

roads bridges transit technology news

Local Transportation Information Center
Iowa State University Engineering Extension Service

Nebraska Edition
September 1983

Introducing the Local Transportation Information Center

Iowa State University was recently designated a "Technology Transfer Center for Local Transportation" by the U.S. Department of Transportation, the Federal Highway Administration (FHWA) and the Iowa Department of Transportation.

Most of you are painfully aware of the major transportation problems facing our small urban and rural areas. Streets and roads are in disrepair or are obsolete, with no improvement funds available. Bridges require a large capital investment. The new construction and reconstruction funds needed have not been available for the past few decades.

Communities also have seen the decline of private taxi and transit operations. In many

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areas, the social service's transit operation for the elderly or disabled is the only public transportation available. The deregulation of the intercity bus industry has had and will continue to have a major effect on public transportation services between communities. Only a few communities are served by intercity transit and the situation will probably deteriorate.

Congress is increasingly aware of the decline of these elements of our nation's infrastructure. They funded the Rural Technical Assistance Program (RTAP) to address these problems. Several programs, including ISU's project for technology transfer to local transportation agencies, are now available through the FHWA.

The goal of ISU's Local Transportation Information Center is to share new research and updated information so that it is useful to you in your daily operations. In order to carry out this program, the Center will:

- * Publish the Technology News newsletter to disseminate technical information, innovative ideas, helpful hints and details about upcoming educational programs.

- * Develop a service to provide technical materials. Publications, films, slide/tape sets and other resource materials will be reviewed in this newsletter and made available to you upon request.

- * Conduct short courses, training schools and workshops on various aspects of local transportation. In general, these schools will offer an opportunity for hands-on learning. They will be conducted throughout the state to minimize your travel. Cost will be minimal.

These are the activities which we envision in this federally supported project. We hope those of you who are concerned with local transportation services and facilities will soon be aware of the center and will utilize the services offered.

We will periodically conduct surveys of your needs. Please call me if you have any questions. My phone number is 515/294-6777 -- Stan Ring, Project Director.

tips from — — — the field —

In Polk County there is an interlocal agreement whereby the county and towns cooperate on maintenance and construction of roads and streets. For example, we are working together to repair potholes. In the summer we mix a cold mix windrow for patch material and deliver it to towns to stockpile for use as needed during fall and spring. This approach works fairly well on existing armor coat and hot mix streets.

We also make saw cuts for utilities in concrete streets and replace with the same material. I have suggested that the towns start to use a utility concrete for backfill in utility trenches under paved streets. I recommend a mix of one or two sacks of utility concrete with sand and gravel per cubic yard with an approximate PSI of 1000 to 1500 pounds. The cost would be approximately \$25 to \$30 per yard. Small towns lack the necessary backfill equipment to get compaction in their trenches. I believe this method should solve the problem.

In addition, the towns of Polk county have started to upgrade utilities with new material and are relocating, where possible, when paving is planned on their streets. Nothing is more unfortunate than tearing up a nice paved street shortly after it is built because of a broken water or gas line.
—LeRoy G. Gerrard, Polk County Highway and Street Superintendent, and City Superintendent for Shelby, Osceola, Stromsberg and Polk

Hall County uses precast concrete box culverts

The Hall County Highway Department is exploring the potential use of precast concrete box culverts. Located in the Platte River Valley, Hall County is quite flat (5' fall per mile). So, we were looking for a low clearance structure.

The first concrete precast concrete box culvert was installed just south of Grand Island on the road to the Hall County Park. This road was programmed to be surfaced and we needed a structure quickly to replace a narrow I-beam bridge. The county purchased the precast box because it could be installed quickly by county forces in preparation for the surfacing. The box was installed and steel sheet pile driven for wing walls.

Hall County has 218 small bridges and culverts where this type of structure could be used. The structures put in were laid on a sand fill and struck off like concrete. Since that time we have installed at 11 different locations precast boxes ranging from 8' x 3' to twin 10' x 5' boxes. The last

boxes we installed were post-tensioned. The fabricator installed a conduit in all four corners of the structure so a cable could be installed to pull all the sections together. We think this will keep the structure as one unit. In case of erosion the sections will stay together.

We had the fabricator make a tapered end section with a 3:1 slope on it. This makes the installation look clean.

We also installed concrete parking curbs at the edge of the box forming a parapet wall.

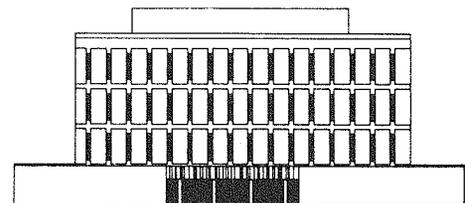
The advantages of this type of installation are its quick removal and installation. Within three days the old structure can be taken out and the new structure opened to traffic. No forming or curing time is involved. Furthermore, the cost of the structure is comparable to a poured in place concrete box. —Daniel J. Hostler, Public Works Director, Hall County Highway Department.

And justice for all
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civil engineering extension



Pothole patching procedure

Most potholes result from the effects of winter freeze-thaw cycles. When temperatures are above the freezing point, water seeps into the cracks and crevices of the pavement. When temperatures fall below the freezing point, water expands, causing enormous pressure. The weight of the passing vehicles creates additional pressure which, coupled with the pressure of freezing water, causes a fracturing action, creating small holes. The cycle is repeated over and over as long as water is available and freezing and thawing occur, thereby expanding the pavement holes.

Other reasons for pothole occurrences are insufficient paving thickness, poor drainage and failures at utility trenches and castings.

The recommended procedure for permanent pothole repair is as follows:

Square up hole sides and remove fractured surfacing to firm and dry support.

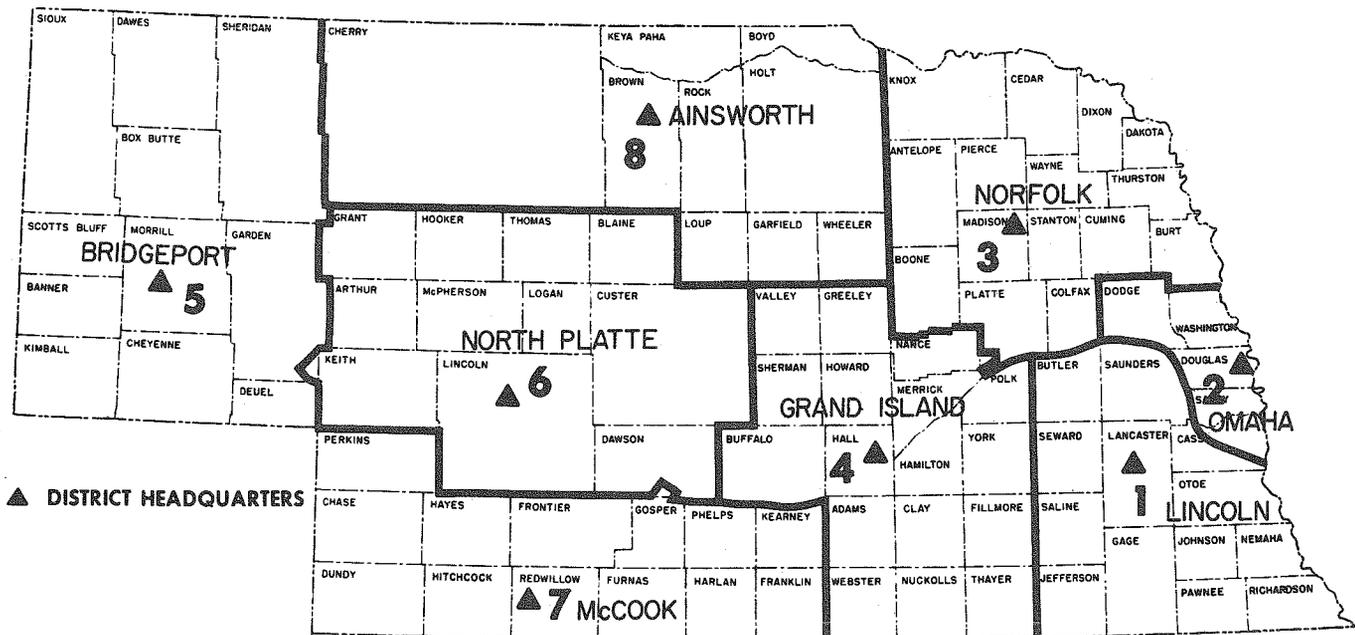
Apply tack coat of liquid asphalt. Place full depth asphalt mixture to a level above surrounding pavement.

Compact to surrounding pavement level, adding asphalt mixture as needed.

It is important to note that the greatest emphasis should be placed on shaping the hole and compacting the mix. Long term observation of pothole repairs has indicated that the above repair procedure will last up to 10 times longer than the old standby of fill hole in one lift with mixture and compact by hitting with the back of the shovel.

Remember, your suggested pothole repair program should include a trained 'pothole supervisor,' proper equipment and, last, but not least, a first class asphalt mixture.
John Bellizzi, Director of Public Services, City of Des Moines

Nebraska highway districts



District 1
 R. J. Stutzman
 Lincoln
 (402) 474-4987

District 2
 Wilbur Hattan
 Omaha
 (402) 331-4661

District 3
 Thomas P. McCarthy
 Norfolk
 (402) 371-2170

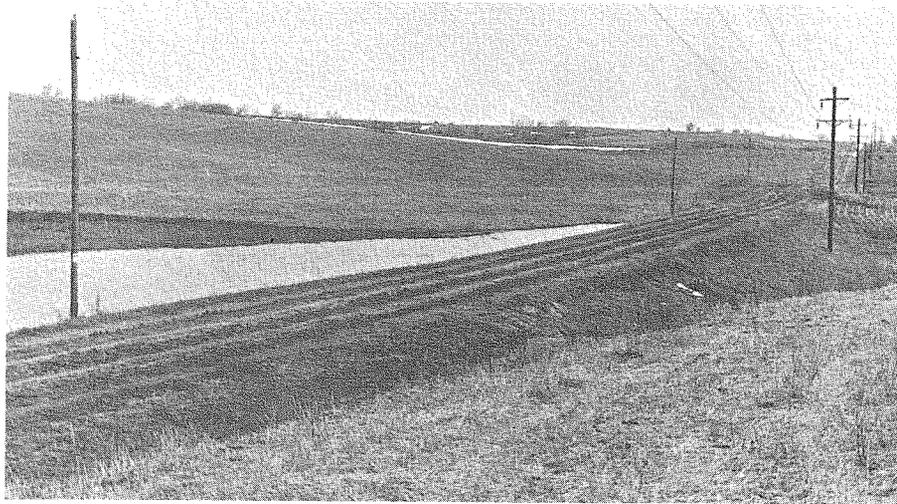
District 4
 Andrew Necas, Jr.
 Grand Island
 (308) 382-1969

District 5
 James R. Jensen
 Bridgeport
 (308) 262-1280

District 6
 Lester D. O'Donnell
 North Platte
 (308) 532-1115

District 7
 Virgil Wagner
 McCook
 (308) 345-3335

District 8
 John E. Klatt
 Ainsworth
 (402) 387-2471



Roadway dam shows how water is held on the upstream and controlled on the downstream side, providing a wide roadway in the process.

In some places, such as a curve or a corner, a roadway dam is not practical. Also, the upstream landowner must consent to have water stored on his property. The land near the stream is often the best farmland and therefore too valuable for the farmer to give up.

But when he or she does consent, the farmer becomes the owner of a good place to water livestock as well as an excellent fishing hole. Wildlife is attracted to the water and the area may become a nesting ground, providing game for a wide area.

The owner of the land downstream from the roadway dam will benefit because controlling the water flow will prevent considerable erosion of the land.

Lindholm said he would like to see two to five bridges a year replaced by roadway dams in Saunders County. The NRD managers would also like to see more use of roadway dams because of the soil and water benefits.

The NRDs assist in the design of roadway dams and also share the cost of putting them in place in their districts.

The goals of conservation and saving in dollars can be realized with the counties and the natural resources districts working together. A good example of this is an old wooden railroad overpass that was removed north of Cedar Bluffs (on the recently abandoned Chicago and Northwestern Railroad) and a roadway dam constructed.

Seminar improves county/township relations

The Saunders County Board of Supervisors has an excellent working relationship with its 24 townships. Part of this relationship is due to excellent communication between both governmental agencies.

Every four years an all-day seminar is sponsored by the Saunders County Supervisors to acquaint newly elected officers with the responsibilities of township boards and to refresh the memories of re-elected officers.

Discussed in detail at this year's workshop were the specific criteria for possible minimum maintenance roads. Safety and liability were stressed. Questions asked by those attending indicated interest and understanding in maintaining roads in rural areas. The response was excellent.

An excellent film, "Maintaining Granular Surfaced Roads," was presented. It showed the actual operations involved in maintaining low volume traffic roads, the type with which the townships are involved. The film was obtained from the FHWA office in Lincoln.

Considering the seven percent lid, if the townships did not have their own budgets the quality of Saunders County road system would suffer greatly.

What would you like to read about?

- pothole patching
- pavement design
- pavement reconstruction
- street & road signing
- transportation funding
- bridge inspection
- training course opportunities

Help us prepare a useful newsletter.

Please let us know what subject matter is of interest to you. Check as many items as you wish or write in others.

Mail to: Technology News, 110 Marston Hall, ISU, Ames, Iowa 50011.

- street maintenance practices
- street maintenance equipment
- urban drainage practices
- tort liability
- transit routing
- bridge rehabilitation
- self study opportunities

Other: _____

Saunders County Roadway dams replace old bridges

In the early part of this century, county and township officials authorized construction of thousands of bridges as the network of rural roads was improved. The ever-growing agricultural economy demanded better roads to link the farmer with his marketplace and the automobiles that were becoming more commonplace required something better than rutted trails that dipped through streams at shallow points or crossed them on rickety spans.

The best available technology and materials of the day that could be afforded went into the building of the bridges, many of which are still in use today. But time, the elements and the increasing size and weight of the loads they have to bear are taking their toll on those old bridges. Using federal and state guidelines that went in effect a few years ago, inspectors have, in effect, condemned many of the old bridges by restricting the weight which they could safely support. Signs were required to warn of the load limits which frequently were much lower than the weight of modern farm equipment or trucks loaded with grain or livestock.

Prior to the existence of the Natural Resources Districts, Saunders County had been installing roadway structures with drawdown pipes for many years. Since the creation of the Natural Resources Districts and their participation in the funding, this program has been greatly accelerated.

Saunders County Highway Superintendent Bill Lindholm reported that of the 751 structures in his county, 294 have been termed as deficient, 75 of which are considered extremely so.



Work nears completion on this roadway dam in Saunders County.

Lindholm and many others, including Alvin T. Smith, general manager of the Lower Platte North Natural Resources District, and Glenn Johnson, general manager of the Lower Platte South Natural Resources District, believe many of those old bridges can and should be replaced with roadway dams. A roadway dam can be built cheaper than a traditional bridge, can carry larger and heavier loads, is safer and is also a valuable conservation tool.

It costs from \$1000 to \$1500 a linear foot to build a typical modern bridge. A 60-foot span, not uncommon on rural roads, would cost between \$60,000 and \$90,000 to build while a roadway dam at the same site would probably cost only half that amount.

The roadway dam is relatively maintenance free after it is built while the bridge will require periodic repainting and repairs. Although a bridge may be new, it can still be a traffic hazard because it's

usually narrower than the existing road and some of the repair work will involve replacing guard rails or other parts damaged by vehicles.

Maintenance and repair of a roadway dam is little different than the work needed on the road itself except for an occasional log that needs to be removed from the inlet.

Because its traveling surface is as wide as the existing road, the roadway dam can be negotiated easily by the large and wide farm equipment that trundle along the rural roads.

Roadway dams help control flooding and erosion by holding back water on the upstream side and limiting its flow downstream and so in many instances help communities that otherwise would be subjected to flooding from overflowing streams.

A decision on whether to build a roadway dam in place of a bridge is based largely on geographic and financial considerations.



The Pothole Primer: A Public Administrator's Guide to Understanding and Managing the Pothole Problem is a 24 page publication prepared by the U.S. Army Corps of Engineers. This non-technical well-illustrated booklet is designed to assist elected officials and non-engineering administrators in understanding the major causes and general solutions to pothole problems in asphalt pavements. It includes information on legal and public relations aspects of safety; identifying and cataloguing pothole causes; drainage; preventive maintenance programs; patching procedures and training and education.

The Pothole Primer is provided in the course notes at the Street Maintenance for Small Communities Workshop. It is available free of charge by writing Stan Ring, Local Transportation Information Center, 110 Marston Hall, ISU, Ames, 50011.

Pavement Patching Guidelines provides how-to recommendations for both hot mix and cold mix materials. This FHWA manual describes techniques of constructing permanent patches for hot and cold mix and a temporary patch using a cold mix. Patching of flexible, rigid, and composite pavements is discussed. Techniques include use of bituminous and portland cement patching materials. Pavement distress and causes are indexed to the recommended repair procedures. A valuable resource for those concerned with street and road maintenance. Well illustrated, 72 pages. Available free from the Local Transportation Information Center. Write to 110 Marston Hall, Iowa State University, Ames, Iowa 50011.

Street maintenance workshops offered

A one day workshop on street maintenance for small communities will be held in North Platte October 12 and in Lincoln October 14. The workshop is for street superintendents and others involved in maintenance programs.

The workshop content will emphasize techniques, specifications and construction procedures for both Portland cement concrete and asphalt concrete pavements.

Instructors will be Harold Smith, city engineer and John Bellizzi public works director for the City of Des Moines.

Registration fee is \$10 and includes lunch and a notebook containing all information presented. If you do not receive registration information contact Delmar Motycka 402/473-4607 or Walter Witt 402-423-4601 or Bill Bowmaster 402/472-2844.

Sponsors are the University of Nebraska, the Nebraska State Department of Roads and the Local Transportation Information Center.



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