

roads bridges transit technology news

Local Transportation Information Center
Iowa State University Engineering Extension Service

May 1985

Filling versus sealing cracks in asphaltic concrete surfaces

Unsealed joints or cracks accelerate the deterioration of asphaltic concrete pavements. Alligating, breakouts, and pothole deterioration are the usual results of moisture intrusion into these surfaces.

Many methods have been suggested for cleaning and filling joints and cracks in asphalt surfaces. Most specifications indicate a distinct difference between the filling and sealing processes.

Filling cracks generally consists of freeing the surface of loose and spalled material with air or hand tools, then filling the crack with liquid asphaltic material. This maintenance procedure is an expedient one, de-

signed to stop moisture intrusion without a specific emphasis on complete cleaning or depth of filling.

Equipment usually consists of high pressure air units capable of blowing sand and other foreign material from a crack, and "pour pots" for applying the liquid asphalt filler material. A "V"-shaped squeegee is a handy tool for distributing the liquid asphalt into the crack.

Based on economics and experience, a CRS-2 emulsified asphalt is recommended for filler material. In general, filling cracks, though not as sophisticated a procedure as sealing, is the "stitch in time that saves nine" when it comes to the possibilities of pavement deterioration.

Sealing of joints and cracks in asphaltic concrete surfaces is a more rigidly specified process than the cleaning and filling procedure, and its success depends upon proper crack/joint preparation. The preparation process involves completely removing old sealer, if any, by blowing or sawing. This is followed by air or water blast cleaning.

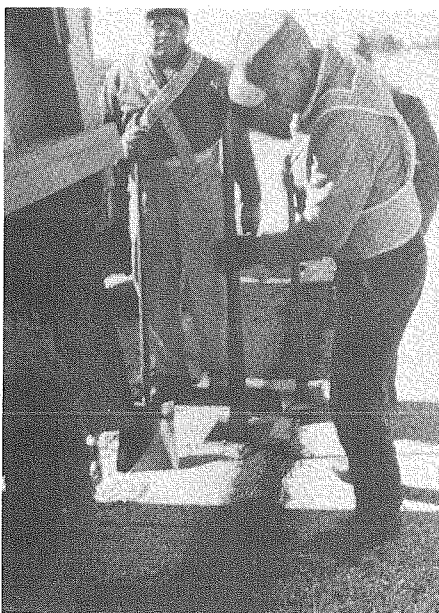
The configuration of the crack/joint reservoir is referred to as "shape factor," and the objective is to obtain a width-to-depth ratio of at least 1:1. An ideally prepared reservoir is a minimum of 1 inch deep. Proper configuration of the joint will enhance the ability of the sealing material to permit movement, and will minimize the possibility of adhesive failure.

Since the process of crack/joint preparation is expensive, it is necessary to select a sealant material that will provide maximum longevity. Factors that would be considered include movement ranges, resistance to hardening, and the potential for loss of bond. Usually the softer the material, the better the performance.

For a proper crack cleaning and sealing project, equipment is sophisticated and expensive and the sealing procedure involves backer ropes and hot poured material. In many small communities, contracted crack/joint cleaning and sealing would be advisable.

For information on sample specifications for cleaning and filling or cleaning and sealing procedures, contact the toll free Transportation Information Line (1-800-262-8498). These specifications are patterned after those used by the Iowa Department of Transportation.

John Bellizzi, director of public services, City of Des Moines.



Maintenance prolongs the life of asphaltic concrete pavements.

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Management considerations for roadside vegetation

Effective and economical roadside vegetation management depends on a variety of principles but perhaps the two most important tools of management are well-planned mowing and proper use of herbicides.

Plants growing in the right-of-way tend to be the same kind as those growing on adjacent land. Most variation in vegetation from place to place is due to differences in moisture and temperature.

During road construction or repair, disturbance of the natural vegetation along the roadside sets off a sequence of changes in vegetation as it recovers. Plants capable of growing in the first stages of succession are weedy forms common in untended gardens and fields: ragweed, pigweed, smartweed, ticklegrass, and horseweed. Most of these take advantage of an opening in the soil surface, produce seeds, and then die. These are replaced by dandelion, quackgrass, thistle, and other slower growing plants that live more than one year and are able to move into relatively new sites.

Self-maintained vegetation

Although naturally occurring plants may provide a self-maintaining characteristic, they usually are not acceptable as roadside vegetation.

In Iowa, the taller grasses and legumes are used in planting mixtures. These include Kentucky 31, fescue, switchgrass, wheatgrass, alfalfa, and birdsfoot trefoil. When the medians and foreslopes are mowed regularly, the short grasses and birdsfoot trefoil predominate. When mowing only every three or four years, the tall grasses predominate. Woody plants that spring up in the right-of-way should be allowed to grow if they are an acceptable species and are in a proper location.

Otherwise, they should be cut down. The more similar the roadside vegetation is to the natural surroundings, the less maintenance is required.

Objectives

The main objective of roadside vegetation management should be to provide a safe transportation corridor. Roadside vegetation should not distract the driver, yet should provide a certain flow of the countryside for the passengers. For economical and ecological reasons, roadside vegetation should be composed of species that are adapted to the locality in which they are used.

Secondary objectives of roadside vegetation management are to prevent erosion, to reduce the spread of noxious weeds, and to promote beauty. Scattered roses of the original Iowa prairie are attractive and self-maintaining in the roadside. Clumps of roadside flowers change with the seasons with little help from anyone and little expense to the public.

Following any type of soil disturbance, the quick establishment of a protective cover with a desirable species is of prime concern in reducing the potential for wind or water erosion and the spread of noxious weeds. Overseeding for a permanent cover and fertilizing can be done in early spring.

Mowing

Mowing is an important maintenance procedure. Mowing too high, too low, and too often may do considerable damage to the vegetation. Mowing standards in rural areas call for a mowing height not lower than six inches. However, in actual practice it is often four inches. This lessens the vigor of the more desirable plants and leaves the site more vulnerable

to erosion and invasion by noxious weeds.

If cut too low, the turf can be permanently damaged. In addition, low cutting produces hazards such as cans, bottles, and other debris thrown by the mowing equipment.

Herbicides

Traditionally, the use of herbicides has been associated with controlling noxious weeds in roadsides to prevent their spread into other areas. Selection of the proper herbicide, the proper time for application, and the proper target areas are all important considerations in a vegetation management program. Climatic conditions that bear close observation in the application of herbicides are wind, rain, and temperature. Be sure to follow the manufacturer's directions.

Harold Dolling and Dwaine Hockett,
landscape architecture, Iowa DOT

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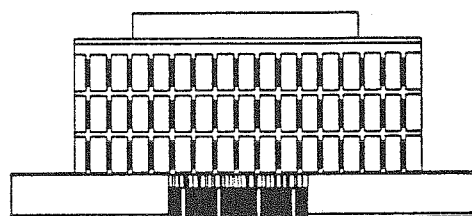
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civil engineering extension



Videotapes available for free loan

Eight videotapes showing various pavement maintenance procedures are available for free loan from the Local Transportation Information Center. Produced by the Portland Cement Association, the tapes are described below.

They may be borrowed by calling or writing our office (1-800-262-8498, Engineering Extension Service, Haber Road, Iowa State University, Ames, Iowa 50011). Be sure to specify the tapes by title.

#1 Recycling of existing "D" cracked pavement as aggregate for new pavement (16 min.)—The tape illustrates this procedure as it was used in a Minnesota project.

#2 Whitetopping (15 min.)—This tape shows treatment of a distressed pavement having thermal cracking up to 3 inches in width across the entire surface, including shoulders. Asphalt surface 2 inches thick was milled off and 8 inches of plain concrete pavement slipformed over the top. With skewed joints at 15-foot spacing, tining was eliminated at joints. This 17 mile project took place in Kansas on I-70.

#3 Designing for Quality (31 min.)—A 31.7 mile project on I-90/I-94 in Wisconsin is the subject of this tape. Old concrete recycled and used as coarse aggregate in new pavement is shown. This was the first use of epoxy-coated rebars in a CRCP pavement.

#4 An Engineering Decision—The Tied Concrete Shoulder (18 min.)—This project involved the undersealing of existing concrete pavement on I-20 and the full depth repair of approximately 800 square feet of pavement. Holes were drilled at 30 inch intervals, 12 inches deep. Tiebars were then grouted using a portland cement fly ash-expanding grout.

#5 Recycling Concrete (15 min.)—This tape depicts a 16 mile project in Minnesota that recycled a "D" cracked plain concrete pavement. Built in 1955, it had a cross-section of 9 inches—7 inches—9 inches and was 24 feet wide. Reasons for the consideration of concrete recycling are discussed. The decision to recycle resulted in a \$600,000 savings compared to conventional methods of construction.

#6 Iowa Bonded Overlay Project (12 min.)—A 9.1 mile project on I-80

in Poweshiek County is illustrated in this tape. A 4 inch bonded concrete overlay was placed on a 10 inch dowel pavement that had been in service for 20 years. Joints were cut at 70 foot spacing directly over the joints in the existing pavement. Four different methods of preparing the existing surface for the bonded overlay were used: roto-mill (not shown), diamond grinding, shot blast, and high pressure water spray.

#7 I-80 Reconstruction—Nebraska, 1984 (18 min.)—This shows three reconstruction projects involving the removal of existing 9 inch mesh-dowel pavement and the reconstruction of 12 inches of plain concrete pavement with tied concrete shoulders. Also included is a shoulder test section on I-80 near Lincoln.

#8 Recycling Continuously Reinforced Concrete Pavement on I-29 in North Dakota (15 min.)—In this project, the existing pavement was 9 inch continuously reinforced with asphalt shoulders. The new pavement is 9 inch plain pavement with a 15 foot randomized joint spacing and tied concrete shoulders. The new concrete used new fines and the recycled material passing the #4 sieve was used as a subbase for the pavement.

Newsletter survey response is positive

Technology News serves a variety of groups, and, thanks to responses to the questionnaire included in the December issue, the newsletter staff hopes to be better able to serve your needs.

Of the 92 responses received, all said the newsletter was read regularly, and 94 percent described it as being appropriately technical in nature.

On a scale divided into the categories of "very useful," "useful," "adequate," "of limited use," or "not useful," 95 percent of the respondents rated the newsletter as "useful" or "very useful."

Of those who had attended a conference or workshop, 94 percent

described it as a "useful" or "very useful" service.

Approximately 33 percent of those replying had called the Info-Line, which was also rated "useful" or "very useful."

Just over 50 percent had ordered a publication listed in the newsletter, and all but two of the 38 respondents listed it as "very useful," "useful," or "adequate."

Subject areas covered by the newsletter that were found to be most helpful (in order of popularity) were new methods and materials, pavement maintenance, publications available, tort liability cases, conference announcements, snow control, pothole patching, transporta-

tion legislation, and equipment maintenance.

Additional information was requested in areas concerning highway safety, funding for small communities, computer usage and software, reconstruction of brick streets, vegetation control, A.I.E. services, drainage engineering and drainage system maintenance, patch and seal coating, cost-saving innovations, asphalt "sprinkle treatment" research, street condition evaluation, new or proposed legislation, and Iowa DOT, FHWA, and FAA programs.

The Local Transportation Information Center appreciates your suggestions, and will do its best to serve those needs in the future.

tips from the field

About four years ago, the Spencer Public Works Department devised a free-standing rack for sign storage. Originally intended as a drying/cooling rack for new signs, the department found that the structure was also useful for permanent sign storage.

The basic frame consists of steel city angle iron and pre-cut 2 x 4 economy studding. The steel city angle iron is used for the vertical supports, and is perforated and punched on 1 inch intervals so that the horizontal members can be adjusted. The overall dimensions are 8 feet x 3 feet x 6 feet.

The 2 x 4s compose the horizontal portion of the structure, with four required per sign row. The midpoint of the studding is supported by a leg of 3/4 inch square tubing to prevent the 2 x 4s from sagging from the weight of the signs.

Slots cut at 1-inch intervals on the studding support the signs vertically during storage. The slots are 1/8 inch wide and 3/4 inch to 1 inch deep, allowing the signs to be slid in and out with relative ease. Signs are stored on both sides of the stand; however, the studding on each side can be adjusted to different fits.



This easy-to-make storage rack protects signs and simplifies inventory control.

Storage capacity will vary according to sign size, but approximately 500-12 inch x 18 inch, or 250-18 inch x 24 inch signs will fit on one side of the stand.

Major benefits of the rack are that it reduces damage to signs during storage, and allows the reflective qualities of the faces to be preserved. The stand requires less room than traditional storage methods and, because of its adjustability, provides an easy answer to storage problems created by odd-shaped signs.

In addition, the stand is a quick and efficient means of inventory control. The slots may be color-coded and numbered, and reorder points can be established that will indicate when the inventory drops below a specified level.

The storage rack is fairly simple to make, and relatively inexpensive, costing approximately \$50 for materials. It is the only sign storage stand of its type in the nation.

For more information, contact Chuck Fisher, director of public works, Spencer, Iowa; phone 1-712-262-6456.

Traffic signal software available

Three pieces of traffic signal software are currently available from the University of Kansas Transportation Center.

EZ-POSIT (Program for Optimizing Signalized Intersection Timing) is used to analyze signal timing plans for single intersections. Based on traffic and geometry data, the program can find the optimal timing plan, including cycle length and phase patterns, that minimizes the fuel consumption rate. A \$15 fee is charged for the program to cover copy and shipping expenses.

EZ-PASSER (Progression Analysis and Signal Evaluation Routine) is an optimized and interactive implementation of PASSERII-80, a general purpose program designed to assist the traffic engineer in determining optimal traffic signal timing for arterial streets where progression is desired through signals having more than one arterial signal phase. The price of the program is \$250, or \$150 for EZ-TRANSYT and EZ-POSIT users.

Both EZ-POSIT and EZ-PASSER are available for IBM MS-DOS and Apple UCSD p-System computers.

EZ-TRANSYT is a powerful input data processor that guides the users to generate virtually error-free input data files for TRANSYT-7F. The program allows the user to maintain a traffic data base that can be updated very easily. The price is \$95, and it is available for the IBM MS-DOS system.

For more information, contact Hobih Chen, Transportation Center, 2011 Learned Hall, University of Kansas, Lawrence, Kansas 66045; phone 1-913-864-5658.



**Transportation
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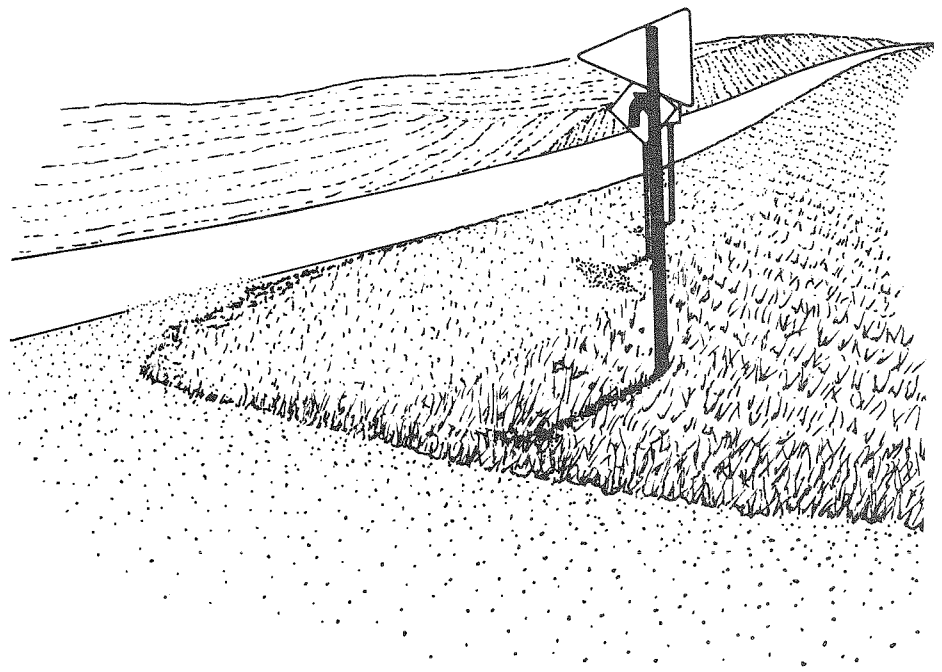
Too many signs lead to a liability problem

Allegations of negligence against an Iowa county have typically involved failure to use one or more traffic signs that allegedly were needed. However, the message afforded by at least one recent case is that a county can also be found negligent for using too many signs.

The incident giving rise to this lawsuit occurred when an automobile traveling south on a gravel road proceeded from a stop sign directly into the path of a motorcycle approaching from the west on a paved county road.

The driver of the automobile claimed that her view of the oncoming motorcycle was restricted by the presence of three signs to her right that were placed on the north shoulder of the paved road. A No Passing Zone pennant was located approximately 55 feet to her right and 13.5 feet from the edge of the pavement. Thirty-three feet farther west was a curve warning sign located 10.1 feet from the edge of the pavement. A route marker was 21.5 feet farther west and was placed 7.6 feet from the roadway edge. The two roads intersected at an angle of approximately 77 degrees.

Testimony at the trial indicated that, with the driver in a particular position, the three signs aligned in a manner that restricted the view of a portion of the paved road to the west. Assuming that the approaching vehicle was proceeding at average highway speeds, the actual sight restriction lasted for approximately one second at a point when



The alignment of three signs blocked the driver's view.

the approaching vehicle was about 350 feet from the intersection.

The trial in this case reportedly resulted in a five-figure judgment against the county that controlled the roads.

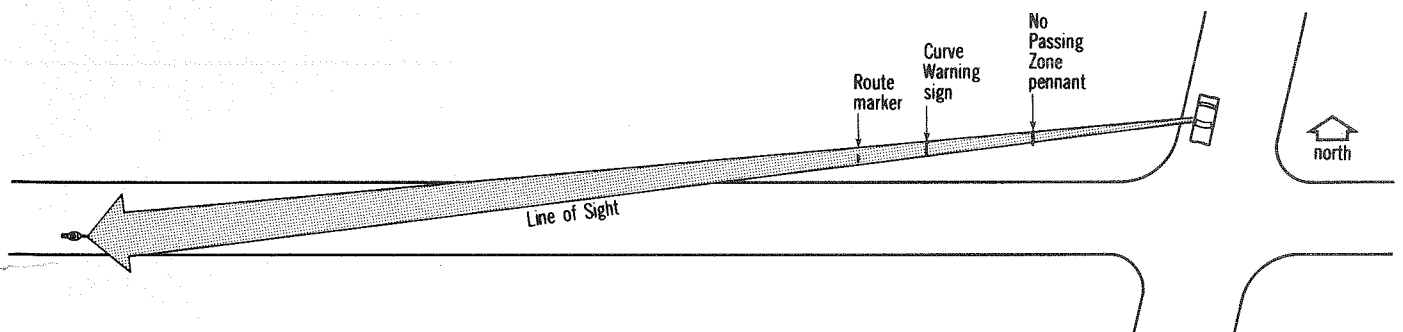
Although the culpability of the county in this case may be questioned, the county's position would have been more defensible if the guidelines for the positioning of signs contained in the *Traffic Control Devices Handbook* had been followed.

The *Handbook* suggests spacing signs for different purposes a minimum of 200 feet apart, if possible. In this case, it was possible to relocate

both the curve warning sign and the route marker farther west to more closely approach the desired 200 foot longitudinal spacing. Further, if all signs had been placed at the recommended lateral spacing of 12 feet from the edge of the pavement, they would not have aligned in a way that produced a sight restriction on the traveled portion of the approaching roadway.

A review of section 2C-1 of the *Handbook* is suggested for those readers who are responsible for the placement of highway signs.

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



The oncoming motorcycle was about 350 feet from the intersection when the one-second sight restriction occurred.



ATSA Guide for Work Area Traffic Control

Available free from the Local Transportation Information Center, ISU. Call the Info Line.

This pocket-sized handbook illustrates typical traffic control setups for various work zone situations. Ideal for supervisors, project engineers, foremen, and others who plan or implement traffic control in work areas, this 48-page book contains 27 illustrations with information on proper use, maintenance, and servicing of devices. The guide is in complete compliance with the federal MUTCD and includes additional "how-to" information.

National Urban Mass Transportation Statistics

Available on loan from the Local Transportation Information Center, ISU.

This report summarizes the financial and operating data submitted annually to the Urban Mass Transportation Administration by the nation's public transit operators. All data are for the 1983 calendar year.

State-of-the-Art Asphalt Pavement Specifications

Available on loan from the Local Transportation Information Center, ISU. Also available from the U.S. Department of Transportation—FHWA, Research, Development and Technology, Turner-Fairbank Highway Research Center, 6300 Georgetown Pike, McLean, Va. 22101. Order # FHWA/RD-84/075.

This report reviews the early development of specifications, the current status of quality control and acceptance plans, and summarizes problems in the use of asphalt pavements.

Practical Guidelines for Minimizing Tort Liability

NCHRP—Synthesis of Highway Practice 106

Available on loan from the Local Transportation Information Center, ISU, or by purchase from the Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave. N.W., Washington, D.C. 20418.

This report recommends that tort liability risks must be managed. The

implementation of an effective program requires organizational structure, staffing, and training personnel. This synthesis of practice reviews the state-of-the-art in this concept.

Transportation Research Board Publications Catalog—January 1985
Available from the Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave. N.W., Washington, D.C. 20418.

This publication lists all of the TRB publications currently in print, according to both subject and series listings. It's very useful as a reference source.

And justice for all

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