

roads bridges transit technology news

Local Transportation Information Center
Iowa State University Engineering Extension Service

July 1984

New law improves liability city/county position

One of the most significant pieces of legislation to pass the Iowa General Assembly in recent years went into effect July 1. Referred to as the comparative fault bill, H.F. 2487 greatly improves the position of the state and its political subdivision before the courts. Defendants with less than 50 percent fault cannot be held jointly and severally liable. Other provisions include: those bringing a lawsuit cannot receive damages if found more at fault than all other parties to the suit and political subdivisions are not at fault for failing to install stop signs or traffic control devices.

Also, the bill states that political subdivisions will not be held at fault for failing to remove snow or ice or not applying enough salt or sand on streets and highways if the subdivision can establish that it complied with its own policy or the level of service that it had determined for snow and ice removal or salting and sanding. However, cities and counties should use care in developing their own snow and ice removal and sanding and salting policies.

Engineers and public works directors also should be aware of the legal implications of H.F. 2393, which

allows the DWAWM to develop rules regulating the use of oil in road oiling, dust control, and weed control, as well as S.F. 2160, which requires a preference for Iowa contractors over contractors from states that provide a preference for their own contracts.

For more information contact the League of Iowa Municipalities, Suite 100, 900 Des Moines Street, Des Moines, Iowa 50316.

David H. Long, director intergovernmental relations, League of Iowa Municipalities.

Continuing education grants offered for Iowa Snow Conference

The Local Transportation Information Center is offering three continuing education grants for the Iowa Snow Conference to be held October 2 at Iowa State University. The conference will cover drift control, plowing, sanding, scheduling, routing, and the use of chemicals and equipment.

A cash award will be given for travel expenses and registration fees. The cash award will be \$50 for those living fewer than 100 miles from Ames and \$100 for those more than 100 miles from Ames.

To be eligible, an applicant must be an employee of a town with a population of less than 5,000 or a county roads employee other than

the county engineer or assistant county engineer. Two city employees and one county employee will receive grants.

Selection will be made by a drawing and winners will be notified directly. To apply, complete the form below and return it to our office by September 1.

Grants also will be offered for two workshops on Management for First Line Supervisors on November 27 and January 22. Application forms for those grants will be in the September issue.

Transportation continuing education grant application Iowa Snow Conference October 2

Name _____ Title _____

Department _____ Town _____

State _____ Zip _____ Phone _____

Return to the Local Transportation Information Center, 110 Marston Hall, ISU, Ames, Iowa 50011.

The preparation of this newsletter was financed in part through federal funds provided by the Federal Highway Administration. 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 those of the Iowa Department of Transportation.

Highway research reports released

Final reports on several Iowa Highway Research Board projects have been approved for distribution. A complimentary copy of the following reports, and others may be obtained by contacting Vernon J. Marks, research engineer, office of materials, Iowa DOT, Ames, Iowa 50010; phone 515/239-1447.

Fibrous P. C. Concrete Overlay Research in Greene, County, Iowa/Final Report for HR-165

This portland cement concrete overlay project was constructed in 1973 and included 42 different sections of both nonfibrous and fibrous concrete. A 24-member rating panel showed the best performance from the thicker nonfibrous sections.

Sprinkle Treatment of Asphalt Surfaces Final Report for HR-199

This project, constructed in 1978, imbedded six different sprinkle treatment aggregates into three standard Iowa DOT mixes. One section of each mix was not sprinkled, bringing the total number of sections to 21. Periodic texture depth measurements and friction testing have shown the benefits of sprinkle treatments.

Settlement at Culverts/Final Report for HR-219

This 1980 research was incorporated into a Dallas County reconstruction project on Iowa 44 between US 169 and the Polk County line. Five different methods of backfill were used to place culverts in trench excavations. Class C stone backfill yielded the least settlement, but flowable mortar was identified as being the least expensive, viable method of backfilling.

Iowa Research with ChemCrete Bitumen/Final Report for HR-226

Test sections were placed on two Story County secondary roads in 1980 with a specially refined asphalt product blended with conventional asphalt cement. Severe cracking developed in the ChemCrete test sections during the first winter after construction.

Development of EDM I Calibration Baseline/Final Report for HR-241

Under this project, ISU established a 1,370 meter baseline with five bench marks at various distances. The National Geodetic Survey accurately determined the length between bench marks on this baseline. Periodic measurements of the baseline have shown no significant movement of the monuments. A computer program was developed for determining the constant and scale factors for EDM I's. The baseline is available to all DOT personnel and all county highway personnel for calibration of their EDM I.

Roadway Lighting on Secondary Roads in Iowa/Final Report for HR-251

To compare accident experience data, 91 before and after lighting comparisons and 102 intersections with and without lighting were utilized. The accident rate at secondary road intersections that had destination lighting did not differ significantly from the accident rate at intersections that were not lighted. The average damages for night accidents that occurred at lighted intersections were lower than for accidents at unlighted intersections.

Perception and Interpretation of Advance Warning Signs on County Roads/Final Report on HR-256

Eight legend and eight symbol signs were used in this research. The research showed that, in their visual field, drivers more accurately detect the presence of a word sign than a symbol sign. For both the stop ahead and the signal ahead advance warning signs, decisions were made faster with symbol legend signs, but such decisions were subject to much higher rates of misinterpretation than for word legends.

The economics of seal coating

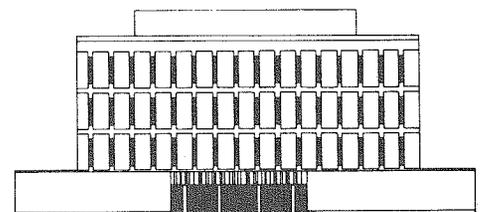
The following article is from the October 1983 issue of APWA Reporter. Although it is based on experiences in Phoenix, the information is applicable to Iowa conditions, according to John Bellizzi, director of public services, Des Moines.

The primary requirement of a seal is to apply one or more successive coats of asphalt binder and cover aggregate to a surface. The object is to provide a low-cost, all weather, waterproof, skid-resistant surface; give new life to dry, weathered surfaces; reinforce pavement; guide traffic; and improve visibility.

To do one or all of these, a design is recommended. Considerations in a seal coat design are strength of foundation materials (aggregate, asphalt), traffic, weather or climatic conditions, construction method, and experience.

Today there are several methods and combinations of methods for applying seal coats. Some of the more common methods are:

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civil engineering extension



tips from the field

Many maintenance crews are increasing their use of diesel powered equipment and trucks because of extended engine life, lower fuel consumption, smaller maintenance costs, greater horsepower, and longer life durability.

It is important to remember that the fuel is the most significant part of the operation and maintenance of a diesel vehicle. When purchasing fuels for use in these vehicles, keep in mind three critical items that can harm a diesel engine: air and water within the system, lubrication and Btu/gallon of the fuel, and fungus and bacterial growth within the fuel.

Air and water must be kept out of any fuel system. However, additional precautions should be taken with diesel vehicles because foaming, freezing, and stalling can occur.

Compared to #2 diesel fuel, #1 is thinner and doesn't gel as easily. Therefore, it often is selected for winter use. However, the engine

lubricating quality of #1 diesel fuel is poor. This will have an effect on engine cylinder wear, injection nozzle wearing, injection pump performance, and, in extreme cases, could cause premature engine failure. Also, the Btu rating for #1 diesel fuel is 25,000 less than for #2. That means less work is accomplished for the same amount of fuel, or more fuel is used for the same amount of work.

This reduction in horsepower and lubrication can also happen when a blend of #1 and #2 diesel fuels is used.

Fungus and bacteria growth can shorten engine life immensely. It can create numerous maintenance headaches and be very costly in terms of repairs and downtime of a piece of equipment. It is imperative that fungus and bacteria growth be controlled to ensure the extended life expected of a diesel engine.

Upon investigation into this matter, the City of Spencer found an after-

market additive, Diesel Fuel Antigell and Fungicide, which is made by E. T. Lubricants. It was found to be cost effective. At less than 15¢ a gallon it is much less expensive than 50/50 blend. The additive also is adequate for cold weather operation. Without sacrificing horsepower or lubrication, the vehicles **did not** gel up in -80° F. wind chill. And, it is effective in the control of bacteria and fungus within the storage tank.

One additional tip on fuels: if you suspect your supplier may be giving you Regohol instead of regular gas (because of tax break) try this test. Use a 100 ml graduated cylinder filled with 90 ml of the fuel in question. Add 10 ml of water and shake thoroughly. Because the water will absorb the alcohol you should not be able to read more than 10 ml of water after settling. If you do read more than that, you have regohol rather than regular.

Charles L. Fisher, assistant superintendent of public works, Spencer

Lawsuit's message: maintain low-level roads

A dirt road with a recorded volume of three vehicles per day, was the location of a single-vehicle accident that resulted in a lawsuit against a county. The accident involved a 350 cc motorcycle operated by a frequent traveler on the road.

The accident occurred in May following unusually heavy rains that caused water to flow across the road and erode the dirt surface. One depression was 12 to 15 inches wide and as much as 3 to 4 inches deep across the full width of the road. The depression caused the motorcycle to spill, injuring the operator.

Testimony in trial indicated that the ditches on this road were usually filled and probably had never been cleaned out. The road surface, which was bladed infrequently, probably had not yet been graded for spring since maintenance efforts

concentrated on granular-surfaced roads carrying high traffic volumes.

An out-of-state expert testified for the plaintiff, citing that loose-surfaced roads should be bladed to provide a crown of ½ inch per foot. Jurors were made aware of the pronounced differences between the road in question and a road maintained to textbook conditions.

The jury found that the county was 40 percent negligent and returned a judgment in six figures against the county.

This case conveys a clear message to county officials: a portion of each county's roads should be designated as an Area Service Level B system.

R. L. Carstens, professor of civil engineering, ISU.

Extension conference calendar available

Each year the civil engineering section of ISU's Engineering Extension Service publishes a nine-month wall calendar that provides dates and information on conference offerings scheduled from September through May. The calendar also includes meetings of associations related to public works and transportation.

If you did not receive a civil engineering extension calendar last year and would like to have a 1984-85 calendar, call the Info-Line. Those who received calendars last year will be sent one automatically this year. The calendars will be mailed in August.

conference 1 2 3 calendar

Urban Drainage Computer Applications

July 25-26, ISU

For consultants and city engineering personnel responsible for the control of runoff in urban areas. Various software will be described and demonstrated. Discussion will include spreadsheet use to size detention basin and outlet structure using SCS TR-55 methodology. Call the Info-Line for more information.

Asphalt Paving Association of Iowa Mid-Year Meeting

July 26-27, Okoboji

For public works personnel, this conference will include the following topics: Iowa roads—the road to recovery; pavement joint and crack research and experimental results; Texas experience in seal coating; cracking and sealing PCC pavements prior to asphalt overlays; recycling of asphalt pavement. Call 515/244-3127 for registration information.

Type 170 Traffic Controllers

Aug. 7-9, ISU

For traffic engineers and technicians, this course will cover operation and maintenance of the new type 170 controllers. Sponsored by FHWA. Call the Info-Line for more information.

ASCE Annual Meeting

Sept. 7-8, Coralville

The program is planned by the technical committees and includes speakers in the areas of transportation, surveying, water resources, structures, geotechnical, and construction. Participants may attend the ISU-Iowa football game after the meeting. Contact Harold Smith, Des Moines city engineer, 515/283-4276.

Bridge Rehabilitation Workshop

Sept. 10-14, Homewood, Ill.

FHWA sponsored workshop emphasizing short span bridges and widening and upgrading load capacity. Topics include: cost-effective methods for local bridges, analytical tools for cost-effective decisions; structural deficiency problems and functional obsolescence on bridges on secondary highways; procedures for assessing damages. County engineers and others involved with bridges are invited to attend. Free of charge. For more information call Fred Walli, 312/799-6300.

Iowa Traffic Control and Safety

Annual Meeting

Sept. 20-21, Ames

In addition to equipment exhibits and the ITSCA annual business meeting, conference speakers will discuss child restraint law enforce-

ment, the motor truck violation program, left turn signal phasing, and cooperation between enforcement and engineering. Call the Info-Line for more information.

Traffic Signal Detectors

Sept. 25-27, ISU

This is the first offering of an in-depth pilot course developed by NHI in conjunction with FHWA. An extensive exhibit of signal detectors will give attendees the chance to review functions of the different types. Call the Info-Line for more information.

APWA Iowa Snow Conference

October 2, ISU

Based on the success of last year's conference, sessions will offer updated information on equipment, plowing, drift control, sanding and chemical applications, and other topics of interest to those involved with snow removal and control. Call the Info-Line for more information.



**Transportation
Info-Line**

Call toll-free
1-800-262-8498

In Ames call
294-7834

Traffic Control Device Handbook offered

Copies of the new *Traffic Control Device Handbook* are still available at reduced prices from the Local Transportation Information Center.

Primarily intended to augment the *Manual on Uniform Traffic Control Devices (MUTCD)*, the handbook offers guideline for implementing *MUTCD's* standards and applications.

To order, complete the form and mail it with a check for the appropriate amount to our office.

Traffic Control Device Handbook

Name _____ Title _____

Department _____ Address _____

City _____ State _____ Zip _____

Check enclosed for:

_____ \$15.00 (cities over 50,000, DOT employees)

_____ \$5.00 (cities less than 50,000, counties)

Make check payable to: Engineering Extension Service

Return to the Local Transportation Information Center, 110 Marston Hall, ISU, Ames, Iowa 50011.

1. Liquid asphalt and uncoated aggregate;
2. Liquid asphalt and coated aggregate;
3. Hot asphalt cement and uncoated aggregate;
4. Hot asphalt cement and coated aggregate;
5. Emulsified asphalt and uncoated aggregate;
6. Emulsified asphalt and coated aggregate;
7. Slurry seal;
8. Asphalt rubber and aggregate;
9. Coal tars and aggregate; and
10. Open-graded plant mix.

The choice of method is influenced by conditions such as aggregate quality, asphalt, climate, traffic, money, and the intended result.

Phoenix has been chip sealing its streets for more than 40 years. There were less than 300 miles of streets in Phoenix then; today there are more than 3,500 miles. Chip sealing is the least expensive preventive maintenance program available. Phoenix chip seals about 300 miles annually. Chip sealing city streets is not always popular because of flying rock, asphalt pick-up, and noise, but even with these problems, there are many reasons why chip seal is used. Asphaltic concrete overlays cannot always be used because of set curb and gutter grades, and recycling is not always effective. These asphaltic concrete overlays crack quickly and cost about 3 to 6 times as much as chip seal. Chip seals reduce pavement temperatures and last longer—about 8 years on major streets and about 10 on residential.

With money enough to chip seal 300 miles annually, streets would receive a chip seal every 11.6 years. If the same maintenance money were to be placed into overlays, only 100 miles could be done annually. Overlays, normally good for about 10 years, would cost 3 times as much, and Phoenix could never maintain or retain its investment. Phoenix uses several other preventive maintenance and maintenance methods under a



Adding aggregate during seal coat application.

management system. Asphalt rubber, introduced by Phoenix in 1969, is very successful, having lasted 14 years so far. It costs 2 to 3 times as much as standard chip seals, however. Slurry seal was first used this past year and is showing promise. Emulsified asphalt as a binder is being used now, but with limited success because of traffic problems. Grinding the pavement and overlaying works very well; however, the cost is four times that of the chip seal. Stress-absorbing membrane interlayers are very successful. This makes use of asphalt rubber or fabrics as interlayer with an overlay. It is used when there are very special problems. Because all these methods have advantages under given situations, we cannot afford to tie up maintenance money to one system.

Phoenix's success in seal coats is due primarily to choice of asphalt, selection of aggregate gradation, and method of application. We use AR-8000 or AC-40 asphalt cement for major streets and 1/4 inch nominal for residential. This is good quality, single-sized aggregate. It is heated and pre-coated with less than 50 percent asphalt. Viscosity of the asphalt is temperature controlled. Drivers are experienced and accurate. The chips are applied immediately behind the asphalt spreader truck and rolled with three pneumatic rollers. The construction train is not more than 100 feet long.

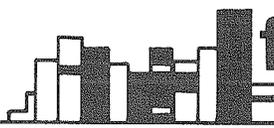
Specifications are clear to do a good job. There is an unwritten requirement that is controlled by the inspector—that is to imbed 50 percent of the aggregate particle into the asphalt before the job is done. This can be accomplished through temperature control, application rates, application, time rolling pattern, and traffic.

The next day the loose chips are swept up and the surface is examined to ensure that 50 percent are imbedded. If not, the new chip sealed surface is fogged as needed with a diluted emulsion. The traveling public is not kept off the project, except when absolutely necessary; however, it is asked to slow to 25 mph until the loose chips are swept up. The finished product meets specifications with the least amount of inconvenience at the lowest cost to the user.

From APWA Reporter, October 1983.

Comparative cost

	Cost	Life expectancy	Cost per year
Standard chip seals (using hot asphaltic cement)	\$.57/yd ²	8 years	\$.0713/yr
Asphaltic concrete	\$1.49/yd ² /inch	10 years	\$.149/yr
Slurry seals	\$.75/yd ²	5 years	\$.15/yr



for more information

Iowa DOT Standard Specifications for Highways and Bridge Construction—Series of 1984

Available for \$4.50 plus \$1.50 postage and handling from Office of Accounting, Iowa DOT, Ames, Iowa 50010. Make check or warrant payable to the Iowa Department of Transportation.

This publication will be in effect for all lettings after July 31, 1984.

Drainage of Highway Pavements

A limited number of copies available free of charge from the Info-Line.

This is a March 1984 revision of the FHWA Hydraulic Engineering Circular Number 12.

Parking Dimensions for 1984 Model Passenger Cars

Available free from the Motor Vehicle Manufacturers Association, Technical Affairs Division, 300 New Center Building, Detroit, Mich. 48202

This publication contains complete listings of length, width, height, ground clearance, and turning diameter dimensions of 1984 domestic autos. A useful reference pamphlet for state, county, municipal, and consulting engineers concerned with street design, driveways, and parking.

The following publications are available from the Transportation

Research Board, 2101 Constitution Avenue, NW., Washington, D.C. 20418. Payment in advance is required for orders of \$10 or less.

Bridges on Secondary Highways and Roads: Rehabilitation and Replacement—

This 132-page manual presents findings from an extensive evaluation of common bridge deficiencies. Included is a manual of recommended practices comprised of 34 procedures for bridge repair and 27 systems for partial or complete replacement. Order NCHRP Report 222, \$9.20.

Rehabilitation and Replacement of Bridges on Secondary Highways and Local Roads—

This 46-page followup expands the manual to include procedures that can be applied directly to problems of fatigue cracking of steel bridge members, scour, bridge deck deterioration, and damage due to accidental impacts. Order NCHRP Report 243, \$6.80.

Bituminous Patching Mixtures—

A useful 25-page reference for personnel involved in pavement maintenance, this publication examines failure diagnosis, mix selection, tests, production, inspection, and

storage. Order NCHRP Synthesis 64, \$4.80.

TRB Publications Catalog—

TRB is recognized as a primary source of research information. This catalog is an excellent reference source and contains a listing by subject area of the nine series of TRB technical publications including Research Circulars, Bibliographies, NCHRP Syntheses of Highway Practice, and workshop proceedings. Subject areas are planning and administration; design, materials, and construction; maintenance and equipment; operations and safety; soils, geology, and foundations; and transportation law. Available free of charge.

TRB Publication Index 1977-82—

More detailed than the TRB Catalog, the Index contains 4,125 citations to 871 publications published by TRB during the six-year period. Citations are listed by 30 subject areas. Order ISSN: 0160-4597, \$16.

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