between road officials and engineers of counties, the state highway departments, and FHWA with respect to those parts of the Federal Aid Highway Program in which counties participate and to develop and apply solutions to problems that arise."

Since then, the board has helped with legislation and policy decisions affecting secondary roads, off-system roads and bridges, the Rural Transportation Assistance Program (RTAP), and The Local Transportation Information Center.

Before becoming the Story County engineer in 1977, Jespersen worked 20 years for the Iowa Department of Transportation. Half that time was in the Office of Secondary Roads.

For More Information

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

"Importance of Roadway Drainage" - This video tape, produced by St. Michael's College, stresses the importance of a roadway drainage inventory and how it works. The need to map drainage areas and flood plains with respect to rural roads and the effects of water on a roadway cross section also are described. **Running time - 60 minutes. Request index #105V.**

"Snow Fighters - Quiet Patriots" - This tape by the Minnesota DOT discusses the mission of the snowplow operator, focusing on responsibilities, communications, and tools. It compares the responsibilities of rural and urban operators. It also defines the terms passable, widening, and clean-up. **Running time - 17 minutes. Request index #106V.**

"Traffic Control for Your Town" This tape, produced by the Colorado

DOT, discusses the guidelines necessary to develop a traffic control plan. The video discusses adopting a model traffic code, using the MUTCD, identifying hazardous locations, developing traffic flow patterns, sign inventory, sign maintenance, and a prioritized list of improvements. **Running time - 14 minutes. Request index #108V.**

"Tort Liability" Produced by the Minnesota DOT and narrated by Minnesota Assistant Attorney General David McKenna, this film defines the meaning of tort and negligence. McKenna discusses the increasing problems of tort claims and what might be done to reduce the number of claims. **Running time - 87 minutes. Request index #109V.**

"Manual on Countermeasures for Sign Vandalism" This 151-page manual describes countermeasures to reduce the costs associated with highway sign vandalism. Also presented are guidelines for planning, implementing, and evaluating anti-vandalism programs. This manual is intended for us by state and local personnel and others interested in reducing sign vandalism. **Request index #201.**

"Local Highway Safety Studies (User's Guide)" This 216-page manual, published in July 1986, is intended for individuals with traffic engineering responsibilities for rural and small urban areas. It has been prepared so that individuals without traffic engineering experience or training can use it. **Request index #220.**

"Manual on Uniform Traffic Control Devices - for Streets and Highways (1988 edition, parts 1 through 9)" This edition of the MUTCD is available from The Local Transportation Information Center as long as supplies last. The cost is \$22 per copy. Make checks payable to Treasurer, Iowa State University. **Request index #217.**

"Reducing Tort Liability: Iowa Case Studies" This 16-page manual, written by R.L. Carstens, Professor Emeritus of Civil Engineering at Iowa State University, touches on a number of important points necessary in tort liability cases. Carstens refers to such things as inventories, work zone traffic control, the ball bank indicator, and problems caused by too many signs in one location. **Request index #537.**

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, ISU Extension, 194 Town Engineering, Ames, IA, 50011.

Name	Title	Index No.	No. of Copies
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Please send a complete listing of all publications from your office.

Please send a complete listing of all audio visual materials available

Conference Calendar

Portland Cement Concrete and Asphalt Concrete Pavement Maintenance Workshop, Nov. 29, Mason City, Nov 30, Dubuque Area (Peosta). This workshop is designed for street and road maintenance crew supervisors and crew members. It defines cost effective methods for maintaining, restoring, and rehabilitating PCC and AC pavements. Contact Jo Sedore 515-294-4817.

Iowa County Engineer Conference, Dec. 5-7, Scheman Building, ISU, Ames. This conference offers continuing education credits for county engineers and technicians. Presentations and special technical sessions including labor issues, road abandonment, computers, management, and others. Contact Connie Middleton 515-294-6229.

Local Road and Street Pavement Management, Dec. 12-13, Scheman Building, ISU, Ames. This workshop provides attendees with a working knowledge of the Iowa State Pavement Management System. This is a computer tool that operates in a Lotus 123™ environment. Attendees will receive a copy of the software, an instructional manual, and instruction on pavement management and the Iowa State System. Contact Connie Middleton, 515-294-6229.

Transportation Research Board Annual Conference, Jan. 7-11, Washington, D.C., Contact TRB 202-334-2934.

Aggregates in Transportation Conference, January 18, Scheman Building, ISU, Ames. Contact Connie Middleton, 515-294-2934.

35th AC Paving Conference, Jan. 30, Scheman Building, ISU, Ames. Contact Connie Middleton, 515-294-2934.

Better Concrete Conference, Feb. 6, Scheman Building, ISU, Ames. Contact Janet Gardner 515-294-5366.

Iowa Concrete Paving Association Annual Meeting, Feb. 14-16, Marriott Hotel, Des Moines. Contact ICPA, 515-278-0606.

Asphalt Recycling Conference, Feb. 21, Scheman Building, ISU, Ames. This conference covers common methods of used in hot and cold recycling, the economics of recycling and procedures to determine recyclability of pavements. Presentations will be made by staff members from local governments on recycling projects in their jurisdictions.

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