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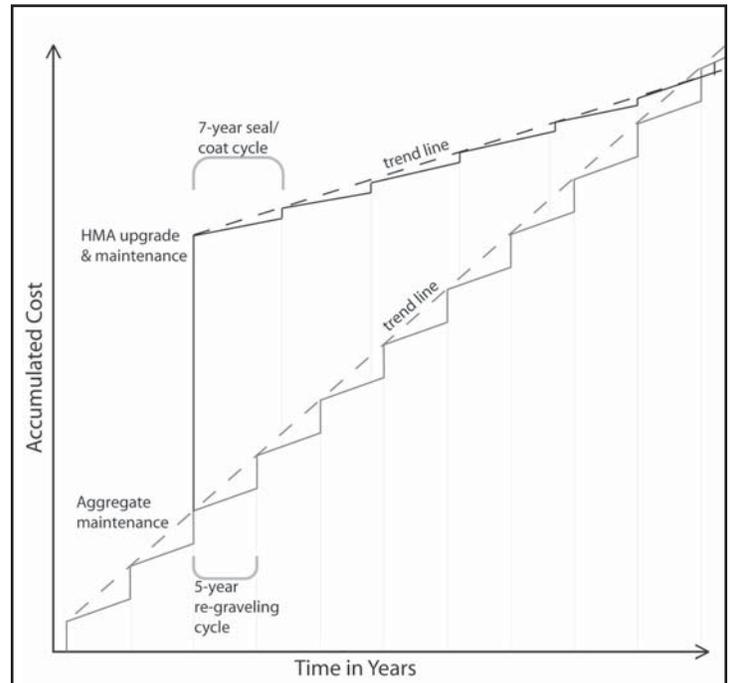
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## If/When to pave a gravel road

County officials have to decide if and when a road should be upgraded. Regarding aggregate roads, many Iowa agencies struggle to answer, When is it appropriate to upgrade to pavement?

Chuck Jahren, ISU professor of civil engineering, and Duane Smith, Iowa LTAP director, recently studied this question for the Minnesota DOT Local Roads Research Board. Their research was conducted on Minnesota roads, but their conclusions and suggestions are useful for Iowa's local agencies as well.



The initial investment of an upgrade to pavement is steep but may eventually be balanced by lower maintenance costs.

### Pressures to upgrade

Iowa's transportation agencies may consider paving gravel roadways for many reasons, usually related to increasing traffic and/or loads due to development.

For example, the number of requests for rural subdivisions near cities like Des Moines and Iowa City is skyrocketing. Commercial industrial developments (e.g., ethanol plants and animal confinements) are cropping up on gravel roads throughout the state.

In addition,

- More houses and cabins are being built near natural geographical features.
- More people are visiting Iowa's recreational areas.
- Rural residents are taking more trips for work and pleasure.

With these changes, the public's expectations regarding roads' level of service may increase. Local officials are often pressured to increase the level of service by paving.

Developers generally finance all or most of the cost of streets within new developments. They rarely fund improvements to surrounding low-service public roads experiencing increased traffic volume or loads from rural homeowners and employees/suppliers of rural industries.

In general, Jahren and Smith recommend that gravel roads with volumes of 200 vehicles per day be upgraded. However, due to persistent budget limitations, Jahren and Smith suggest that agencies begin planning to upgrade a gravel road when traffic volumes reach 100 vehicles a day and are expected to continue increasing. This gives the agency a few years to plan, finance, and carry out a construction program.

## Acronyms in Technology News

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
CTRE	Center for Transportation Research and Education (at Iowa State University)
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
NACE	National Association of County Engineers



U.S. Department of Transportation  
Federal Highway Administration



Iowa Department  
of Transportation

LTAP is a national program of the FHWA. Iowa LTAP, which produces this newsletter, is financed by the FHWA and the Iowa DOT and administered by CTRE.

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*gravel road continued from page 1*

## Evaluating costs

Jahren and Smith offer tools for forecasting and comparing gravel-versus-paving investment costs. They also suggest that agencies consider the potential benefits of paving to both road users and owner-agencies.

To make an accurate financial comparison, agencies need to forecast costs of pavement and gravel alternatives over a long time, perhaps 30 years.

The projections for paving a gravel road should account for likely traffic redistribution from neighboring gravel roads to the newly paved road. Motorists often prefer driving on pavement. When a gravel road is paved, traffic volumes on nearby aggregate roads are likely to decrease, reducing their potential maintenance costs.

Projections should also consider potential hidden costs that can come with paving:

- A higher level of service, including snow/ice removal and brush control, will likely be expected.
- More signs and pavement markings may be required.
- More lights may have to be installed at intersections.

At the same time, cost projections for a road that is not paved should account for expected traffic volume increases. To ensure a road holds up to the wear and tear of more traffic, a five-year re-graveling cycle may need to be changed to two or three years. Re-graveling more frequently not only consumes more person-hours but also increases material costs.

Reliable cost projections are based on route-specific historical data on maintenance costs.

Jahren and Smith recommend keeping accurate records of the amount of labor and material, as well the purchase price and depreciation of equipment, required to keep aggregate roads at a reasonable level of service.

As the line chart on page 1 indicates, large up-front investments for paving may eventually be offset by potential savings in long-term maintenance.

## Other factors

Budget should not be the only factor. Jahren and Smith encourage agencies to consider potential benefits to road users and indirect benefits to agency-owners of paving a gravel road.

Road users will likely experience

- Safer driving surface, due to better skid resistance and stopping distance.
- Reduced wear on tires and vehicle suspensions.
- Increased travel speeds (time savings).
- Reduced air pollution.

Agencies may be able to

- Redirect employee efforts from grading, graveling, and applying dust suppressants to other tasks.
- Reduce administrative time handling complaints.
- Collect more property tax if the corridor along the paved road attracts developers.

## Each case is unique

There is no magic formula for if and when to upgrade a gravel road. The costs, benefits, traffic volumes, and political pressures of each project need to be weighed.

## For more information

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See their final report online, [www.lrrb.org/PDF/200509.pdf](http://www.lrrb.org/PDF/200509.pdf).

See also *To Pave or Not to Pave*, a brochure, [www.mnltap.umn.edu/pdf/2006PavingGuide.pdf](http://www.mnltap.umn.edu/pdf/2006PavingGuide.pdf) ■

# SAFETEA-LU highlights for local transportation agencies

## Installation II: Earmarks and their impacts on core funding

A sweeping five-year, \$244.1 billion transportation funding bill—Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)—was signed into law in August 2005.

Roughly \$2.2 billion of this funding, including millions of dollars in earmarked projects, will be distributed to Iowa through 2009.

### Earmarks in SAFETEA-LU

Perhaps the most controversial feature of the new legislation is the large increase in congressionally earmarked projects over previous transportation bills. While 1998's TEA-21 included 1,849 earmarks that totaled \$9.3 billion, SAFETEA-LU has budgeted over 5,600 earmarks that will total more than \$19.4 billion through 2009.

Earmarks—a term derived from the ID tag that cattle ranchers often tack onto the ears of their livestock—describe the language inserted into congressional appropriations bills that specify how certain funds are to be spent.

SAFETEA-LU's earmarks are written into the High Priority Projects, Transportation Improvements, Bridge Discretionary, and National Corridor Infrastructure programs.

Iowa will receive funding for 150 earmarked projects that will cost \$473.9 million through 2009. This represents about a fourfold increase over Iowa's TEA-21 earmark budget (\$109 million) and a tenfold increase in number of projects (15).

With SAFETEA-LU, the funding stream for earmarked projects is also roughly as large as some core highway programs. For example, Iowa's Surface Transportation Program (STP), which funds a significant number of federal-aid highway projects, will receive \$466.7 million.

**Editor's note:** This is the second installment in a series describing the impacts of SAFETEA-LU on Iowa's local transportation agencies. The first article (Sep–Oct 2006) highlighted SAFETEA-LU's implications for local agency safety programs. This article summarizes the effects of SAFETEA-LU's earmarks on local Iowa transportation agencies.

Included in the earmarks are numerous highway construction and rehabilitation projects throughout Iowa, as well as railway, scenic bypass, trail, and transit projects. The National Center for Concrete Pavement Technology at ISU's Center for Transportation Research and Education will receive \$10 million for its research program.

### Earmarks' effects on Iowa's local agencies

For local governments, the effects of this level of earmarking will be mixed.

On one hand, notes Charlie Purcell of the Iowa DOT Office of Local Systems, "Most earmark funding comes at the expense of core highway program budgets." In other words, earmarks reduce funds available to local governments through sources like STP or the Highway Safety Improvement Program.

Moreover, state and local governments are often required to come up with funding to match the earmarks' federal allotment.

And, since earmarked projects are, in a sense, programmed by congressional representatives, more earmarks mean less state and local control over highway spending decisions.

Dale Vander Schaaf of the Iowa DOT's Policy and Legislative Service notes, "Local governments, in particular, may need to re-allocate some of their local matching funds to projects they had not included in their Transportation Improvement Program."

However, local control over earmarked projects is not as limited as it may appear. Vander Schaaf points out, "The state or local jurisdiction is fully responsible for the project development process and determines the actual timeline for spending the funds."

Earmarked funds are almost always available until expended, which means that no timeframe is specified for using the funds.

Local governments have also shown some success in using earmarks to their advantage. Says Purcell, "Local governments collectively received a slightly larger share of SAFETEA-LU's earmarked funds for projects in their jurisdictions than the Iowa DOT," channeling federal funds directly into local jurisdictions.

Even before the new legislation, he adds, some local governments had been quite effective in securing earmarked dollars for projects in their jurisdictions.

For example, Altoona secured a \$2.98 million earmark in 2004 to rebuild the I-80/Iowa 945 interchange. Des Moines received almost \$12 million between 2003 and 2005 to build Martin Luther King Jr. Parkway.

### Future earmarks

While SAFETEA-LU's earmarked projects have already been legislated, new projects may be earmarked in future yearly transportation appropriations bills. Local agencies can request earmarked funds for specific projects.

The House and Senate Transportation Appropriations Committees solicit earmark requests through a formal application process. Local jurisdictions can submit an application to their appropriate congress member.

But, of course, there are no guarantees. The political climate regarding earmarks can be almost as changeable as Iowa's weather.

### For more information

See a summary of Iowa's SAFETEA-LU funding, including a complete list of earmarks, on Iowa DOT's website [www.dot.state.ia.us/pdf\\_files/safetela\\_lu.pdf](http://www.dot.state.ia.us/pdf_files/safetela_lu.pdf).

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## Iowa LTAP Mission

To foster a safe, efficient, and 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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## 2006 snow "roadeo" winners

Nearly 80 people competed in the Iowa Snow Roadeo in Cedar Rapids, October 26, 2006. This was a new venue with new courses.

Participants in the truck and motor grader competitions took a written exam, inspected a vehicle for defects, and then drove a snow plow truck or motor grader through an obstacle course. In addition to the truck and motor grader divisions, participants could also enter a new loader competition, which included driving only.

Teams from central Iowa swept the truck and motor grader competitions, but smaller jurisdictions held their own in the loader competition.

### Snow plow truck competition

Twenty-three teams of two demonstrated their skill in the truck division. In first place were John Trunnel and Kevin Decker, City of

Des Moines. In second place were Jeff Anderson and Jeff Sherman, City of Des Moines. And in third place were Keith Warne and Kevin Buttrey, City of Des Moines.

### Motor grader competition

Fifteen drivers competed in the motor grader division. Caryl Vanderkam, City of Des Moines, took first place. Gary Rank, City of West Des Moines, won second (last year he placed first). Steve Todd, City of Des Moines, placed third.

### Loader competition

Seventeen drivers tested their skills on the new loader course. Josh Reynolds, City of West Des Moines, placed first. Doug Klett, Keokuk County, took second. Marv Manternach, Jones County, and Don Wallace, City of Bettendorf, tied for third.

Congratulations to all who competed. ■



2006 motor grader winners (from left to right): 3rd place Steve Todd, 2nd place Gary Rank, and 1st place Caryl Vanderkamp.



2006 loader winners (from left to right): 1st place Josh Reynolds, 2nd place Doug Klett, and 3rd place Don Wallace. Marv Manternach, not pictured, also tied for 3rd place.



2006 snow plow truck winners (2-person teams from left to right): 3rd place Keith Warne and Kevin Buttrey, 1st place John Trunnel and Kevin Decker, and 2nd place Jeff Anderson and Jeff Sherman.

All 2006 snow roadeo photos provided by Jon Meeks, City of Davenport.

## What do kids want to be when they grow up? Tell them to *Go!*

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**exploring the world of transportation** January–February 2007

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Go!'s new homepage.

Introduce young people in your life to *Go!* ([www.go-explore-trans.org/](http://www.go-explore-trans.org/)). This entertaining, free, online magazine published by CTRE/ISU will open their eyes to the variety of careers in transportation.

*Go!* includes upbeat feature articles, up to five rotating departments—School Spotlight, Train your Brain, Historically Speaking, Green Scene, and Mystery Photo—and puzzles and quizzes.

The January–February 2007 issue focuses on winter-related topics like “How do they do that?” (keeping airplanes and runways clear of snow and ice) and “Learning to drive a snowplow” (an Ames High student struggles to maneuver a virtual snowplow via a state-of-the-art driving simulator).

In addition to being fun, even a little quirky, feature articles provide basic information—general qualifications, educational requirements, working conditions, etc.—about specific careers.

*Go!*'s advisory board includes high school and college students who help keep the editor, Michele Regenold (still a kid at heart), in touch with their interests and issues. For more information, contact Michele, 515-296-0835, [mregenol@iastate.edu](mailto:mregenol@iastate.edu).

Do not let your kids pass *Go!* ■

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\* New sponsors as of January 2007



Megan Kroeger “at the wheel” of a snowplow simulator during a winter storm.

# Just for street and road workers

## Seal coats and full-depth repair of asphalt pavements

**Editor's note:** This article is the third in a series based on information in Iowa's new Local Roads Maintenance Workers' Manual. The manual was developed by CTRE and sponsored by the Iowa Highway Research Board (TR-514).

Previous topics included maintaining gravel roads, identifying asphalt pavement distresses, and conducting routine asphalt maintenance activities. See Technology News, July–Aug and Sept–Oct 2006.

As described in the previous issue of *Technology News*, effective asphalt pavement maintenance begins with identifying the pavement distresses, then determining the most effective treatment. See table 1.

This article summarizes two treatments: seal coats and full-depth repairs.

Seal coats should be applied before structural distresses have occurred. Seal coats fill cracks and low spots, waterproof the surface, and provide a wearing course for traffic. They consist of an application of asphalt binder followed by an application of aggregate.

Full-depth repairs are permanent solutions for ruts, washboards, and potholes. They involve removing and replacing the distressed slab section, from top to bottom.

The following instructions are general guidelines. Always check with your supervisor and follow your local policy.

### Seal coat repair guidelines

A good seal coat will have the following characteristics:

- An adequate crown (slope) on the roadway for good drainage.
- Few unsealed cracks, alligator cracking, potholes, or ruts.
- A smooth tight surface with little or no bleeding (asphalt binder rising to surface), raveling (a rough, pitted surface due to loss of aggregate), or dust.

**Materials.** Two materials used for seal coats are binder (asphalt) and aggregate. Binders consist of asphalt cutbacks or asphalt emulsions. Aggregates normally used for seal coats are quartzite, limestone, and pea gravel.

**Table 1. Select maintenance activities based on level of distress**

Distresses	Maintenance Activities				
	Routine Maintenance		Full-Depth Repair	Seal Coat Repair	HMA Overlay
	Crack Sealing	Surface Patching			
Ruts			X		X
Cracks	X			X	X
Washboards			X		X
Potholes		X	X		

**Optimum timing/conditions for seal coating.** Seal coats should be applied during the hottest, driest months of the summer, when binders cure quickly, normally not later than mid September in Iowa.

Delay a seal coating project if wind speeds are high. Wind affects the spray pattern from the distributor truck, blows debris on the uncovered binder, and can cause the binder to cure before aggregate is applied.

### Preparing for seal coating.

1. Seal cracks and place surface patches as appropriate.
2. Ensure all equipment is on site and functioning properly:
  - Street sweeper
  - Distributor truck
  - Chip spreader
  - Pneumatic tire roller
  - Dump trucks for aggregate hauling
3. Ensure materials are on site and the aggregate is clean.
4. Sweep and clean the pavement. Remove vegetation from cracks.
5. Cover utility access lids with construction paper so the seal coat does not adhere to them.

### Placing a seal coat.

1. Spray the pavement with binder.
  - Use roofing paper to make a sharp line across the pavement when starting and stopping application.
  - Align the binder application with the center line of the road. Align the nozzles and set the spray bar height as appropriate. See figure 1.
  - If using a slow setting emulsion, spray approaches or intersection radii first. If using a rapid setting emulsion, spray approaches and radii after the main road.
  - Apply only as much emulsion as the chip spreader will be able to cover with a load of aggregate. Calibrate this distance by measuring the distance the chip spreader travels on one load of aggregate.
2. In general, apply aggregate before the binder has set, usually within two to three minutes after the binder has been applied or before its surface has turned black.
3. Roll the aggregate with a pneumatic tire roller closely behind the chip (aggregate) spreader.
  - Make two to four passes on a 24-foot wide roadway.

- Do not start and stop the roller quickly. This will cause diffraction of the surface.
4. The following day, sweep up excess unbound aggregate.

**Application rates.** Application rates will vary, depending on materials used and the condition of the surface. Excessive aggregate fly rock (unbound aggregate) will be kicked up by traffic and may damage vehicles. Excessive fly rock leads to additional cleanup, dust, and haul-away costs.

The following rates are guidelines:

**Binder:** 0.25–0.3 gal/yd<sup>2</sup> (less for smooth pavement with few voids, more for rough pavement with many voids).

**Aggregate:** 15–30 lb/yd<sup>2</sup> (enough to cover the binder without excess).

#### Cleaning up.

1. Remove all construction signs the next work day after the seal coat has been installed.
2. Remove debris from the work zone and all affected driveways and parking areas.

#### Full-depth repair guidelines

##### Preparing for full-depth asphalt repair.

1. Make sure the warning lights attached to vehicles are on and in proper working order.
2. Clean and dry the surface before removing deformed pavement material.

##### Placing a full-depth repair.

1. Saw cut around the area.
2. Remove material with a jack hammer, picks, shovels, broom, air hose, or mechanical sweeper.
3. Apply a tack coat to the edges of the existing pavement.
4. Replace in lifts, or layers, of 2½ inches maximum.
5. Compact with a vibratory roller.
6. Reapply pavement markings if appropriate.
7. Allow traffic to drive on repair when the new asphalt is cool enough to touch.

#### For more information

To borrow a copy of Iowa's manual, contact Jim Hogan, Iowa LTAP librarian, 515-294-9481, hoganj@iastate.edu. You can download a printable copy, [www.ctr.e.iastate.edu/pubs/maint\\_worker](http://www.ctr.e.iastate.edu/pubs/maint_worker). ■

#### Rule of Thumb

Everyone is responsible for quality control.

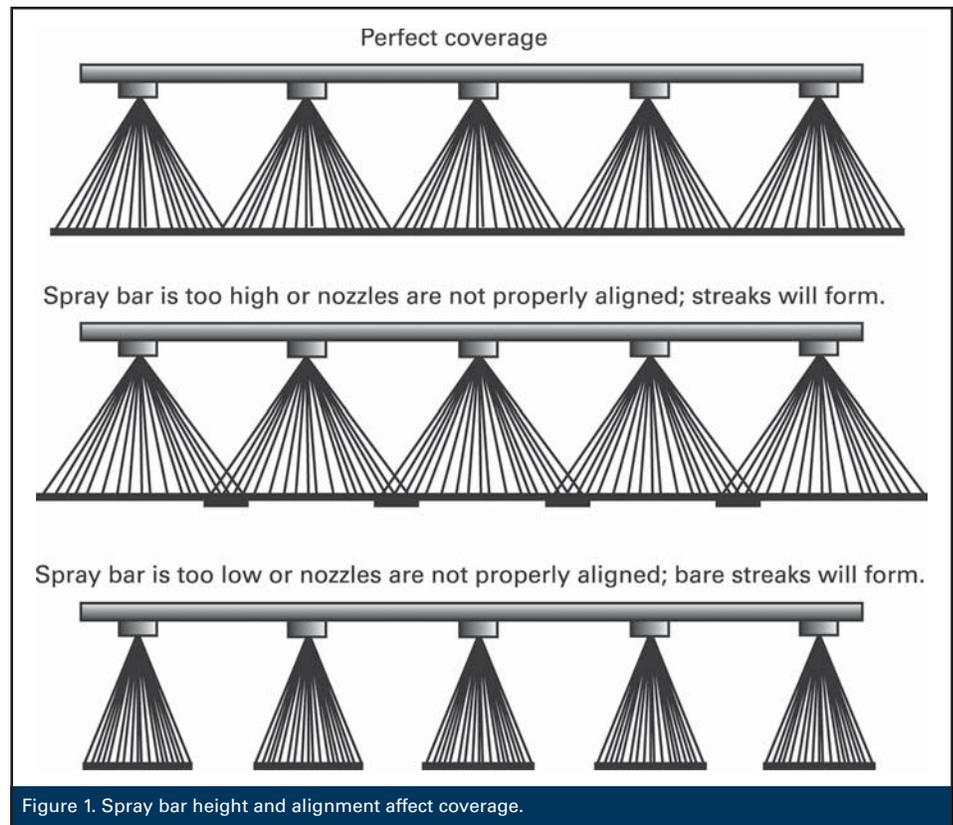


Figure 1. Spray bar height and alignment affect coverage.

#### Rule of Thumb

To check for proper binder application rate, remove a few stones that have been embedded in the binder by the pneumatic roller. About 50–70 percent of the aggregate should be covered with the binder. See figure 2.

If tires on the chip spreader or roller are picking up aggregate, there's too much binder for the amount of aggregate.

#### Binder application rate

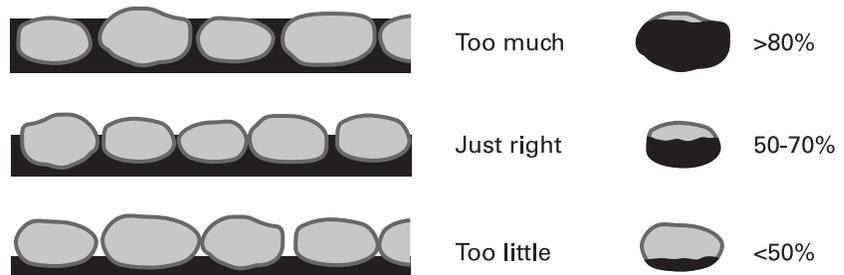


Figure 2. Visual check of application rate.

## Vehicle safety: Watch your backing

All backing crashes are preventable. In general, the best way to prevent them is to avoid backing whenever possible. When you can't avoid backing, use the following safety strategies:

- Back in on arrival instead of on departure.
- First, conduct a visual walk-around of the vehicle to check for maneuvering room and pedestrians.
- Have someone outside your vehicle guide you.
- Continuously check all mirrors while backing.
- Always back slowly while continuously looking and listening for signs of trouble.

To download a flyer version of this information to post in your shop, see [www.ctre.iastate.edu/pubs/vehicle\\_safety\\_poster.pdf](http://www.ctre.iastate.edu/pubs/vehicle_safety_poster.pdf). ■

**Vehicle Safety:  
Avoiding Backing Accidents**

One in four accidents involves backing. Considering that the average driver operates in reverse less than a mile every year, this statistic is even more alarming.

To prevent backing accidents, plan ahead and avoid backing whenever possible. Drivers should reduce backing operations in the first place.

When you must back up as a last resort, the following tips will help you avoid collisions:

- Continuously check all mirrors while backing.
- Always back slowly while continuously looking and listening for signs of trouble.
- Try to position the vehicle to avoid backing.
- If backing cannot be avoided, it is better to back in upon arrival than to back out later while departing.
- Conduct a visual walk-around of the vehicle to check for maneuvering room or pedestrians.
- Whenever available, use a passenger to guide you during backing operations.

All backing accidents are preventable. The following key failures can cause collisions during backing operations:

- Failure to look before backing
- Failure to check blind spots
- Failure to conduct a walk-around
- Backing at an unsafe speed
- Failure to check mirrors often for potential hazards

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## Compliance deadlines: Help drivers see workers, read signs

Compliance dates for two federal rules—one about worker visibility, the other about street name signs—are getting closer.

### Worker visibility

November 2008 is the compliance deadline for the FHWA final rule (Code of Federal Regulations (CFR), Title 23, Part 634 under Worker Visibility): “All workers within the right-of-way of a Federal-aid highway who are exposed either to traffic . . . or to construction equipment within the work area shall wear high-visibility safety apparel.”

Section 6E of the MUTCD already requires that flaggers wear high-visibility apparel when working on any roadway. The federal rule extends the requirement, at least on federal-aid projects, to all workers in the right-of-way.

Workers are defined as people on foot including construction, maintenance, and survey crews; utility employees; emergency responders; and law enforcement officers.

High-visibility safety apparel is defined as Class 2 or 3 performance level garments meeting the requirements of ANSI/ISEA 107-2004.

### Street name signs

January 9, 2012, is the compliance deadline under MUTCD Section 2D.38 Street Name Signs (D3). This section details sign lettering height on two-lane roads:

On two-lane roads with a speed limit greater than 40 mph, the lettering on

ground-mounted street name signs should be at least 6 in. high in upper-case letters, or at least 6 in. upper-case letters and 4½ in. lower-case letters. When the speed limit is 25 mph or less, the lettering may be a minimum of 4 in. high.

Your agency may want to begin planning a five-year phased sign replacement program to avoid a major budget hit in 2011. When replacing signs, remember to consider MUTCD recommendations for retroreflectivity and colors. ■



High-visibility safety apparel.

# Survey for engineers and supervisors: What are your training needs?

Help us choose LTAP workshop training topics for 2007. Most events can be scheduled locally or regionally, so attendees do not have an overnight stay.

Note: Your responses are not a firm commitment.

After completing the survey, fold and mail (postage prepaid) this survey as instructed on the back of this page.

## Workshops to be offered in 2007

(Indicate no. of people from your shop likely to attend)

- \_\_\_\_\_ **Asphalt base repair (one day in Ames)**  
 \_\_\_\_\_ **Surveying (one-week course in Ames)**  
 \_\_\_\_\_ **Road maintenance rodeo**  
 \_\_\_\_\_ **Streets and roads supervisors conference (two days in Ames)**

## Additional potential workshop topics

For each workshop topic below, circle the number that best indicates the likelihood that someone from your agency will attend in 2007. (For each topic below circle 1, 2, or 3)

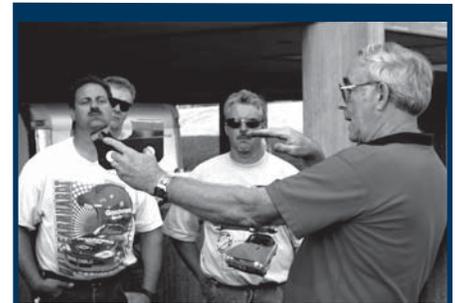
**1 = Very likely to attend**  
**2 = Somewhat likely**  
**3 = Not likely**

	1	2	3
Traffic studies for local agencies	1	2	3
ADA pedestrian accessibility	1	2	3
Road safety fundamentals (NEW)	1	2	3
Road safety assessments (NEW)	1	2	3
Successful management for supervisors	1	2	3
Tractor mower safety (NEW)	1	2	3
Basic construction inspection (technicians)	1	2	3
Construction inspection admin (engineers/managers)	1	2	3
Flagger training	1	2	3
Work zone safety	1	2	3
Permanent roadway signing and pavement markings	1	2	3
Safety coordinators' conference	1	2	3
Excavation safety (Jack Mickle, instructor)	1	2	3
Roads and streets maintenance fundamentals	1	2	3

## Contact information

If you'd like to be contacted by Iowa LTAP about your interest in any of these or other workshop topics, complete the information below:

Name: \_\_\_\_\_  
 Position: \_\_\_\_\_  
 Organization: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City, State, Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Email: \_\_\_\_\_



**Additional Comments**

Please list any additional comments or suggestions you have about Iowa LTAP training below.

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To mail back, just fold in half, tape, and drop in the mail.

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## Stanley L. Ring Memorial Library: New acquisitions

**Note:** A few videos are available in both VHS and DVD format. New videos will generally be in DVD format.

The library recently began using the U.S. Postal Service for sending orders. This change will result in important savings for CTRE, but ordered materials will not arrive as quickly. If you have an urgent need for library materials, please let us know when you place your order so we can arrange for faster delivery.

### DVDs

#### DVD57 Who Moved my Cheese?

This 90-minute animated video is based on the book of the same name and shows the need for adapting to change in your work and your life.

#### DVD58 Jacqueline

This 15-minute video was made by the Ames Police Department to raise awareness of the dangers of drinking and driving. It shows the devastating impacts of an OWI crash on the driver and the innocent victim.

#### DVD63 Chain Saw Safety, Maintenance, and Operation

This one-hour video provides information on how to properly use and care for a chain saw. Multiple chapters cover protective apparel and chain saw features, maintenance, sharpening procedures, and proper operation.

#### DVD67 Highway Safety and Trees: The Delicate Balance

This 12-minute video explores the issue of safe placement of trees along roadsides. It stresses that the design of highway projects should be a cooperative effort involving the highway agency, concerned communities, organizations, and individual citizens that provides opportunities for all parties to recognize the benefits and risks associated with trees.

#### DVD95 A Snowplow Operator's Guide to Snow and Ice Equipment

This interactive DVD contains short video clips and interactive elements for snow plow operators to learn about or review snow and ice fighting equipment types, maintenance, inspection, and operation. Operators can review individual equipment and techniques at their own pace and then test their knowledge using the included interactive quizzes. Reviewing the entire DVD takes about four hours and requires a Windows-based computer with a mouse.

### CD-ROM

#### CR83 High Performance Materials Training

This set of two CDs contains PowerPoint presentations from these seminars on high performance materials:

- Corrosion Resistant Rebar
- Fiber Reinforced Polymer (FPR) Composite Bridge Technology
- High Performance Concrete (HPC)
- High Performance Steel
- Accelerated Bridge Construction/Prefabricated Bridge Element

#### Order LTAP library materials in three ways:

- Order online, [www.ctre.iastate.edu/library/search.cfm](http://www.ctre.iastate.edu/library/search.cfm).
- Contact Jim Hogan, library coordinator, 515-294-9481, [hoganj@iastate.edu](mailto:hoganj@iastate.edu), fax 515-294-0467.
- Mail or fax the order form on the back cover of *Technology News*.

## Conference calendar

### February 2007

7-9	Iowa Concrete Paving Association Annual Workshop	Des Moines	ICPA Office 515-963-0606
16	District No. 3 Workshop	Sioux City	Denise Wagner 515-294-5798 <a href="mailto:aleopold@snyder-associates.com">aleopold@snyder-associates.com</a>

### March 2007

2	District No. 4 Workshop	Council Bluffs	Denise Wagner 515-294-5798 <a href="mailto:aleopold@snyder-associates.com">aleopold@snyder-associates.com</a>
16	District No. 5 Workshop	Ottumwa	Denise Wagner 515-294-5798 <a href="mailto:aleopold@snyder-associates.com">aleopold@snyder-associates.com</a>
30	District No. 6 Workshop	Iowa City	Denise Wagner 515-294-5798 <a href="mailto:aleopold@snyder-associates.com">aleopold@snyder-associates.com</a>

Get more information and/or register online for these events at [www.ctre.iastate.edu/calendar/](http://www.ctre.iastate.edu/calendar/).

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