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Iowa State University's Center for Transportation Research and Education (CTRE) is the umbrella organization for the following centers and programs:

- Bridge Engineering Center
- Center for Weather Impacts on Mobility and Safety
- Construction Management & Technology
- Iowa Local Technical Assistance Program
- Iowa Statewide Urban Design and Specifications
- Iowa Traffic Safety Data Service
- Midwest Transportation Consortium
- National Concrete Pavement Technology Center
- Partnership for Geotechnical Advancement
- Roadway Infrastructure Management & Operations Systems
- Sustainable Transportation Systems Program
- Traffic Safety and Operations

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## Not-just-for-engineers guide to concrete pavements

*"This manual is one of the best concrete pavement technical documents developed in the last 15 years."*

—A Michigan practitioner's reaction to *Integrated Materials and Construction Practices for Concrete Pavement: A State-of-the-Practice Manual* (IMCP manual)

The new, 350-page IMCP manual is the product of a multi-year, FHWA-sponsored effort at Iowa State University. It covers fundamentals and advanced knowledge about concrete pavements, focusing on the effects of mix materials and construction practices on the slab's performance.

The manual describes best practices, technologies, and tests to identify mix materials, concrete properties, and construction practices that optimize concrete performance.

### What's different about this book?

The IMCP manual reflects the combined expertise and effort of several dozen professionals from around the country:

- Seventeen authors provided "best practices" information in their areas of expertise.
- Three technical editors—Peter Taylor (principal engineer, CTLGroup, Inc.), with help from Jerry Voigt (president and CEO, American Concrete Pavement Association) and Steve Kosmatka (vice president of research and technical services, Portland Cement Association)—synthesized and organized the information into nine chapters and a troubleshooting guide.
- A team of 32 technical experts thoroughly vetted two major drafts.
- Staff from the National Concrete Pavement Technology Center at CTRE/ISU—Dale Harrington (consultant) and Marcia

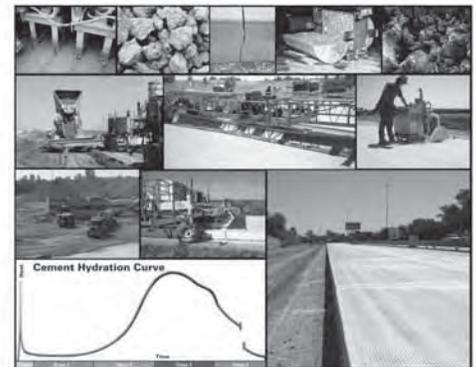
## Integrated Materials and Construction Practices for Concrete Pavement:

A State-of-the-Practice Manual

FHWA Publication No. HIF-07-004

December 2006

U.S. Department of Transportation  
Federal Highway Administration



National Concrete Pavement  
Technology Center **ctre**  
Center for Transportation  
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Figure 1. The *Integrated Materials and Construction Practices for Concrete Pavement: A State-of-the-Practice Manual* cover.

Brink (managing editor)—guided the manual's development, then edited, designed, and published the final product.

The manual is written in a style that is accessible to a wide audience:

- Design, materials, and construction engineers and technicians.
- Quality assurance/control personnel.
- Construction supervisors and inspectors.
- Contractors.

The manual describes not only *how* but *why*. "It's not good enough just to tell people how something should be done," says Harrington. "When they understand the effect of weather on new concrete, for example, or why certain problems can develop,

## 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

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*guide to concrete continued from page 1*

they respond more effectively to whatever comes up." The manual helps everyone involved in concrete pavement projects, from designers through construction supervisors, understand how their individual roles and decisions collectively contribute to the concrete slab's performance.

The manual's format is uniquely user friendly. It has an easy-to-flip-through thumb index, call-outs of key points with each major section, several methods of cross-referencing, and clear illustrations and examples (figure 2). The book cover is a flexible plastic that will withstand heavy use.

Each manual comes with a six-foot foldout poster (figure 3) and an electronic version of the manual on CD.

## For more information

The IMCP manual has been distributed to state DOTs, FHWA offices, and contractors. You can borrow a copy from the Iowa LTAP library. Contact library coordinator Jim Hogan, 515-294-9481, [hoganj@iastate.edu](mailto:hoganj@iastate.edu).

A few copies are available to Iowans, for free or the cost of shipping, through the Iowa Concrete Paving Association (515-963-0606, [icpa@iowaconcretepaving.org](mailto:icpa@iowaconcretepaving.org)) or the American Concrete Pavement Association (Bill Davenport, vice president of communications, 847-972-9810, [BDavenport@pavement.com](mailto:BDavenport@pavement.com)). The manual is going to be reprinted, and more copies will be available this summer.

An electronic version is online, [www.cptechcenter.org/publications/imcp/](http://www.cptechcenter.org/publications/imcp/). If you download the complete file ([www.cptechcenter.org/publications/imcp/imcp\\_manual.pdf](http://www.cptechcenter.org/publications/imcp/imcp_manual.pdf)), you can search the entire document and use links to move between cross-references.

If you have specific questions about the manual or related training, contact Dale Harrington, Snyder & Associates, 515-290-4014, [dharrington@snyder-associates.com](mailto:dharrington@snyder-associates.com), or Marcia Brink, communications manager, National Concrete Pavement Technology Center, 515-294-9480, [mbrink@iastate.edu](mailto:mbrink@iastate.edu). ■

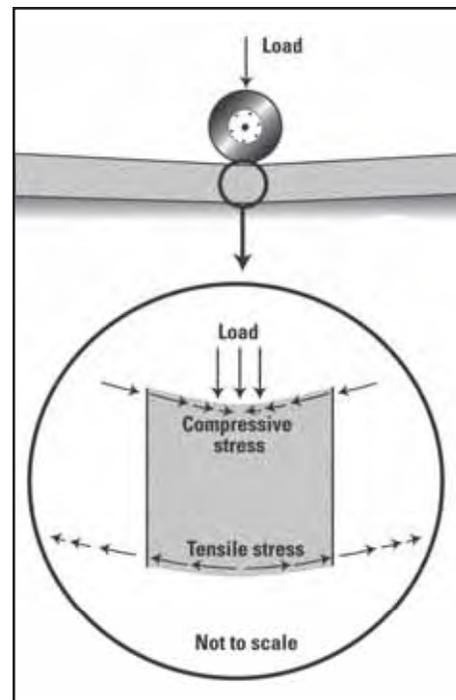


Figure 2. The IMCP manual contains many illustrations, like this one, to help readers understand different stresses on and in concrete slabs.

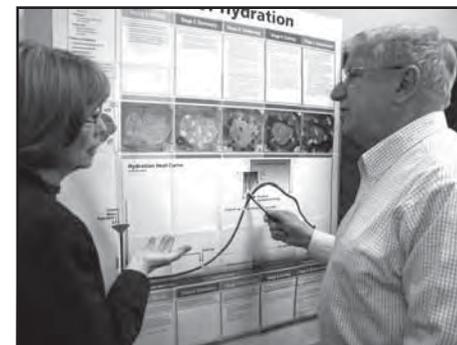


Figure 3. Dale Harrington and Marcia Brink discuss ways to illustrate variations in the sawing window on the Stages of Hydration poster.

## Use the IMCP manual

- In the shop or lab as a quick reference.
- In the field as a troubleshooting guide.
- In the training room as a learning/teaching tool.

## County crash data available

The Iowa DOT's Office of Traffic and Safety announces that county crash data are available on its website, Crash Analysis and Resources ([www.iowadot.gov/crashanalysis/](http://www.iowadot.gov/crashanalysis/)), follow the Data link, then the County Profiles link).

Michael Pawlovich, Iowa DOT traffic safety and crash data engineer, maintains the website. He says, "This information was developed and made available to address media and citizens' requests more proactively and to enhance our highway safety marketing efforts. We hope this information will cause people to consider how they might become safer drivers and discuss safety with their kids or parents."

Crash frequency information for every county is available in both standard tabular format (Microsoft Word documents and .pdf files) and map formats (.pdf and .jpg files) (figure 1). The standard county profiles cover crashes related to several factors, including those identified by the federally mandated Comprehensive Highway Safety Program (CHSP):

- Impaired drivers, vehicle speeds, inattentive/distracted drivers, older drivers, and younger drivers,
- Vehicle/animal (typically deer),
- Roadways or intersections,
- Vehicle type, including heavy trucks and motorcycles, and
- Multiple-vehicle cross centerline/cross median, multiple fatality, and single-vehicle run-off-road.

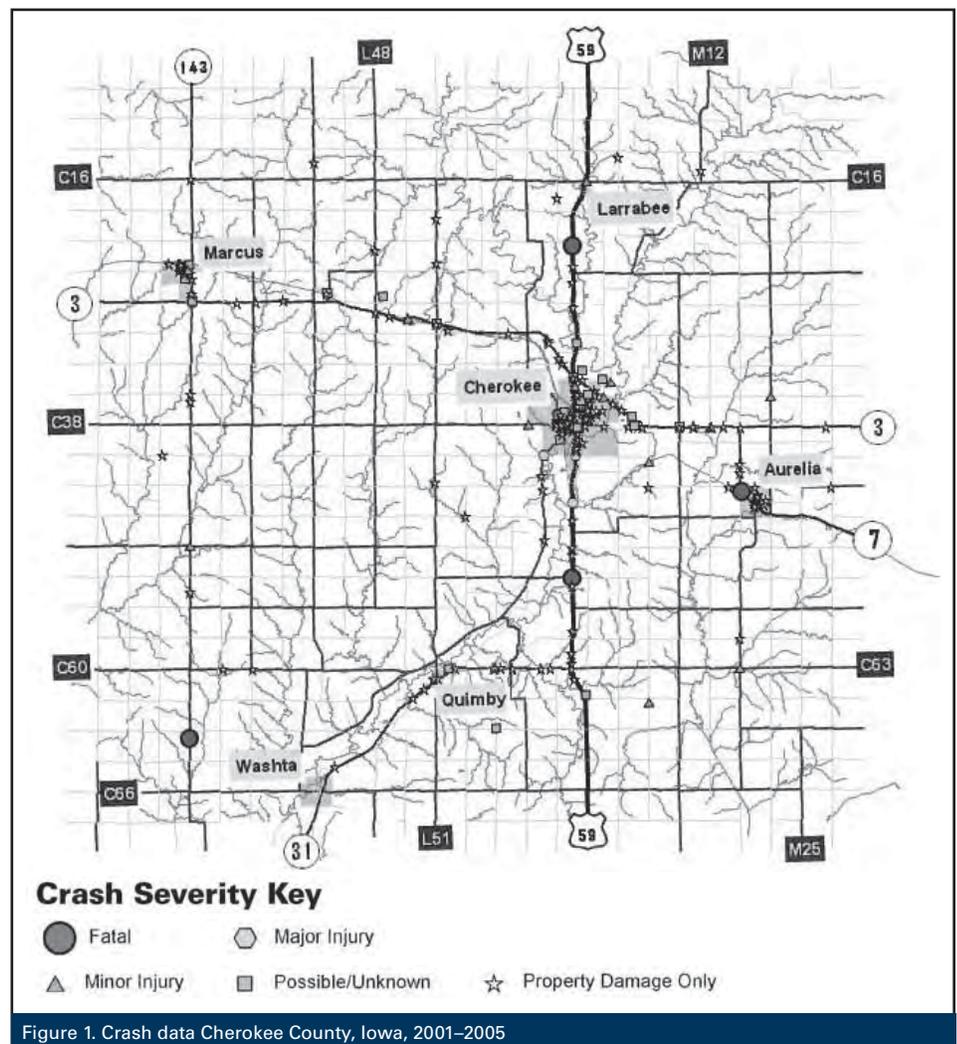
The county profiles provide snapshots of local crash conditions. In addition, the main web page includes links to two data analysis tools, CMaT and SAVER/Diagram Magic, that agencies can use to perform their own analyses. For example, a local agency may need specific information to support a funding request for a proposed safety improvement. The Iowa DOT offers training in both of these tools.

The website provides links to several other sources of traffic information for public agencies specializing in different aspects of highway safety (see the Partners at the bottom of the main page). It also provides a link to submit specific data requests ([www.iowadot.gov/crashanalysis/](http://www.iowadot.gov/crashanalysis/), follow the Data Requests link).

### For more information

For information about crash data analysis tools or the website in general, contact Pawlovich, 515-239-1428, [Michael.Pawlovich@dot.iowa.gov](mailto:Michael.Pawlovich@dot.iowa.gov).

Local agencies needing assistance with specific crash data analyses can contact Iowa Traffic Safety Data Service at CTRE, [www.ctre.iastate.edu/itsds/](http://www.ctre.iastate.edu/itsds/). ■



## 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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## Welcome CTRE's new director

Shashi Nambisan, Ph.D., P.E., became the director of CTRE on February 1, 2007. He takes the helm from interim director Lowell Greimann, retired chair of ISU's Department of Civil, Construction, and Environmental Engineering. Dr. Greimann had been interim director since June 2006, when Steve Andrie, after nearly seven years as CTRE's director, took a position with the Transportation Research Board in Washington, D.C.

Dr. Nambisan—who prefers to be called “Shashi”—comes to Iowa from the University of Nevada, Las Vegas. He was professor of civil and environmental engineering and the director of UNLV's Transportation Research Center for several years. To recognize his valuable contributions to the state, Nevada's governor proclaimed January 31, 2007, “Professor Shashi Nambisan Day” (<http://gov.state.nv.us/PROCs/2007/2007-01-31ProfessorShashiNambisanDay.htm>).



Shashi Nambisan, CTRE's new Director

Shashi received his Ph.D. in civil engineering from the University of California, Berkeley. His professional expertise includes transportation safety, risk analysis, transportation planning, and infrastructure management.

At ISU, Shashi says he is finding “a wonderful complement of people, programs, and partnerships that excite me about being in Iowa and at CTRE.” He will continue building CTRE's core strengths and partnerships, including LTAP. He looks forward to meeting city and county engineers, road supervisors, and crews in Iowa and learning about their unique challenges.

In addition, Shashi will pursue some new initiatives at CTRE, two in particular:

- Transportation issues related to the new bio-economy and bio-fuels.
- Transportation and the environment, under the new Sustainable Transportation Systems Program.

One of Shashi's first major community events as director will be hosting, with the Iowa DOT, the 2007 Mid-Continent Transportation Research Symposium in Ames, August 16–17, 2007. Come to the symposium and give him a warm Iowa welcome. ■



Professor Shashi Nambisan Day proclamation

# Just for street and road workers

**Editor's note:** This article is the latest 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). The series began with the July–August 2006 issue of *Technology News*. Previous topics included maintaining gravel roads and identifying and repairing asphalt and concrete pavement distresses.

This article discusses asphalt overlays, from chapter 3. A future issue of *Technology News* will include an article about concrete overlays (based on sources other than the TR-514 manual).

## Repair, strengthen, and protect: Hot mix asphalt overlays

A hot-mix asphalt (HMA) overlay is a new HMA layer placed on an existing pavement. Such overlays can protect and add some strength to an existing pavement structure, extend the pavement life, and improve ride quality.

Before applying an overlay, repair distresses in the existing pavement. Notify affected residents about anticipated work schedules. Trim plant foliage that might break loose and contaminate the overlay material.

Following are general steps for applying HMA overlays; always check with your supervisor and follow your agency's procedures.

### Preparing for the overlay

#### A day or two in advance

1. Prepare the existing pavement surface by grinding two-inch to zero wedges at start and stop points at the first lateral joint.
2. Lay tack paper and cold mix ramps.
3. Ensure that drainage will be maintained (e.g., bevel-grind cross streets at flow lines).
4. Remove loose material and water from deteriorated areas. Clean, patch, and compact.
5. Replace any failed areas of curb.
6. Make sure all manholes and intakes are working properly.

#### The day before the overlay

1. Count the number of risers and lids needed for manholes, water, gas, and monument castings. Assemble, inventory,

check for fit, and place the required risers and lids on the site.

2. Sweep the street. Remove any grass and water from pavement cracks.
3. Telephone the asphalt plant and let them know your tonnage requirements.

#### The day of the overlay

1. Have all traffic control and construction signs up and in place.
2. Spray the paving machine with a release agent and heat the screed to operating temperature.
3. Remove cold mix ramps and paper.
4. After the street has been cleaned, apply a tack coat at the proper rate so you can avoid pushing or shoving the mat.
5. Contact the plant and have trucks loaded

and dispatched to the job site. (Contact the plant immediately if any major breakdowns force you to stop paving during the day.)

6. Identify areas where leveling courses need to be placed to fill in low spots, and pave as needed.
7. Place all risers and lids.
8. At the beginning of the overlay section, set up the laydown machine to run the finish course. Set the heated screed on lath to gain prior mat elevation.
9. Position paver personnel with their workmanship tools.

### Applying the HMA overlay

1. Back the asphalt truck up to the laydown machine. When contact is made raise



Placement of hot mix asphalt overlay. Photo courtesy of the National Center for Asphalt Technology.

the truck box, causing the mix to slide against the tailgate. This ensures that, when the tailgate is tripped, the mix will flood the hopper, reducing segregation behind the screed.

2. If the truck needs to be pulled away from the paver after loading, thoroughly remove any spilled asphalt before paving begins. (If the paver drives over spilled asphalt, the pavement surface will likely be irregular.)
3. During paving, the paving machine hopper should be full at all times to ensure a constant flow of materials to the screed. In addition, the augers that move the mix in front of the screed should be turning most of the time so that the mix is uniform in density before compaction.
4. To compact the overlay, a rubber-tired (breakdown) roller should follow the paver as closely as possible without rutting or disturbing the asphalt. This should be followed as closely as possible by a steel-wheeled (finish) roller; it will remove any wheel tracks left by the breakdown roller.

### Cleaning the area and other follow-up activities

1. Clean the work zone, driveways, and parking areas of debris and excess asphalt.
2. Barricade the street to allow for cure time overnight. Notify police, fire, and transit of closure.
3. The next day, remove all construction signs.
4. Schedule a sand seal for the overlay at the end of the construction season.

### For more information

Additional details can be found in the Iowa Local Roads Maintenance Workers' Manual, chapter 3, beginning on page 54, [www.ctre.iastate.edu/pubs/maint\\_worker/index.htm](http://www.ctre.iastate.edu/pubs/maint_worker/index.htm).

The Iowa LTAP library has publications and a video about HMA overlays. Contact Jim Hogan, LTAP library coordinator, 515-294-9481, [hoganj@iastate.edu](mailto:hoganj@iastate.edu). ■



A hot mix asphalt laydown machine with constant flow of materials helps ensure paving uniformity. Photo courtesy of the National Center for Asphalt Technology.



A consistent roller pattern helps achieve density, an important quality for hot mix asphalt longevity. Photo courtesy of the National Center for Asphalt Technology.

## Rules of Thumb for asphalt overlays

**Asphalt depth.** Asphalt will densify approximately 20 percent after laydown machine placement. So if the layer being placed is to be 2 inches thick, the mix passing out from under the screed should be about 2½ inches deep to allow for compaction.

**Estimating tonnage.** For each load, the supervisor should keep track of the tonnage of asphalt going through the paver, and the distance the paver travels. This will provide the basis for estimating the tonnage required for the last truck load.

**Laying asphalt on curb edges.** This takes more hand work than the pass down the crown of the roadway. Construct wedges at the opening to driveways to keep water from ponding. Add the right amount of hot mix to force water past the drive. Square off and tap the upper edge of the wedge with a lute, then compact the wedge before the mix cools.

**Ensuring uniform paving operations.** This helps provide a better finished overlay product. Uniform delivery of mix at a consistent temperature allows for uniform laydown and compaction of the HMA overlay.

## Conference calendar

### May 2007

6–9	National Conference on Pavement Management	Norfolk, VA	<a href="http://www.cpe.vt.edu/pavementmanagement07/">www.cpe.vt.edu/pavementmanagement07/</a>
15–16	Integrated Materials and Construction Practices (IMCP) for Concrete Pavements Workshop	St. Cloud, Minnesota	
22	Motor Grader Operator Workshop	Ames	Duane Smith 515-294-8103 desmith@iastate.edu

### June 2007

5	Motor Grader Operator Workshop	Iowa City	Duane Smith 515-294-8103 desmith@iastate.edu
19	Motor Grader Operator Workshop	Charles City	Duane Smith 515-294-8103 desmith@iastate.edu
24–27	9th International Conference on Low-Volume Roads	Univ. of Texas Austin, TX	<a href="http://www.cae.utexas.edu/9LVR/Reg.htm">www.cae.utexas.edu/9LVR/Reg.htm</a>

### June—July 2007

TBD	District Lunch Programs on Decorative Concrete	TBD	Melisse Leopold 515-964-2020 mleopold@snyder-associates.com
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### July 2007

10	Motor Grader Operator Workshop	Fayette	Duane Smith 515-294-8103 desmith@iastate.edu
17	Motor Grader Operator Workshop	Council Bluffs	Duane Smith 515-294-8103 desmith@iastate.edu
31	Motor Grader Operator Workshop	Ottumwa	Duane Smith 515-294-8103 desmith@iastate.edu

### July—September 2007

TBD	District Lunch Programs on Early-Age Cracking in Concrete Pavements: Causes and Cures	TBD	Melisse Leopold 515-964-2020 mleopold@snyder-associates.com
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### August 2007

16–17	Mid-Continent Transportation Research Symposium	Ames	<a href="http://www.ctre.iastate.edu/events/midcon2007/">www.ctre.iastate.edu/events/midcon2007/</a>
28	Snow Roadeo	Ames	Georgia Parham 515-294-2267 gparham@iastate.edu
29–30	Iowa Maintenance Training Expo	Ames	Georgia Parham 515-294-2267 gparham@iastate.edu

### October—December 2007

TBD	District Lunch Programs on Concrete Pavement Constructability Issues	TBD	Melisse Leopold 515-964-2020 mleopold@snyder-associates.com
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## 9th International Conference on Low-Volume Roads

**June 24–27, 2007  
Austin, TX**

This conference, held only once every four years, is a major activity of the Transportation Research Board's Committee on Low-Volume Roads. It provides a full agenda of presentations, workshops, and field trips for learning about the variety of low-volume roads research being conducted internationally and for connecting with professionals from around the world who are dealing with similar challenges. For more information about the program and for online registration, see [www.cae.utexas.edu/9LVR/Reg.htm](http://www.cae.utexas.edu/9LVR/Reg.htm). ■

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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