TECHNOLOGY NEWS
Iowa's Local Technical Assistance Program (LTAP): providing transportation technology transfer for Iowa's cities and counties

March–April 2002

Acronyms in this issue

AASHTO	American Association of State Highway and Transportation Officials
CTRE	Center for Transportation Research and Education
FHWA	Federal Highway Administration
Iowa DOT	Iowa Department of Transportation
ISU	Iowa State University
LTAP	Local Technical Assistance Program
MUTCD	Manual on Uniform Traffic Control Devices

Low-volume road lessons from the Land Down Under

ENGINEERS and road builders in Australia and New Zealand have a penchant for technical excellence and careful research. With this mindset and little money to waste, they have come up with some solutions for maintaining and upgrading aggregate roads that deserve careful consideration in the Upper Midwest.

Such is the conclusion of Charles T. (Chuck) Jahren, Iowa State University professor-in-charge of construction engineering. While on sabbatical from ISU recently, Dr. Jahren studied a number of road-building practices, including seal coating, hot mix asphalt, and stabilization, in Australia and New Zealand.

This article briefly describes Australian practices; New Zealand practices will be covered in a future issue of *Technology News*.

Australia's road network

With a land mass 78 percent that of the United States, Australia has just 20 million people, 85 percent of whom live in the urban areas of Melbourne and Sydney. Ninety percent of vehicle miles are thus driven on 20 percent of the roads.

Of the country's 500,000 miles of roads, 40 percent are bound surface, 40 percent are aggregate, and 20 percent are natural surface.

"Whinging" (Aussie lingo for complaining) about road conditions is not common in Australia, where maintaining some 400,000 miles of rural roads at the service level expected by most Americans is simply cost prohibitive. Accustomed to driving long distances in the outback, for example, Australian motorists are more tolerant than Americans of dust on gravel roads and less likely to blame a transportation agency for damage to their autos from flying rocks.

Another difference between countries is that there is no highway trust fund in Australia, which means all transportation funding comes out of general funds,

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It's not uncommon in Australia to see four-wheel drive vehicles with bullbars (to protect the radiator and headlights from errant kangaroos) and snorkel (black air intake pipe going up the right windshield support with air cleaner on top, to get the air intake above the road dust). *Photos here and bottom of page 3 courtesy of Chuck Jahren.*

Center for Transportation Research and Education IOWA STATE UNIVERSITY

Preparation of this newsletter was financed through LTAP, a nationwide effort financed jointly in Iowa by the FHWA and the Iowa DOT. Iowa's LTAP is housed and administered at ISU's Center for Transportation Research and Education (CTRE).

The mission of Iowa's LTAP: To foster a safe, efficient, environmentally sound transportation system by improving skills and knowledge of local transportation providers through training, technical assistance, and technology transfer, thus improving the quality of life for Iowans.

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Laser scanning can improve project efficiency

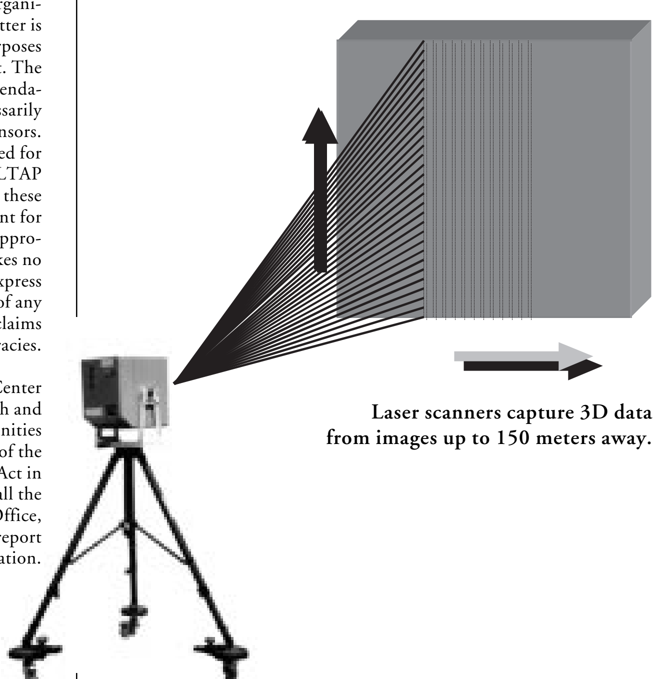
LASER SCANNING is a state-of-the-art technology with the potential for improving the efficiency and cost-effectiveness of many highway and bridge projects. Laser scanning provides a fast and accurate method for gathering three-dimensional (3D) data to use in surveys, design models, and construction.

How laser scanning works

A laser scanner is taken into the field, attached to a laptop computer, and directed toward a structure up to 150 meters (490 feet) away. A laser beam pulses from the scanner toward the structure (see figure below), capturing detailed 3D data at approximately 2,000 data points per second. Captured data are stored in the computer and can be immediately viewed as a 3D "point cloud" image on the screen. This cloud of points is a dimensionally accurate representation of the existing object.

Laser scanner capabilities

Further enhancements, such as "shrink-wrapping" (a process that makes images clearer), can be made using the capabilities of available laser scanning software. Scanned data can also be exported to CAD applications such as AutoCAD and MicroStation. If desired, two-dimensional drawings can be created from the three-dimensional models.



Laser scanners capture 3D data from images up to 150 meters away.

The 3D models generated through laser scanning include extensive detail and allow for fast and accurate measuring. The virtual database that is created can be used to design modifications to an existing structure or to design new structures.

Though a fairly new technology, laser scanning applications are already being used to improve efficiency in many different areas, as illustrated by the examples below.

As-built surveys. When accessibility and safety issues prevent a traditional survey, laser scanning offers an excellent alternative. Laser scanning can be used to perform accurate and efficient as-built surveys and before-and-after surveys. Inaccessible locations, complex arrangements, and hazardous locations can all be easily modeled.

Construction design. Construction design is one of the largest areas for 3D modeling development. Designing construction projects using 3D modeling has been found to have many benefits:

- Coordination issues can be minimized with virtual design and construction.
- 3D modeling provides efficient generation of multiple views.
- The 3D modeling process can generate automated bills of material.
- Data generated through laser scanning and modeling can be efficiently integrated into analysis software.

Transportation applications

There are many benefits to using laser scanning for highway design, including the ability to survey during heavy traffic times without positioning surveyors in the roadway and without closing the road. Laser scanning has been successfully utilized for highway widening projects and for creating as-built drawings of bridges to assist in modifications.

The Pennsylvania Department of Transportation used laser scanning to efficiently generate a 3D rendering of an existing bridge (see figure, top of page 3). This process has the potential to significantly reduce the costs of many highway and bridge rehabilitation projects.

In addition to many other potential transportation applications, laser scanning also provides an

LASER SCANNING . . . continued top of next page

LASER SCANNING . . . continued from previous page

excellent method for rebar tie-wire inspection, assessing potholes, and inspecting roads for rutting.

For more information
For more information contact Associate Professor Edward Jaselskis, Department of Civil and Construction Engineering, Iowa State University, 515-294-0250, ejaselsk@iastate.edu. •

Laser scanned 3D images of existing bridges, like this one in Pennsylvania, could help agencies reduce rehabilitation costs.

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making it "very political," according to Dr. Jahren. In the state of Western Australia, all maintenance has been privatized.

Road building basics
Gravel roads. More progressive road agencies build gravel roads with a four percent cross fall that allows them to shed water and resist pothole development. Gravel roads are built in two layers: a strong bottom layer with clean crushed stone to provide strength, and a top layer of crushed stone mixed with clay binder to mitigate dust and corrugation.

Paved roads. Most paved roads in Australia (including a few four-lane expressways) are actually layers of unbound aggregate with a seal coat surface. Superior quality control of the base construction process helps make this method successful. However, differences in weather, vehicle loads, maintenance practices (these can be fragile roads that require immediate maintenance action when problems develop), and user expectations (sometimes these roads do get bumpy as they age) may cause challenges if we attempt to transfer the technology here.

Australians' road use expectations are slightly different from ours.

Cementitious stabilization. Seal coat roads are often rehabilitated through cementitious stabilization. Australia's and New Zealand's practices minimize additive requirements and add quality control efforts in comparison to our regional practice.

For more information
The Minnesota Local Road Research Board funded a report of Dr. Jahren's findings. For a copy, call the Minnesota Department of Transportation's Office of Research Services, 651-282-2274. Ask for report number P2002-01. It is also online: mnroad.dot.state.mn.us/research/. (Click on "Products," then on "Online reports.")

For additional information, contact Dr. Jahren, 515-294-3829, cjahren@iastate.edu. •

This article is adapted, with permission, from one in the spring 2002 issue of The Exchange*, the newsletter of the Minnesota LTAP program, University of Minnesota. Our thanks to Pamela Snopl, managing editor.*

Low water stream crossings: Affordable alternative to bridge replacement

LWSCs are recommended only on unpaved or primitive roads, field access roads, roads with no inhabitable dwellings, low traffic volume roads, and roads with alternative routes available during flooding.

MOST IOWA counties have low volume roads with at least one structurally deficient or obsolete bridge; in some counties, the percentage of faulty bridges may be as high as 62 percent. Replacing all such bridges with structures of similar size would require large capital expenditures that many counties simply can't afford.

Fortunately, in certain situations, constructing low water stream crossings (LWSCs) may be an acceptable, low cost alternative. LWSCs are particularly suitable across streams where the normal depth of flow is relatively low.

A recent ISU study provides recommendations for selecting, designing, and constructing LWSCs. The study, *Low Water Stream Crossings: Design and Construction Recommendations,* involved an extensive literature search, a survey of Iowa county engineers, and innovative analytical studies. It was sponsored by the Iowa Highway Research Board (TR-453) and conducted by Robert Lohnes, university professor, and Roy Gu, associate professor, in the Department of Civil and Construction Engineering, with Tom McDonald, safety circuit rider at CTRE.

LWSC sites, types, and designs should be selected carefully, because such crossings may be flooded periodically, requiring the road to be temporarily closed to traffic.

Determining LWSC candidates

The following factors should be considered when identifying potential LWSC sites:

Road use. Average daily traffic (ADT) of less than five vehicles is ideal. A LWSC should not be constructed along roads that provide critical travel routes or where a future increase in traffic is expected.

Road type. LWSCs are recommended only on unpaved or primitive roads, field access roads, roads with no inhabitable dwellings, low traffic volume roads, and roads with alternative routes available during flooding.

Roadway geometry. Approach grades should be less than 10 percent. Projected height between road approach and LWSC surface should be less than 12 feet.

Stream characteristics. Stream channel should be stable with regard to both degradation and lateral migration.

Cost. The cost of constructing an LWSC should be considerably less than the cost of replacing a bridge/culvert.

Selecting LWSC type

Once a site has been determined to be an LWSC candidate, the type of crossing should be selected. There are three common types of LWSCs: unvented fords, vented fords, and low water bridges.

- *Unvented fords* are constructed of crushed stone, riprap, or precast concrete slabs to provide a stream crossing without the use of pipes.

  Unvented fords are best suited for streams that are dry most of the year or where normal streamflow is less than six inches deep, at a low velocity. Unvented fords are the least costly of the three LWSC types.

- *Vented fords* (see photo, top right) use pipes under the crossing to accommodate low flows without overtopping the road. High water will periodically flow over the crossing. The pipes or culverts may be embedded in earth fill, aggregate, riprap, or portland cement concrete.

  Vented fords should be considered where the normal depth of flow is calculated to exceed six inches over a raised unvented ford. A vented ford can usually be constructed for $15,000–$20,000.

- *Low water bridges* (see photo, bottom right) are flat-slab bridge decks constructed at about the elevation of the adjacent stream banks, with a smooth cross section designed to allow high water to flow over the bridge surface without damaging the structure.

  Low water bridges are the recommended LWSC choice where normal stream flows exceed the capacity of a vented ford or where the watershed has a high potential for debris that might clog the pipes of a vented ford. A low water bridge is also an appropriate alternative where the ADT exceeds five vehicles per day or where the road is relatively important, regardless of stream size. A normal low water bridge costs about $40,000–$50,000 to construct.

Vented ford with pipes
(Tama County, Iowa)

The Iowa Code gives boards of supervisors authority to establish reduced maintenance levels for certain roads under their jurisdiction. It is under this authority that decisions to construct LWSCs can be made.

Design and construction considerations

Specific recommendations for material selection, design, construction, and signing for each of the LWSC types are given in the *Low Water Stream Crossings* report. The following elements should be considered in any LWSC design:

- Roadway approaches should be designed to provide a smooth transition, with acceptable approach grades of less than 10 percent.
- The approach should have a 750-foot minimum sight distance for warning signs.
- The channel cross section should not be altered.
- Vegetation should be established to provide stream bank protection.
- Stream bank height should not exceed 12 feet.
- Height of crossing above stream bed should be less than four feet.
- Overtopping depth for normal flow should be less than or equal to six inches.

In addition, for vented and unvented fords, cutoff walls and minimum 4:1 sidewalls (foreslopes) should be provided for core material protection and safety. Aprons should be included with pipes.

Limiting liability

The Code of Iowa Section 309.79 states that all bridges and culverts must comply with design standards and specifications furnished to local agencies by the Iowa DOT.

However, the Code also gives boards of supervisors authority to establish reduced maintenance levels for certain roads under their jurisdiction. It is under this authority that decisions to construct LWSCs can be made.

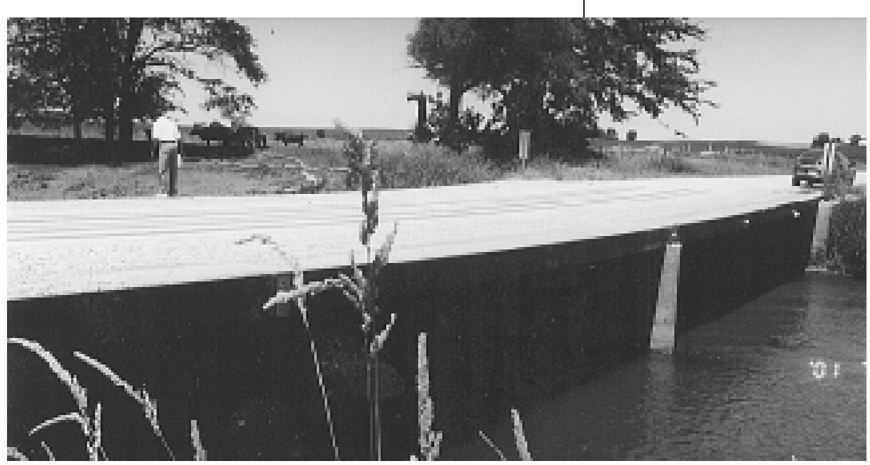
To minimize exposure to tort liability, local agencies using low water stream crossings should adopt reasonable selection and design criteria and provide adequate warning ahead of these structures to road users. Recommended placement of "Flood Area Ahead," "Impassable During High Water," and "Do Not Enter When Flooded" signs is provided in the report. Proper placement of these signs, along with an illustration of a suggested typical layout for signing an LWSC, is also described in *Iowa Traffic Control Devices and Pavement Markings: A Manual for Cities and Counties* (TCD manual), an Iowa Highway Research Board sponsored project (TR-441).

For more information

The *Low Water Stream Crossings* report is available on CTRE's website, www.ctre.iastate.edu/research/search.cfm. The TCD manual is also online: www.ctre.iastate.edu/pubs/itcd/index.htm.

For more information, contact Dr. Lohnes, 515-294-8746, rlohnes@iastate.edu; or Dr. Gu, 515-294-4534, roygu@iastate.edu; or Tom McDonald, 515-294-6384, tmcdonal@åiastate.edu. •

Low water bridge
(Benton County, Iowa)

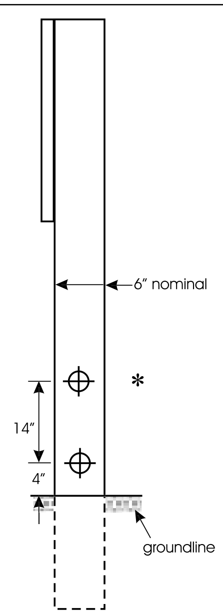


Two new MUTCD requirements

New post and support requirements do not have a phase-in period; therefore, they should be considered effective immediately.

The new crossbuck standard has a 10-year compliance period, but implementing it sooner could improve motorist safety sooner.

Typical breakaway modification for wood sign posts (4- by 6-inch)



side view

∗ Hole size for larger posts:
6″ x 6″ - 2″ diameter
6″ x 8″ - 3″ diameter

All 4″ x 6″ wood posts shall be modified by having two 1 ½″ diameter holes drilled perpendicular to the roadway centerline.

Tom McDonald, Safety Circuit Rider

TWO NEW requirements in the millennium edition of the MUTCD will affect local agencies:

Post and support requirements

The following new mandate does not include a phase-in compliance period, nor is a waiver offered for low-volume roads:

"Roadside-mounted sign supports shall be breakaway, yielding, or shielded with a longitudinal barrier or crash cushion if within the clear zone," according to Section 2A.19 Lateral Offset of the millennium edition of the MUTCD. (Section 5A.04 of Part 5, Low-volume Rural Roads contains a similar statement).

To comply with this requirement, all agencies should consider

- reviewing clear zone requirements for all classifications of roads and streets in their jurisdictions,
- inspecting all posts and supports currently located within those limits for crashworthy compliance, and
- planning to replace, relocate, or shield any that do not achieve the new minimum standards.

The "Sign Posts and Supports" section of the *Iowa Traffic Control Devices and Pavement Markings: A Manual for Cities and Counties* (Iowa Highway Research Board project TR-441) may be a beneficial reference. It provides information about commonly used materials, such as wood or steel for small signs and other devices, and supports that can be used to mount larger signs, such as aluminum, steel, and even overhead trusses.

Manufacturer information is listed for several common types of posts such as u-channel, square tube, and breakaway couplings. The features of these materials and other types occasionally installed in cities are discussed, and tips are provided for installation in challenging locations.

While not intending to favor one material or vendor over others, this information may provide local agencies with a background for making decisions about the best materials for their particular needs.

New mandate for crossbucks

Imagine driving down an unfamiliar gravel road at night. In the distance, your headlights pick out a highway-rail grade crossing (crossbuck) sign (R15-1, R15-2). But is the crossing clear? It's hard to tell in the dark.

Using retroreflective material on crossbucks and their posts, as specified in Section 8B.02 of the millennium edition of the MUTCD, may make railroad crossings, especially passive ones, more visible and ultimately safer. The new mandate states that a strip of reflective material, two inches wide, **shall** be placed on the back blade of the crossbuck sign, unless back-to-back signs are used, and also on both the front and back sides of the supporting posts.

At night, with the reflective material in place and no train at the crossing, a vehicle's headlights will reflect steadily off the back of the opposite crossbuck. However, when a train is passing through the crossing at night, a vehicle's headlights will reflect intermittently, in an apparent flashing mode, off the back of the opposite crossbuck.

MUTCD . . . continued on next page

MUTCD phases in most requirements

Unlike new post and support requirements, which are effective immediately, 24 other revisions in the millennium edition of the MUTCD that could impact local agencies do not require immediate action. Instead, compliance dates are listed to allow orderly phase-in periods for each change. A listing of the MUTCD sections containing changes with compliance dates can be found on an FHWA web page, mutcd.fhwa.dot.gov/kno-compliance.htm.

Connecting with small communities

Duane Smith, Associate Director for Outreach

IOWA'S Local Technical Assistance Program (LTAP) and the Iowa chapter of the American Public Works Association (APWA) have a common goal: connecting with small communities. LTAP wants to make training opportunities more convenient for transporation staff in small communities, and APWA is interested in including more communities in its activities and events.

People in smaller communities may not have the opportunity to participate in many APWA or LTAP activities. This may be due to a lack of funding, low staffing (a one-person shop can't be closed all day), or lack of approval to attend.

Along with public works directors and APWA members Bret Hodne (West Des Moines), Al Olson (Ankeny), John Klostermann (Dubuque), Stan Ericson (Bettendorf), Bart Weller (Clive), and Greg Parker (Cedar Rapids), I am part of a committee that is working together to find new ways of reaching public works employees in smaller communities.

As part of this effort, during the last two years, we have held area meetings with staffs from small communities. We sent personal invitations to communities within a two-hour driving distance of host cities, which included Bettendorf, Burlington, Cedar Rapids, Clive, and Harlan. In general, 35–40 people attended each meeting.

Meetings included a short presentation on a public works topic, a discussion of the topic, an open discussion in smaller groups, and a tour of the host city's public works facilities. We also surveyed the participants to learn how APWA and LTAP could better serve them.

The consensus of the survey was that employees in small communities

- normally cannot travel overnight,
- usually have to report to work and get daily activities started before attending training events,
- need to be back to their home base at the end of the day to close up shop,
- would have funding for a minimal registration fee that would cover the cost of lunch, and
- would like to meet approximately twice a year

APWA and LTAP will keep these issues in mind as we plan additional activities that involve small communities. One thing seems apparent. Larger cities need to become more involved with smaller cities by inviting them to and hosting them at APWA meetings and training events. LTAP is available to coordinate and provide subject matter.

By working together, all cities, large and small, can provide quality training and professional development opportunities for their employees.

For more information
Contact me anytime for more information about this new APWA/LTAP initiative, 515-294-8103, desmith@iastate.edu. •

MUTCD . . . continued from previous page

The standard has a 10-year compliance period, but implementing it sooner where railroad crossing crashes/violations have occurred could improve motorist safety.

In Iowa, it is generally accepted that the crossbuck signs and supports are the responsibility of the railroad company, so road agencies may tend to ignore this requirement. However, Section 8A of the MUTCD implies that highway agencies have a joint responsibility to ensure appropriate and proper traffic control devices at all locations. Therefore, it may be advisable for agencies to initiate contact with rail company authorities to discuss the new standardized requirements of the MUTCD, especially the installation of retroreflective tape on crossbuck signs and supports.

For more information
Please contact me if you have questions about these new MUTCD standards, tmcdonal@iastate.edu, 515-294-6384.

Iowa Traffic Control Devices and Pavement Markings: A Manual for Cities and Counties is available online: www.ctre.iastate.edu/pubs/icd/index.htm. •

Scratching your head about management systems?

"Pavement and bridge management systems won't solve all your management headaches. And, frankly, they'll provide some challenges of their own, especially in the early stages of development and implementation."

SMALL COUNTIES considering implementing pavement or bridge management systems may be concerned about start-up time and expense compared to potential benefits. Indeed, even Iowa counties firmly committed to implementing such systems may find it challenging to get up to speed.

Jim George, Dallas County engineer, says, "We believe in the process. We have been working with CTRE to get all the pieces in place for implementing a pavement management system. But so far we haven't had time to really use the system and experience the potential benefits."

If you're wondering if the start-up effort would pay off for you, consider the experience of Jackson County in Missouri. Jackson County, a small rural area, has been using a pavement management system for a while now and believes it has saved the county both time and money.

Saving time and effort

According to Dr. Ali Roohanirad, Jackson County chief engineer, its pavement management system has helped the agency better organize asset data and processes. He uses the system to help prepare budgets, select projects, evaluate pavements, plan maintenance, and evaluate performance.

Using the system, according to Roohanirad, has facilitated access to information and coordination among all agency divisions.

Using money wisely

Another benefit of using a pavement or bridge management system is the potential for stretching tight budget dollars. Such a system can help agencies prioritize projects so they can perform the most appropriate and economical routine maintenance procedures first.

Roohanirad believes Jackson County's system generates more precise cost estimates and eliminates duplication of effort.

Managing Iowa's infrastructure

Iowa counties can participate in the Iowa Pavement Management Program (IPMP) and the Iowa Bridge Management System (BMS) to manage their pavement and bridge infrastructure more efficiently.

The IPMP provides Iowa counties with pavement management data (condition, inventory, and history information), information tools (geographic information systems, or GIS), and decision support tools (pavement management software). And training is part of the package.

The IPMP covers all federal-aid eligible paved county roads, with the option for counties to work through CTRE to add the rest of their paved roads. So far, 35 Iowa counties are in some stage of implementing a pavement management system for all their paved roads.

For help with bridge management, CTRE and the Iowa DOT are developing and implementing a PONTIS-based bridge management system (BMS). PONTIS, a software tool supported by AASHTO, is used by most transportation agencies in the country. Thirty Iowa counties are collecting PONTIS bridge data.

Not a cure-all

Pavement and bridge management systems won't solve all your management headaches. And, frankly, they'll provide some challenges of their own, especially in the early stages of development and implementation. Every agency needs to weigh the benefits and costs of implementing any or all of the spectrum of tools that make up such a system (e.g., pavement condition data, GIS, management software).

For more information

Direct your questions about the IPMP or Iowa's Bridge Management System to Omar Smadi, CTRE's pavement management specialist, 515-294-7110, smadi@iastate.edu.

An update on IPMP data collection will be included in the May–June 2002 issue of *Technology News.* •

Editor's note: Some information in this article was adapted from an article in the June 2001 issue of Better Roads, *"Small Counties Can Prioritize Too," by Dr. Ali Roohanirad. Used with permission.*

Staying organized with concrete supply trailer

IS YOUR AGENCY losing valuable production time by searching for the proper tools, hauling them to the job site, and returning to the shop for the tools you forgot? The City of Clive Public Works Department has the solution: an enclosed trailer for all concrete tools and supplies.

The Clive Public Works Department bought an enclosed trailer measuring 8 feet by 18 feet and then customized the interior to hold all tools and supplies needed for concrete work.

The public works crew constructed special bins and holders for concrete stacks, trowels, floats and handles, shovels, rakes, barricades, forms, curing compound, etc. At the fold-down rear door there is room to roll in the vibratory screed. A stand was constructed at the front of the trailer to hold a generator, which has its exhaust piped through the floor.

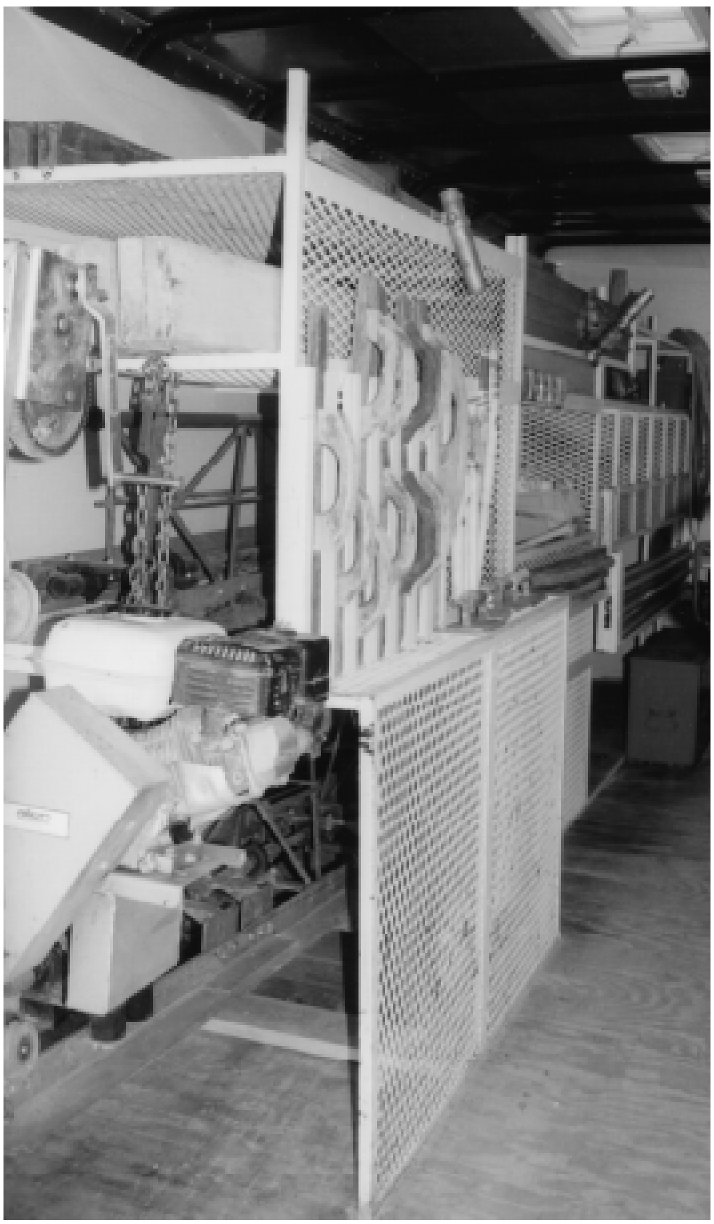
Shelves and brackets were constructed with an angle iron frame with expanded metal shelves. The department saved money by recycling old shelving and scrap metal.

The entire trailer can be easily cleaned out with a hose.

For more information, contact Bart Weller, Clive Public Works Department, 515-223-6231, bweller@ci.clive.ia.us. •

Editor's note: The concrete supply trailer is one of several winning innovations from the "Better Mousetrap" competition at the Iowa Maiantenance Expo in September 2001. In each issue of Technology News, *we're highlighting one of the winners.*

For information about other winning "mousetraps," see CTRE's website: www.ctre.iastate.edu (under "CTRE News").



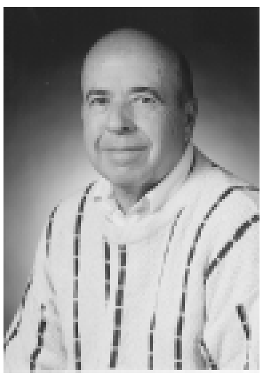
The City of Clive saved money by recycling old shelving and scrap metal in its trailer for concrete tools and supplies.

Stanley L. Ring Memorial Library: New acquisitions

Order library materials

ORDER library materials any of three ways:

- Order online at www.ctre.iastate.edu/library/search.cfm.
- Use the order form on the back page.
- Contact Jim Hogan, library coordinator, 515-294-9481, hoganj@iastate.edu, fax 515-294-0467.



Jim Hogan
LTAP library cordinator

New videos

V671 Scheduled Lives, Stressful Drives: How Advanced Traveler Information Systems Are Changing. This video describes the advantages of advanced traveler information systems (ATIS) in helping travelers use their time more effectively and regain control over their hectic schedules.

V672 Winter Driving Safety. This video shows how to drive safely in winter and why certain rules need to be followed. It addresses appropriate stopping distances in winter weather, the proper use of conventional vs. ABS brakes, how to correct/eliminate skids, and what to do if your vehicle gets stuck in snow and ice.

V673 Safety Awareness II: The Gory Story. This video captures employees' attention by making them think "this could be me" through dramatic pictures of actual injuries. A variety of accidents and resulting injuries are covered.

New publications

P1583 Maintenance of Signs and Sign Supports for Local Roads and Streets. This guide explains the importance of maintaining the sign face and cleaning, checking, repairing, and replacing sign panels and small sign supports. It also discusses the materials and equipment used in maintaining signs, the kinds of traffic control needed during sign maintenance, and the importance of sign maintenance records. It can be downloaded form the FHWA website, www.fhwa.dot.gov/safety/media/pdf/sign_support.pdf.

P1584 Pavement Management, Monitoring, and Accelerated Testing—TRR 1769. This report contains papers presented at the 2001 Transportation Research Board meeting.

Check out this useful guide

√ **P1460 Inspector's Job Guide and Highway Maintenance Tables.** The guide is a 20-page, crush-proof, spiral-bound booklet with 3-1/4 inch by 7 inch, fully laminated pages. It covers pre-inspection duties, safety, uniform color code, concrete and plant mix bituminous paving, base course and truck scale, grading, structures, geotextiles, bituminous surface treatment, storm sewer and culvert pipe installation, seeding, finishing, and wind chill equivalent temperatures. The highway maintenance tables list material amounts needed for various road applications, storage capacities by storage method, weights of various materials (both loose and compacted), compacted hot mix, metric conversion factors, and area formulas. **Contact the library for complimentary copies.**

Expert help with gravel roads

Get your *free* FHWA *Gravel Roads Maintenance and Design Manual,* authored by the South Dakota LTAP, through the LTAP library. In particular, the manual discusses

- using surface gravels appropriately, and
- building and maintaining roads that carry heavy trucks and agricultural equipment.

Jim Horner, Cherokee County road maintenance supervisor, says the guide is a good resource for both new and experienced grader operators.

He especially appreciates the information on materials.

"There's such a vast difference in rock," says Horner. "We use mostly river rock in Cherokee County, but east of here it's mostly limestone. And north, they've got a lot of granite."

For free copy(ies) of the manual, contact Jim Hogan. You can also download either of two online versions: www.epa.gov/owow/nps/gravelman.pdf, or www.ltapt2.org/gravelroads.htm.

A quick tutorial about acquiring real estate

FEDERALLY FUNDED projects that involve acquiring real estate and/or displacing anyone from a home, business, or farm must comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended) (the Uniform Act).

A new, simple, interactive tutorial about the Uniform Act is now online as an executable file that can be downloaded. It will run on any Windows-equipped PC with a mouse: www.fhwa.dot.gov/realestate/uaintro.htm.

This service is a courtesy of FHWA's Office of Real Estate Services in Washington, D.C. The office is also developing a more in-depth, web-based, National Highway Institute training course on the same subject. It should be available in June 2002 as web course #141045.

For more information about the tutorial, web-based course, or the Uniform Act, contact Bryan O'Neill, FHWA reality specialist, 202-366-9881, Bryan.O'Neill@igate.fhwa.dot.gov. •

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