TECH TRAN
TECHNOLOGY TRANSFER ASSISTANCE PROGRAM

Missouri Transportation Bulletin

■ Research, Development & Technology Division
Missouri Department of Transportation
■ Federal Highway Administration
■ Local Technical Assistance Program

Vol. 17, No.1

Inside:

MoDOT Rounds Up Safer Intersections

They're popping up all across the country and, yes, one is even coming your way. Plans for a roundabout are being proposed at a four-way intersection in Perryville. But, before you panic . . .

We know you've heard the horror stories--but never fear, MoDOT's here . . . and roundabouts are our friends.

"We will be using more roundabouts because they bring big benefits," said MoDOT Project Manager Tim Richmond. "Safety is increased tremendously at intersections with roundabouts."

A sample of intersections with roundabouts saw an 89 percent reduction in deadly accidents. A national study of 24 roundabouts in eight states delivered those statistics. The results are about a 75 percent reduction in accidents nationwide.

Roundabouts have no left turns, no traffic signals and no four-way stop signs. They reduce driver delay by allowing motorists to yield rather than stop, handle higher traffic volumes and help vehicles get through intersections quicker. The better flow also flows better for your pocketbook, saving your time and fuel and cutting back about $5,000 a year that MoDOT would have to spend on maintenance and electricity of traffic lights. Roundabouts are also good for the environment, moving vehicles through quicker reduces pollution and they offer a center island perfect for beautification projects.

"Safety is MoDOT's number one priority," Richmond said. "Without all the other benefits, being able to reduce deadly accidents by 75 percent would be worth building a roundabout."

Perryville's Roundabout

MoDOT is proposing building a roundabout in Perryville at the intersection of Main Street and Route 61. Route 61 is slated to undergo widening and the addition of a center turn lane beginning next year and the roundabout is part of the project.

The existing intersection was built in the 1930's and is somewhat outdated. Because the existing streets intersect at an acute angle, a more oval-shaped roundabout will be constructed.

MoDOT worked with a consultant very experienced with roundabouts to help with designing Perryville's new intersection.

"The design of the intersection is all about balance," Richmond said. "It is necessary that the roundabout be loose enough to easily accommodate semi-trailer vehicles, yet tight enough to slow the speed of the vehicles in the intersection so that it remains safe and user friendly."

Possible landscaping in the center island will add beauty to the design. The roundabout addition will not only be an attractive entryway to downtown Perryville but will also handle traffic safely and efficiently for many years to come.

For more information on Roundabouts check out the new Roundabout website at Kansas State University at www.ksu.edu/roundabouts. Kansas State has been studying roundabouts for three years. If you have or know of any roundabouts in your area, please send a name, location, address, picture and story to Gene Russell at geno@ce.ksu.edu

or

Eugene Russell
Kansas State University
Department of Civil Engineering
2118 Fiedler Hall
Manhattan, KS 66506-2905

Census Data at MoDOT

With the release of the 2000 census data, MoDOT has initiated an effort to identify relevant social and economic data and data formats to be used by personnel in planning, public involvement and project development. Most are aware of the use of census data in general planning activities, but some are not aware that this information is also used as a primary step in meeting the responsibilities of Title VI and Environmental Justice responsibilities of agencies operating with federal funds.

While MoDOT's core function is to provide safe and reliable transportation services and facilities, we must be aware of and consider the population and economic changes that drive the need for the transportation system. As MoDOT incorporates the use of census data into our operations we will be offering census data training to our personnel. We would like to extend this training opportunity to municipalities, counties and planning organizations if there is interest. If you or your group are interested let us know. Please fill out the form below, and return to MoDOT Research Development and Technology Transfer Unit at (573) 526-4337, or email your response to sheam@mail.modot.state.mo.us , or call Mike Shea at 573-751-0852. Please respond by December 15, 2001.

Yes, I am interested in attending census data training.
No, I am not interested in attending census data training.

Name and Oganization

Address

Phone and email

Historic Bridges Available

Ralls County, Missouri: Bailey Ford Bridge over the Salt River. 5.5 miles southeast of New London, MO S11 T55N R4W. Ralls County offers a 230' 10-panel Pennsylvania through truss with a Pratt pony truss and steel stringer approaches for sale. The bridge was built by Stupp Bridge & Iron company of St. Louis, MO 1910.

Re-erection and maintenance covenants per Secretary of Interior Guidelines.

Price: $1.00
Length: Overal 320'
Width: 16'
Contact: MECO Engineering, Inc. (573) 893-5558

Callaway County, Missouri: Berry's Ford Bridge spanning the Auxvasse Creek is available for adaptive use. National Register eligible. Erected in 1886 by the Missouri Valley Bridge and Iron Company, Leavenworth, Kansas, this bridge is an excellent excellent example of a 153' pin-connected wrought iron 8 panel Pratt through truss with a 13.5' wide roadway. It can be dismantled and match marked for further handling by the party accepting ownership. Contact Philip Schrick, McDonald & Warger, Inc., P.O. Box 236, Liberty, Missouri 64069, (816)781-6182, or fax (816) 781-0643."

Ray and Lafayette Counties, MO: The "Lexington Bridge" (G-55R) over the Missouri River is available for adaptive reuse. If the bridge is transferred to another party, the transfer deed will include preservation covenants that require the new owner to preserve and maintain the bridge in accordance with the recommended approaches in "The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Bridges." Monies may be available for reuse of the bridge. **Description:** The National Register of Historic Places-eligible bridge was constructed in 1924-25 by the Kansas City Bridge Company and designed by J. A. L. Waddell. This 3,073-foot bridge consists of two steel 12-panel rigid-connected Warren through trusses with polygonal upper chords, five 7-panel Warren through trusses, three Warren deck trusses, and 8 steel girder approach spans. The roadway width is 20 feet. **Interested Parties:** Contact Randall Dawdy, Cultural Resources Section, Missouri Department of Transportation, P.O. Box 270, Jefferson City, Missouri 65102, phone (573) 526-3591, FAX (573) 526-1300, or email: dawdyr@mail.modot.state.mo.us, by December 31, 2001.

Carroll and Lafayette Counties, MO: The "Waverly Bridge" (G-54R) over the Missouri River is available for adaptive reuse at a new location. If the bridge is transferred to another party, the transfer deed will include preservation covenants that require the new owner to relocate, preserve, and maintain the bridge in accordance with the recommended approaches in "The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Bridges." Monies may be available for reuse of the bridge. **Description:** The National Register of Historic Places-eligible bridge was constructed in 1924-25 by the Wisconsin Bridge and Iron Company, and designed by Harrington, Howard and Ash. This 1,945-foot bridge consists of two steel 18-panel Pennsylvania through trusses, and three 11-panel Parker through trusses, with one deck truss approach span, two plate girder approach spans, and one steel stringer approach span. The

roadway width is 20 feet. **Interested Parties:** Contact Randall Dawdy, Cultural Resources Section, Missouri Department of Transportation, P.O. Box 270, Jefferson City, Missouri 65102, phone (573) 526-3591, FAX (573) 526-1300, or email: dawdyr@mail.modot.state.mo.us, by December 31, 2001.

Stone County, Missouri: Located in Section 1, Township 25 North, Range 23 West, the McCall Bridge over the James River near Galena, Missouri is available for adaptive reuse. Constructed in 1900, the 321-foot bridge consists of a 156-foot, 10-panel, pin-connected steel truss with concrete filled steel cylinders at the north and south. A 38-foot four-panel pony-truss connects the major truss into a solid rock abutment on the north. The un-trussed approach span on the south is supported by I-beams set in a concrete footing. Party accepting ownership will be responsible for the dismantling, transport and reassembling of the structure. Ownership of the structure will go to the highest bidder. If sold, bridge must be reassembled for public use.

Interested persons can contact Mr. Denny McCrorey, Stone County Commissioner, at P.O. Box 45 in Galena, Missouri 65656, or contact by phone at (417) 357-8141 by December 3, 2001.

Christian County, Missouri: The Riverdale Bridge located in Section 36, Township 27 North, Range 22 West in Christian County. Constructed in 1906, the 175-foot total length and 11.5-feet wide bridge consist of a 2-span (each approximately 87-feet long). The superstructure is a steel, 5-panel, pin-connected Pratt through truss. The party accepting ownership will be responsible for the dismantling, transport and re-erecting of the structure. Ownership of the structure will go to the highest bidder. If sold, bridge must be re-erected and maintained in accordance with the "Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitation of Historic Buildings."

Contact: Spencer Jones, Great River Engineering, 3032-A S. Fremont, Springfield, MO 65804 (417) 886-7171. By: November 30, 2001.

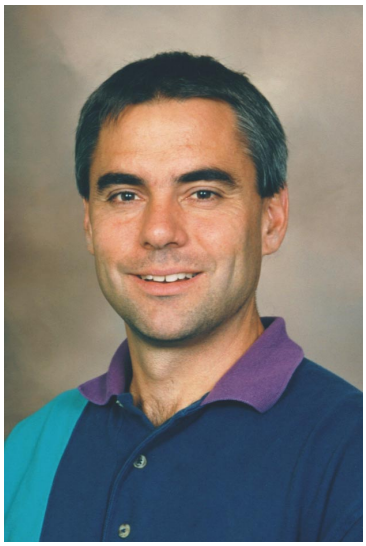
Crawford County, Missouri: The Sappington Bridge located in Section 35, Township 40 North, Range 2 West. Constructed in 1904, the 250-foot total length and 15.1-feet wide bridge consist of 2-spans. The approach span is a steel, 3-panel, pin-connected Pratt pony truss which is 50-feet long. The main span is 200-feet long and is a steel, 11-panel, pin-connected Parker through truss. The party accepting ownership will be responsible for the dismantling, transport and re-erecting of the structure. Ownership of the structure will go to the highest bidder. If sold, bridge must be re-erected and maintained in accordance with the "Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitation of Historic Buildings."

Price; Square Feet; Lot Size: **n.a.**

Contact: Spencer Jones, Great River Engineering, 3032-A S. Fremont, Springfield, MO 65804 (417) 886-7171

Marion County, Missouri: Hall Bridge located in Section 2, Township 58 North, Range 7 West located in Marion County, Missouri, is for adaptive reuse. Constructed in 1914, the 160-foot bridge consists of a 110-foot main span, pin-connected steel through-truss with 6 panels, and a 11.8-foot road width. Two approach spans consist of concrete deck pavement on steel I-beam stringers. The prospective purchaser accepting ownership for the bridge will be required to disassemble, transport, re-erect, and maintain the structure in accordance with the "Secretary of the Interior's Standards for Rehabilitation of Historic Buildings." Contact: James D. Bensman, P.E. at MECO Engineering Co., Inc. 3120 Highway W, Hannibal, MO 63401 by January 1, 2002.

New Technology Transfer Director named at MoDOT



In June MoDOT named Michael Shea as the new Technology Transfer Director. Mike is taking over for the retiring Jim Radmacher who served in that capacity for 11 years. Mike Shea is a 9 year department employee who started with MoDOT in 1992 in the Kansas City District in roadway design. In 1994 Mike took a design assignment in the Joplin District Office. Since 1995 Mike has been working at the General Headquarters Office where he has held positions in planning and value engineering. Prior to joining MoDOT Mike has held positions with the City of Overland Park, Kansas, FHWA and as an engineering consultant.

Mike is pleased to join the RDT unit at MoDOT. "Our job here at the Missouri LTAP Center is to help our local governments upgrade and maintain their transportation facilities. I am fortunate to have the support of our Research staff here at MoDOT to meet the needs of our customers. You the customer is the reason why technology transfer works. Our program's success can be attributed to the time and effort that each of you take in sharing information with us here at the center and to your colleges around the state." LTAP in Missouri will continue to serve the needs of our local communities by providing training and publications in several areas.

In his spare time you can usually find Mike on a field in Jefferson City coaching kids on baseball, soccer and football.. Mike is married and the father of 3 children..

44th Annual UMR Asphalt Conference

UNIVERSITY OF MISSOURI-ROLLA
December 4-5, 2001

The 44th Annual UMR Asphalt Conference will be held on Tuesday and Wednesday, December 4-5, 2001 at the University of Missouri-Rolla. Presentations at the conference include:

MoDOT update, MAPA update, re-evaluation of the gradation restricted zone, NCAT test track, use of RAP and shingles, PG binder problems and construction requirements, importance of performing mix design correctly, use of recent technology in city/county projects, QC/QA: relationship of aggregate supplier and paving contractor, resolving QC/QA differences, pavement engineering for the 21st century, Arkansas rubbilization project, construction of the shoulder template, St. Louis County full-depth project, low volume street maintenance, FHWA traffic control manual, and status of future funding.

The conference should be of interest to contractors, public agencies, consulting engineers, testing labs, aggregate producers, asphalt binder suppliers, and equipment technical reps.

For conference program information contact Dr. Dave Richardson, Conference Director (573-341-4487; richardd@umr.edu) and for registration information contact Engineering Continuing Education, Room 105 ME Annex, University of Missouri –Rolla, Rolla, MO 65409-1560, (573-341-4200; suep@umr.edu).

R&D Trade Publication Recognizes MoDOT Sponsored Research as Top 100 World Wide

At a Recent R&D Awards Ceremony in Chicago MoDOT and Honeywell were recognized in the Top 100 projects World Wide for research conducted on "Automated Imaging System for Hardened Concrete." This research will provide an automated method to determine the durability of concrete pavement.

Over the years, the U.S. Department of Energy's Kansas City Plant (KCP), operated by Honeywell has developed an extensive capability in image processing, pattern recognition, and system integration for use in weapons application. For this Cooperative Research and Development Agreement (CRADA) project between KCP and MoDOT, the same technology was applied to evaluate the microscopic properties of hardened concrete.

The system will provide an automated process to analyze air void structures within cores taken from concrete pavement. Air void structure is directly related to the durability of concrete pavement. The current process to evaluate concrete pavement is labor intensive and time consuming.

More details on the award can be obtained on the world wide web at www.rdmag.com. For more information on the project please call the RDT office at (573) 751-3002 or email: cookn@mail.modot.state.mo.us.

Training Events

City and County highway departments can increase their employee knowledge base through participation in the training programs administered by the Missouri Department of Transportations Local Technical Assistance Program (LTAP). Entities can choose from a list of popular topics that are designed to expand the capabilities of county workers as well as provide technical support to commissioners, road superintendents and administrative personnel.

A sample of courses and workshops include;

Traffic Count Methodology

Part 1- Traffic Count Methodology

Designed to be shared with county commissioners, administrators and data collectors who are considering the purchase of traffic counting equipment. The course delineates the benefits of a traffic count program and highlights a few of the traffic counting systems available.

Part 2- Traffic Count Field Assistance

Hands on demonstration of the state entities purchased traffic data collectors. This assistance includes the actual setting of counters, retrieval of data and discussion of technical support. The assistance will acquaint personnel with the best practices and techniques concerning the operation and use of traffic counters.

Work Zone Traffic Control

The course will acquaint attendees with the serious nature of traffic control problems in work zones and assist them in being able to prepare and implement a traffic control plan.
Items Covered;

Legal responsibility

Why is it a tough job?

How dangerous is it?

What help do we have?

The importance of traffic management

Traffic control standards

Device location

Flagging Procedure

Professionally made videos are shown along with a discussion on legal consequences of improper traffic control.

Traffic Control Flagging

Contents of course include;

Flagging equipment

Requirements of a good flagperson

Flagging positions and factors that effect flaggers and motorists

Flagging operations (single flagger, two flagger, one direction, etc)

Nighttime and emergency flagging

Gravel Road Workshop

Designed for both commissioners and road grader personnel, the contents of this workshop include;

Basic principles of roadway design (base, crown, drainage etc)

Surface maintenance requirements and techniques

A series of videos will be utilized to review the techniques discussed in the workshop

A complete list of training session and workshop topics can be obtained by contacting Mike Shea LTAP Director at 573-751-0852, or e-mail; sheam@mail.modot.state.mo.us.

Don't Gasp Over GASB

Local Governments Face New Accounting Rules

The rules of governmental accounting are changing. As state and local governments are required to adopt accounting practices similar to those used in the private sector, transportation administrators face the task of bringing their financial reports into compliance with the new standards—before time runs out.

State and local governments have traditionally reported their infrastructure assets (roads, bridges, dams, vehicles, etc.) according to the cash accounting method: the cost of the infrastructure investment appears on the agency's financial reports the year in which its cost was incurred. Under this system, the value of existing physical assets is not reported in subsequent years.

But according to new financial reporting requirements known as "GASB 34," governments must begin to report such assets using accrual accounting methods similar to those used in the private sector—taking into account the monetary value of assets throughout their lifespans and factoring in depreciation, in the same way a business would account for the value of the buildings and machinery it owns.

GASB (pronounced "gasbee") 34 stands for Government Accounting Standards Board Statement 34. GASB is a nonprofit entity responsible for establishing accounting practices for state and local governments; its sister organization, the Financial Accounting Standards Board (FASB), sets accounting standards for the private sector. Statement 34, dealing with accounting practices for infrastructure and capital investments, was approved in June 1999 and will take effect in phases over the next several years.

By bringing governmental accounting practices into line with those of the private sector, GASB 34 is intended to "improve the accountability of governments to their citizens by providing better, more accessible information about the condition and costs of capital assets." [Source: Terry K. Patton and Penny S. Wardlow, "Why Infrastructure Reporting?" GASB Action, Vol. 16, No. 5, May 1999.]

Benefits of GASB 34

Although the new reporting system will make government financial information more comprehensible to private citizens, GASB 34 will also help businesses and financial institutions obtain a clearer picture of government finances. GASB 34 will therefore be an important factor in dealing with creditors and investors, and governments not in compliance will be at a distinct disadvantage.

Another important advantage of capitalizing infrastructure assets in compliance with GASB 34 is likely to be seen when it comes time to request public funding. The new accounting system will make it easier for the general public to understand that the transportation system represents an investment in the community's future, so allowing infrastructure to degrade amounts to saddling future generations with a deficiency they'll have to pay. In countries where similar accounting practices are required, this "stewardship" argument has been very effective in gathering public support for funding even during periods of economic recession.

What's Required?

GASB 34 requires two types of financial reporting: prospective and retroactive. Prospective reporting, which will go into effect first, simply requires agencies to report the value of newly acquired or constructed assets. Four years later, when retroactive reporting requirements go into effect, agencies will be required to determine values for their preexisting assets (constructed or significantly improved since 1980) and report them as well.

These reporting requirements will take effect in phases, beginning with the largest governmental entities, so the fiscal year in which reporting begins will depend on your agency's annual revenue (see Table 1).

There are two methods available for assessing the value of transportation infrastructure: the depreciation approach and a modified approach. The relatively simple depreciation approach applies the perpetual inventory method of accounting to depreciate asset value based on historical costs. The more complicated modified approach, detailed in GASB 34, applies asset management techniques. Agencies are free to choose either method; determining which method is right for your agency will involve a number of factors including your internal organization and past accounting practices.

Depending on your agency's unique situation, implementing GASB 34 may be relatively simple or represent a substantial unfunded mandate. However, GASB 34 is not a "one size fits all" regulation, and agencies may take advantage of the built-in flexibility in reporting to develop a strategy for meeting the new reporting requirements.

We would like to extend a training opportunity to municipalities, counties and planning organizations. If you or your group are interested let us know. Please fill out the form below, and fax to MoDOT Research Development and Technology Transfer Unit at (573) 526-4337, or email your response to sheam@mail.modot.state.mo.us , or call Mike Shea at 573-751-0852. Please respond by December 15, 2001.

Name and Organization: _____

_____

Address: _____

_____

Phone: _____

Email Address: _____

Yes, I am interested in the GASB 34 Training

No, I am not interested in the GASB 34 Training

I am interested in learning the new accounting procedures

I am interested in learning about asset management

I am interested in learning how to calculate the value of public works assets

Table 1:
GASB 34 Reporting Requirements

Reporting Requirements	**Agency's annual revenue**		
Prospective	$100 million or more	$10 million to less than $100 million	less than $10 million
Prospective	fiscal year Beginning after June 15, 2001	fiscal year beginning after June 15, 2001	fiscal year beginning after June 15, 2003
Retroactive	fiscal year Beginning after June 15, 2005	fiscal year beginning after June 15, 2006	encouraged but not required to report

Extensive information on GASB 34 can be found at the GASB Web site: www.rutgers.edu/Accounting/raw/gasb.
—Peter Nelson

[Reprinted with permission from the Minnesota T2/LTAP Program, University of Minnesota, Oct.-Dec. 2000.

Cooperative Buying Plan Saves Money for Cities & Counties

City and County highway departments can stretch their road and bridge dollars through the Cooperative Purchase Plan offered through the Local Technical Assistance Program (LTAP).

The program allows political subdivisions, like cities and counties, the opportunity to purchase new equipment (such as salt, trucks, material spreaders, and rotary mowers), at bid prices that the Missouri Department of Transportation is quoted. In many cases, cities and counties can save money because prices quoted the department are often lower due to the quantity of items purchased. Savings can also be realized in reduced time and effort required to advertise, analyze and award bids on products to be used by the towns and counties.

To be included, an organization needs to submit a RESOLUTION to the department showing interest in the program. Preprinted resolutions are available upon request. When an organization has filled out, notarized and submitted it to LTAP, they will be included on the coop mailing list. Participants will be notified with special mailings throughout the year as pertinent bids are received. Cities and counties can then work with the individual vendors for purchasing and delivery arrangements.

Recently, the Missouri Department of transportation has received bids on single and tandem axle dump trucks (purchase and lease), snow-plows to fit those trucks, three section rotary mowers, and liquid and bagged salt. Bids are expected in late October on street sweepers and light duty trucks. It should be noted that MoDOT gas gone to a leasing or multiple bid quote program for tractors and back-hoe loaders so these items are not available for coop purchase at this time.

The State of Missouri Office of Administration (OA), has a similar program entitled the "Local Government Cooperative Procurement Program" This program offers cooperative purchasing of bid on office equipment and light duty vehicles utilized in state government. Cities and counties may view bid items on their web site at http://www.oa.state.mo.us/purch/coop.html. Their coop purchase membership form, which performs the same function as a MoDOT resolution, is downloadable from the site.
For more information on the MoDOT LTAP program, call Mike Shea LTAP Director at 573-751-0852.

Emergency Response Plans Reviewed

In light of the recent tragedies in New York and Washington, the Missouri Department of Transportation and other state agencies are reviewing emergency-response plans to ensure the state is prepared in case of an emergency. Agency representatives met with the governor recently in Jefferson City to review plans and discuss appropriate emergency responses.

"MoDOT's goal in any emergency situation is to get the roads open and keep them open," says Scott Stotlemeyer, who coordinates the department's emergency response plans. "Our role is critical not only in ensuring travel in Missouri, but also for the safety of our citizens if rescue or volunteer efforts are needed." For more information contact Scott Stotlemeyer at 573-526-1759.

We want to hear from you ...

Let us know if your address has changed.

Mike Shea, LTAP Director
Phone: 573-751-0852
e-mail: sheam@mail.modot.state.mo.us

Future Events

December 4-5, 2001
44th Annual University of Missouri – Rolla Asphalt Conference
UMR Campus
Rolla, Missouri
Contact: Dr. Dave Richardson
Phone: 573-341-4487 or
email: richardd@umr.edu

March 19-21, 2002
92nd Annual Highway Engineers Conference
Tan-Tar-A
Osage Beach, MO
Contact: Mark Zacher
Phone: 573-526-3577

April 14-18, 2002
2002 Mid-America GIS Symposium
Hyatt Regency, Crown Center
Kansas City, MO
http://magicweb.kgs.ukans.edu

The Missouri Transportation Bulletin is published by the Technology Transfer Assistance Program of the Missouri Department of Transportation, Jefferson City, Missouri. The opinions, findings or recommendations expressed in this Bulletin are not necessarily those of MoDOT or the Federal Highway Administration.

Editor:
Mike Shea
sheam@mail.modot.state.mo.us
(573) 751-0852

Address:
Missouri Department of Transportation
1617 Missouri Boulevard, P.O. Box 270
Jefferson City, MO 65102

Research, Development and Technology
Quarterly
Missouri Department of Transportation
Vol. 5, No. 1

Stay Safe. Stay Alive.

Follow these tips and use care on Missouri roadways.

1. Slow down in work zones and watch out for workers. Uneven pavement, narrow lanes, barriers and slow-moving equipment make driving in work zones a challenge. Reduce your speed in work zones to protect yourself and the workers. Plan ahead by calling 1-888-ASK-MODOT or visit www.modot.state.mo.us for information on work zone locations.

2. Drive courteously. Don't let frustration make you careless. Be patient, polite and ready to react to other driver's actions.

3. Stay sober. Driving drunk is not only foolish - it's illegal. Alcohol was a factor in 23 percent of all traffic fatalities in 2000.

4. Wear your seatbelt. Statistics show that wearing a seatbelt significantly increases your chance of surviving a crash. Make a habit of buckling up.

5. Pay attention to weather conditions. Is it raining? Snowing? Foggy? Give yourself extra time and slow down when road conditions aren't ideal.

6. Observe speed limits. Speeding was the number one cause of fatal crashes in 2000. Be late if it means being safe.

7. Obey signs and signals. Yellow lights don't mean "speed up." Stop signs aren't merely suggestions. Follow traffic signs and beware of drivers who don't.

8. Watch for pedestrians and bicyclists. Motorists share the road with many different people. Look out for bicyclists and pedestrians.

9. Be alert! Don't drive drowsy. Plan rest stops during long drives. Share the driving if possible. If you feel tired, stop and get some sleep.

10. Protect children with safety seats and booster seats. Vehicle crashes were the leading cause of death for children ages 5-14 in the United States in 2000. Make sure young passengers are safely secured in a device that meets federal safety standards.

11. Bike and walk safely. Be visible. Wear light-colored or reflective clothing so motorists can see you. Bicyclists, wear a helmet. A properly fitting helmet can reduce the chance of head injuries.

In 2000, 1,157 people died on Missouri roads. The question is: Why?

One fatality every 7.6 hours. Three a day. Twenty-two each week. Ninety-four a month. Although no single cause can be blamed for all of these crashes, the truth is that many of them were prventable. Here are the facts about Missouri fatalities.

Speeding caused 36 percent of all fatal crashes in Missouri. That means 437 people lost their lives because someone drove too fast.

Alcohol contributed to the deaths of 261 people. In 2000, one person was killed or injured in Missouri every 1.3 hours in an alcohol-related crash.

Nearly 26 percent of fatal crashes involved a driver under the age of 21.

Most crashes involving motorcycles and bicycles resulted in death or injury.

Vehicle crashes are the leading cause of death for people aged 5-34 in Missouri.

Almost 70 percent of the people killed on Missouri roads were not wearing a seat belt. Drivers involved in crashes had a 1 in 59 chance of being killed if they did not buckle up. Drivers who wore a seat belt improved the odds to 1 in 1,369.

More than 94 percent of crashes involving pedestrians resulted in death or injury.

Half of the children under age 4 who were killed in Missouri traffic crashes were not secured in an appropriate restraint device.

Inside:

Warning: Work-Zone Changes Ahead

Missouri motorists will see changes in MoDOT work zones next spring.

MoDOT is implementing changes to begin reducing motorist delay and the frustrations resulting from work zones. The results will be fewer traveler delays and frustrations and a decrease in the time contractors and MoDOT takes to complete projects.

"Simply put, in many areas of the state, traffic levels and congestion are at gridlock levels, and MoDOT work zones should not be contributing to traveler delays," says Kevin Keith, MoDOT chief engineer. MoDOT will not be conducting "business as usual" in its work zones.

The impact of work zones on traffic can be minimized in many ways. Changes include:

- working during off-peak and/or at nighttime when possible,
- scheduling multiple projects on the same route through the coordinating of work zones,
- reducing the number of days allowed for projects and activities requiring lane closures,
- ensuring all work zones are neat, orderly and effective,
- reopening a closed lane if traffic backs up significantly,
- keeping the speeds in work zones at or near the usual speed when possible,
- closing the road entirely for short periods to complete the work, rather than lengthy closures.

"This is going to take a change in everyone's philosophy and our approach to the work we do," Keith says. "Everyone will be accountable to ensure these new guidelines are carried out."

Evaluation of Early Entry Sawing of PCCP

Background

Contraction or control joints are generally established in concrete pavements through sawing of the hardened concrete. These sawed joints create a weak plane in the slab, which promotes cracking of the slab at that plane. The joints provide the stress relief needed for the concrete while controlling the location of cracks. It is common practice in Missouri to saw transverse control joints at 15' spacing. The sawed joints also provide a smooth wide channel in the slab that can be filled with sealant material to keep moisture and incompressible materials out of the cracks in the slab.

Missouri Department of Transportation standards require transverse contraction joints in concrete pavements to be sawed a minimum width of 3/8" and a minimum depth of 1/4 the pavement thickness. These sawed joints are cut with conventional 65hp diamond saws. According to MoDOT specifications, "sawing of the joints shall begin as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling". With conventional sawing equipment, these sawed joints are usually cut between 8 and 24 hours after concrete placement, depending on weather conditions and concrete mix characteristics.

An early entry saw is lighter than a conventional saw. Early entry sawing is a dry sawing operation, requiring no water source. The lightweight early entry saw permits sawing of the concrete at earlier ages than could be done with the heavier conventional saws. Establishing the joints earlier is believed to increase the probability that the concrete will crack at those joints rather than relieving stresses through random cracking. It is also believed that the standard joint depth of 1/4 of the pavement thickness is not necessary with early entry sawing. The manufacturer recommends joint depth of 1/10 the pavement thickness, but at least 1" when using the early entry saw.

Project Information

Three projects (US 60 in Wright Co., US 63 in Osage Co. and US 65 in Benton Co.) were selected to evaluate the use of an early entry concrete saw manufactured by SoffCut International, Inc. Test sections were established in each of the three projects to compare early entry sawing at various depths with conventional sawing at the standard depth. All transverse joints were spaced at 15'.

The early entry saw used to establish the joints for this evaluation was a Soff-Cut 20hp model. The Soff-Cut saw is equipped with a dust shield that prevents dust produced during sawing from becoming airborne. The dust is left neatly alongside and inside the saw cut. The dust is in the form of damp powder because the concrete is still green. It may be blown from the pavement with pressurized air, swept or washed with water if available. The Soff-Cut saw is also equipped with a skid plate that protects against raveling. The skid plate performed well. Very little raveling was observed around joints made by either the Soff-Cut or the conventional saw.

Test Section # (Pavm't Thickness)	Dimensions of Transverse Joint	Type of Saw Used	# of Joints	Time After Paving Joints were Established	Ambient Temp. Range from Paving to 7 days after	% of joint cracks that developed by: *(from time of sawing)*			
						1 day	3 days	5days	7 days
US60-TS1 (12")	3/8" x 1 1/2"	Soff-Cut	42	3 ½-6 hours	50 - 90 °F	11.9%	54.8%	64.3%	71.4%
US60-TS2 (12")	3/8" x 3"	Conventional	42	8-9 hours	50 - 90 °F	31.0%	81.0%	92.9%	95.2%
US63-TS1 (10")	3/8" x 1 3/4"	Soff-Cut	31	6-7 hours	30 - 75 °F	3.2%	35.5%	41.9%	51.6%
US63-TS2 (10")	3/8" x 1 3/4"	Soff-Cut	13	6-7 hours*	30 - 75 °F	0.0%	23.1%	23.1%	38.5%
US63-TS2 (10")	3/8" x 1 3/4"	Soff-Cut	21	17-18 hours*	30 - 75 °F	14.2%	38.1%	38.1%	42.9%
US63-TS3 (10")	3/8" x 2 1/4"	Soff-Cut	33	17-18 hours*	30 - 75 °F	48.5%	66.7%	72.7%	76.5%
US63-TS4 (10")	3/8" x 3"	Conventional	34	18 hours	30 - 75 °F	0.0%	20.6%	23.5%	44.1%
US65-TS1 (12")	3/8" x 1 1/2"	Soff-Cut	35	3-4 hours	70 - 95 °F	94.3%	94.3%	97.1%	97.1%
US65-TS2 (12")	3/8" x 2 1/4"	Soff-Cut	35	3-4 hours	70 - 95 °F	94.3%	100.0%	100.0%	100.0%
US65-TS3 (12")	3/8" x 3"	Conventional	35	8-10 hours	70 - 95 °F	100.0%	100.0%	100.0%	100.0%

***Sawing in part of US63-TS2 and US63-TS3 could have been done sooner but sawing was stopped at dark.**

Performance Data

The table above shows details of the transverse joints, ambient temperatures and the rate at which cracks developed at the joints in each of the test sections.

Only two small random cracks were observed in one test section. The cracks are believed to be related to poor consolidation rather than stress relief. Overall, all of the joints effectively controlled random cracking. As can be seen in the table, generally the early entry sawed joints did not crack as rapidly as the conventional joints.

The early entry sawing operation consisting of one saw with operator achieved similar or slightly better production in terms of joints per hour than two conventional saws with operators.

Ambient conditions were the main factor affecting saw timing and joint crack development; however, the US 65 project was constructed with concrete with a 2" maximum size coarse aggregate. This large coarse aggregate did not adversely affect the sawing operation or the development of joint cracks in that project.

Current Status

A specification is currently being reviewed that would allow the use of the early entry saw at a depth of 1/8 the pavement thickness as an alternate to conventional concrete saws at 1/4 the pavement thickness. Use of early entry saws has been shown to provide acceptable resistance to random cracking in PCCP, and is expected to result in time and cost savings due to the observed increased productivity compared to conventional sawing methods.

A full construction report, RDT01-010 *"Evaluation of Early Entry Sawing of PCC Pavement"* is available.

Contact:

If you would like further information, please contact:

Tim Chojnacki
Phone: (573) 751-1040
E-mail: chojnt@mail.modot.state.mo.us

Type A Water Reducers in MoDOT's PCCP Mixes

Project Description

In MoDOT's quest for improving the condition of the state transportation system, it is necessary to explore any opportunities to improve the performance of our PCC pavements at a lower cost. Recently, Research, Development, and Technology, pursued investigating the addition of a Type A water reducer while reducing cement content in PCCP mixes. It was proposed that adding a water reducer will lower the water/cement ratio and promote complete hydration of cement particles resulting in an improved hardened concrete product, despite a ¼-sack reduction (per cubic yard) in cement content.

This investigation was a two-part study that consisted of both laboratory and field results of PCCP mixes containing a Type A water reducer with cement reductions. The laboratory study consisted of ten different mix designs containing various combinations of Type A water reducer dosages and cement content, including control mixes with no water reducer. The field study consisted of testing a PCCP mix from a district paving project containing a Type A water reducer and a ¼-sack cement reduction in its design. A standard field mix containing no water reducer and no cement reductions was also tested for comparison purposes. In both the laboratory and field studies, concrete specimens were fabricated from each mix and were tested for the following concrete characteristics:

7 and 28 day compressive strength (AASHTO T22)
28-day flexural strength (AASHTO T177 or AASHTO T97)
freeze/thaw durability (AASHTO T161)
air void analysis (ASTM C457)
rapid chloride permeability (AASHTO T277).

Compressive Strength (AASHTO T22)

Laboratory Results

Figure 1 illustrates the effect on compressive strengths when varying the cement content and the dosage of water reducer for the mixes developed in the laboratory. (Note: dashed horizontal lines denote the average 7 and 28-day compressive strengths of the control mix.)

The general trend for the laboratory results follow that for a given cement content, mixes containing 5 oz./sack of water reducer had greater compressive strengths than the mixes with lower water reducer dosages. Another observation of the water reducer is that it provided the concrete with greater compressive strengths compared to the control mix, even at the lowest cement content.

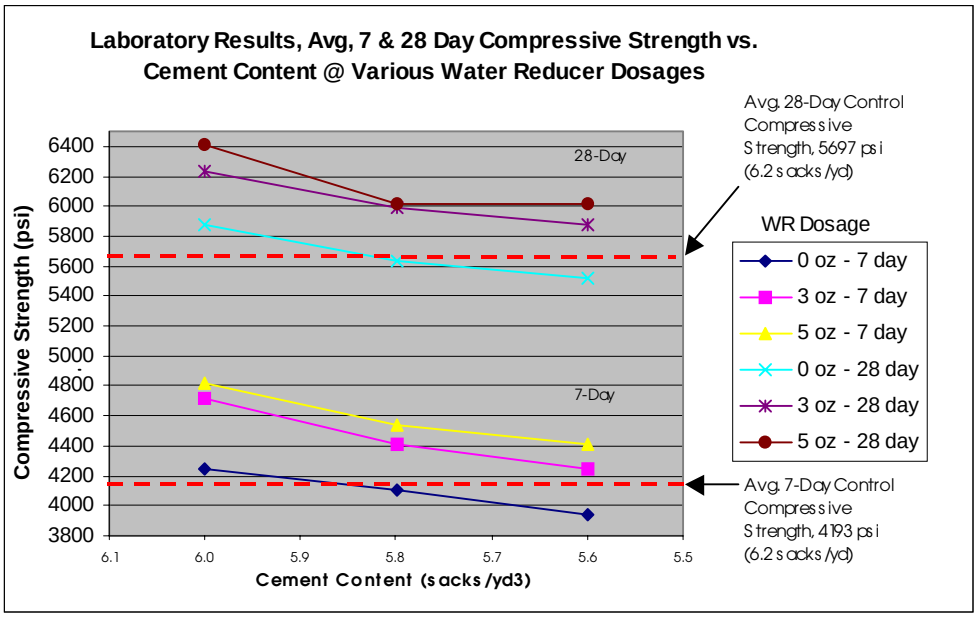


Figure 1 – Laboratory Compressive Strength

Field Results

Compressive strength data were also collected from 7 and 28-day concrete cylinders taken from both the control mix and the water reducer mix that were produced in the field. Figure 2 illustrates the average 7 and 28-day compressive strength of the field water reducer test mixes and compares them to the control. The average 7 and 28-day compressive strengths of the field control mix are denoted in the figure by the lower and upper solid/dashed lines, respectively.

As Figure 2 illustrates, the water reducer appears to increase compressive strength despite the ¼-sack cement reduction in the mix. The only exception to this is when the air content of the WR mix is relatively higher compared to the control.

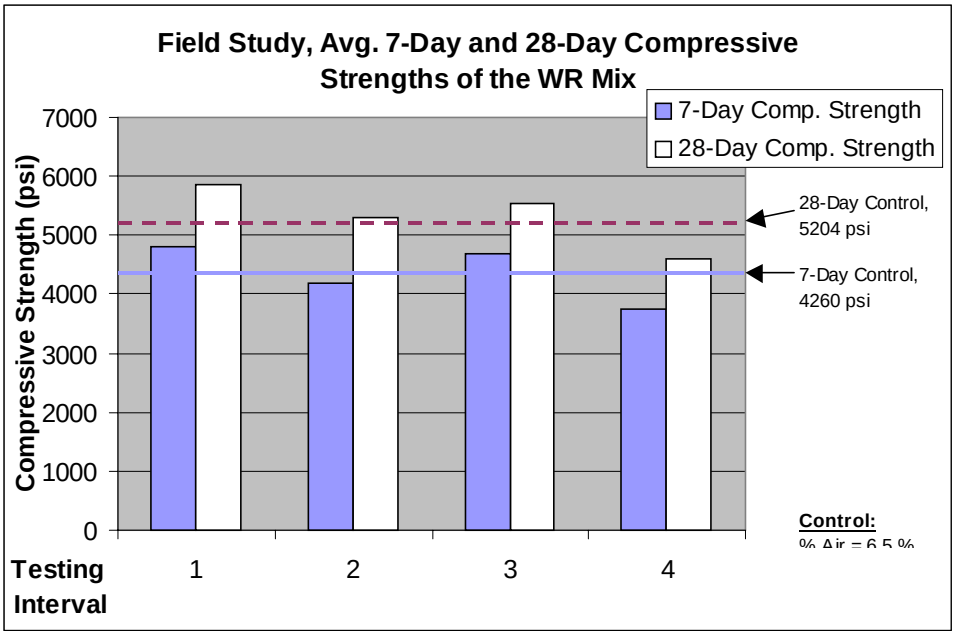


Figure 2 – Average 7 and 28 Day Compressive Strengths

Flexural Strength (AASHTO T-177 and AASHTO T-97)

Laboratory and Field Results

The flexural strength results for the laboratory study were too inconclusive. The laboratory flexural tests were conducted according to AASHTO T-177, which varied considerably between companion test specimens.

Field flexural strengths were conducted according to AASHTO T-97, which provided a more thorough flexural test and more comparable results. The flexural strength of the WR mix followed the same general trend as the compressive strength. The flexural strength of the water reducer mix was higher than the control, except when the air content of the WR mix exceeded the control. Table 1 lists the 7 and 28 flexural strengths of the WR mix and the control mix from the field project.

Mix Interval	Avg. % Air	Avg. 7-Day Flexural Strength, psi	Avg. 28-Day Flexural Strength, psi
WR 1	5.8	681	694
WR 2	7.5	627	663
WR 3	6.0	629	680
WR 4	8.5	538	600
Avg. Control	6.5	631	668

Table 1- Field Study, 7 and 28-Day Flexural Strength

Freeze/Thaw Durability (AASHTO T161)

Laboratory Results

All PCC mixes tested in the laboratory had an average freeze/thaw (F/T) durability factor in the range of 95 –97. There was no indication of superior or inferior freeze/thaw performance by the addition of water reducer in any mix design. Even the PCCP mixes that had the lowest cement content and contained no water reducer performed well. The aggregate used in the PCCP mixes for this laboratory study had a good F/T performance history, thus any substandard results would have been due to the effects of the water reducer and/or reductions of cement to the PCCP mix.

Field results

Although the water reducer mix had a lower average F/T durability factor compared to the control mix, both mixes obtained an average F/T durability factor less than 60, which is substandard. The F/T testing results indicate that the coarse aggregate used in this study was questionable on its resistance to freezing and thawing cycles. Due to the likely substandard aggregate, no valid comparisons could be made between the WR mix and the control mix.

Air Void Analysis (ASTM C457)

The PCCP mixes specimens from both laboratory and field studies had an adequate air void structure for good freeze/thaw durability. The bubble spacing factors, specific surfaces, and void size distributions were within the proper ranges. Despite this, good freeze/thaw performance from the field did not occur. This further indicates that the aggregate quality of the materials in the field may have not been satisfactory.

Rapid Chloride Permeability (AASHTO T 277)

PCCP mixes containing water reducer and decreased cement content closely compare to that of the control mixes from both laboratory and field testing. The water reducer in combination with a reduced cement content appeared to decrease the average permeability, but all mixes were considered to be within the same moderate permeability range.

Key Findings

The main findings of this investigation can be summarized as follows:

PCCP mixes containing a Type A water reducer and at least a ¼-sack reduction in cement showed increases in compressive and flexural strength compared to a conventional mix. Both mixes were produced at approximately the same water/cement ratios.

The laboratory freeze/thaw results indicated no additional benefit or

(continued on next page)

(continued from page 5)

detriment to freeze/thaw resistance for the mixes containing water reducer and lower cement content. All laboratory mix designs achieved above a 95 freeze/thaw durability factor.

- The field freeze/thaw results indicated poor freeze/thaw performance (< 60 durability factor) by both the control and water reducer mixes. The poor durability is probably due to the quality of the aggregate, but further testing is needed to verify this. The control mix had approximately 12% higher durability compared to the water reducer mix. This may be partly due to the relatively lower air contents in two of the water reducer mix samples compared to the control mix.
- The water reducer does not appear to alter the air void structure in the concrete and demonstrated to produce the proper air bubble spacing factor, specific surface, and size distribution for good freeze/thaw performance.
- The PCCP mix containing the water reducer with a ¼-sack reduction in cement cost less than a standard PCCP mix. The proposed savings for the field demonstration project was approximately $0.28 per cubic yard.

Recommendations

Based upon laboratory and field testing results and observations, Research, Development, and Technology recommends that Type A water reducers can be used to obtain equivalent or better concrete characteristics at lower costs compared to conventional PCCP mixes. Further testing of field PCCP mixes containing different brands of Type A water reducers, ¼-sack cement reductions, and acceptable aggregate materials is needed in order to validate improved or equivalent freeze/thaw resistance of these mixes compared to conventional field PCCP mixes.

For more information, please contact:
Jason Blomberg
Phone: 573-526-4338 or
e-mail: blombj@mail.modot.state.mo.us

I-29 Sand Anti-Fracture (SAF) Layer

3rd Year Performance Report

Background:

Reflective cracks in asphalt overlays often accelerate pavement deterioration, which affects ride performance and shortens the life of the overlay. Maintenance crews also spend much of their time sealing cracks to help prolong the life of asphalt overlays. In an effort to reduce reflective cracking in asphalt overlays, the sand anti-fracture (SAF) layer was implemented as MoDOT's rehabilitation strategy for an overlay project on I-29. The SAF layer is a sand asphalt mixture containing high-polymerized asphalt binder, which is placed between the existing pavement and the new asphalt overlay to act as a stress relieving membrane. The SAF layer is proposed to absorb the high strains that occur at the bottom of asphalt overlays and retard reflective cracking.

The SAF material cost approximately three times more than the cost of a conventional SuperPave mix. The SAF will need to extend the life of an asphalt overlay to justify its cost.

Project Description:

The sand anti-fracture (SAF) layer was constructed under a SuperPave overlay on Route I-29, Holt County, Missouri, in the summer of 1998. The original 9-inch PCC pavement was constructed in 1974 and had moderate to severe deterioration at joints and cracks. This project included eight different test sections in order to monitor and evaluate the SAF layer. Figure 1 illustrates the layout of each test section. The test sections included a combination of two degrees of pavement repair (normal vs. minimum), two different overlay thicknesses (3 ¾" vs. 5 ¾"), two different grades of asphalt cement (PG64-22 vs. PG76-28), and some sections with and without the 1- inch SAF layer.

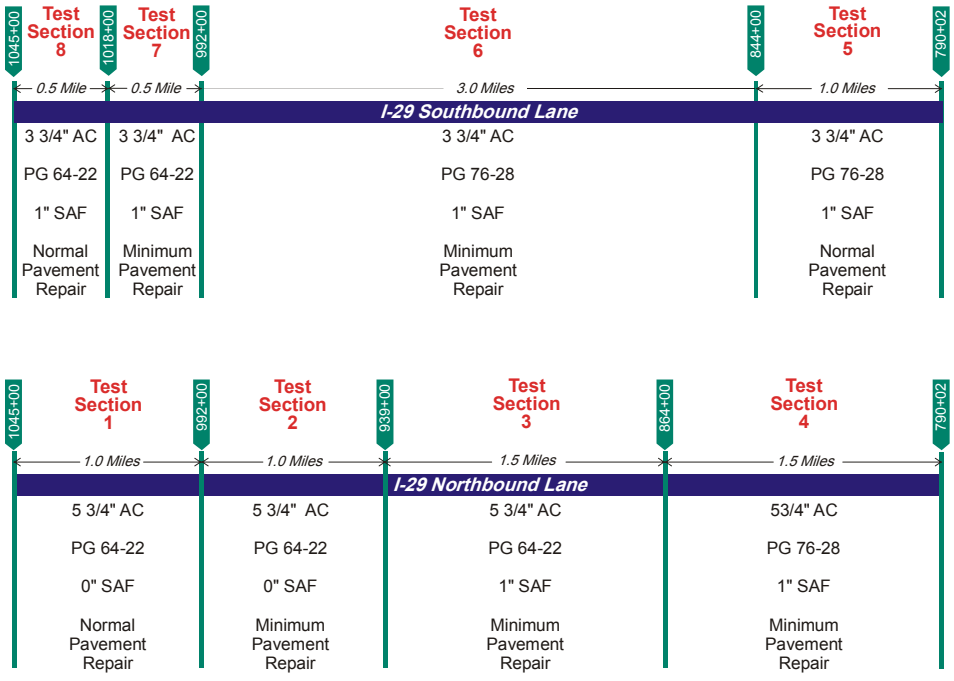


Figure 1 - Test Section Layout

After three years of service, the performance of the eight test sections was evaluated. The evaluation was based upon the following:

- Visual Distress Survey
- Drilled Cores
- 2000 ARAN and Traffic Data

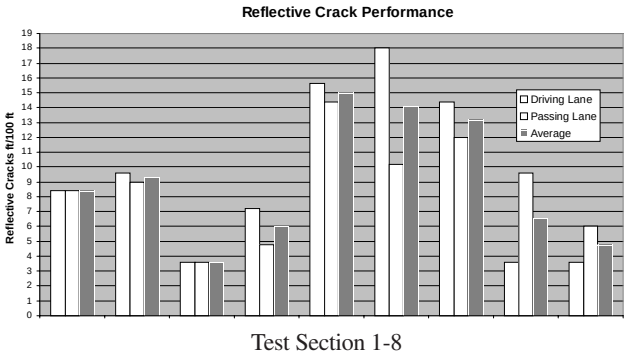


Figure 2 - Reflective Crack Survey

Visual distress surveys were conducted on each test section. Figure 2 shows the amount of reflective cracking occurring in each test section. Drilled cores were taken from a reflective crack from each test section. Table 1 provides drainage characteristics of the test section and a brief description of the drilled core. Year 2000 ARAN and traffic data were collected for this project. Tables 2 and 3 provides the ARAN and traffic data, respectively.

Test Section	Drainage Description	Description
1	Good	Minor crack on surface, not penetrating down.
2	Good	Minor crack on surface, starting to penetrate down.
3	Fair	Minor crack on surface, starting to penetrate down.
4	Fair	Minor crack on surface, starting to penetrate down, SP125 layer debonded from SP150 layer.
5	Poor	Severe crack from surface down to the SAF layer. Debonding between SuperPave mixes and the SAF layer. No crack at SAF layer.
6A	Poor	Severe multiple cracks at surface through the SP125 mix. Debonding between SuperPave mixes. No crack at SAF layer.
6B	Poor	Severe multiple cracks at surface down through the SAF layer. Debonding between SuperPave mixes. Crack through SAF.
7	Good	Reflective crack at surface down to the SAF layer. No Debonding.
8	Good	Reflective crack through SuperPave overlay. No SAF due to removal at construction.

Table 1 – Drilled Cores

Preliminary Conclusions:

The conclusions from the 3rd year performance of the SAF test sections on the I-29 project are summarized as follows:

- The polymer modified asphalt binder PG76-28 does not appear to be reducing reflective cracking compared to the conventional performance grade asphalt PG64-22.
- Using polymer modibinder and the 1" SAF layer does not justify reducing overlay thickness.
- Performing normal vs. minimum pavement repair does not appear to affect the amount of reflective cracking in the test sections.
- The performance of all test sections appears to be directly related to the drainage characteristics of the test site.
- Two SAF test sections (TS 7 & 8) are performing similar to the conventional sections (TS 1 & 2) in good drainage areas.
- Three SAF test sections (TS 5, 6A, & 6B) are not performing well and are showing the highest levels of surface distress in poorer drainage areas.
- The SAF layer, itself, is not cracking and remains intact. The SuperPave overlay is showing signs of stripping and debonding at the reflective cracks.
- The cost of 1" of the SAF material is approximately three times the cost of 1" of conventional SuperPave mix. Based upon initial performance, the SAF is not considered to be a cost-effective method of rehabilitation at this time.
- The distress on the pavement to date does not appear to affect ride performance.
- Traffic loadings in the northbound and southbound lanes appear to be equivalent.

2000 ARAN DATA	
Test Section	**Avg. PSR Score (0 – 40)**
1	31.8
2	31.1
3	32.7
4	30.4
5	32.5
6	32.4
7	33.8
8	32.8

Table 2 – 2000 ARAN Data

2000 TRAFFIC DATA		
Lane	**Annual Average Daily Traffic (AADT)**	**ESAL/YR**
Northbound Lane (Test Sections 1-4)	5707	674,870
Southbound Lane (Test Sections 5-8)	5789	554,880

Table 3 - 2000 Traffic Data

Preliminary Recommendations:

- Based upon 3rd year performance of the SAF test sections, the SAF layer is not recommended as a pavement rehabilitation strategy until final evaluation of the I-29 and the U.S. 36 SAF projects.
- Further monitoring of the I-29 project is needed to determine the long-term effectiveness of the SAF material in order to justify its cost.

Based upon the condition of the drilled cores, mix characteristics of the SuperPave layers need to be investigated to determine the causes of stripping and debonding of the SuperPave layers.

For more information, contact:

Jason M. Blomberg
Phone: (573) 526-4338
Email: blombj@mail.modot.state.mo.us

Missouri Department of Transportation
Technology Transfer Assistance Program
Local Technical Assistance Program
P.O. Box 270
Jefferson City, MO 65102

Telephone
573-751-0852

Address Correction Requested

The Missouri Transportation Bulletin is published by the Technology Transfer Assistance Program of the Missouri Department of Transportation, Jefferson City, Missouri. The opinions, findings or recommendations expressed in this Bulletin are not necessarily those of MoDOT or the Federal Highway Administration.

Editor:
Mike Shea
sheam@mail.modot.state.mo.us
(573) 751-0852

Address:
Missouri Department of Transportation
1617 Missouri Boulevard, P.O. Box 270
Jefferson City, MO 65102