



U.S. Department of Transportation

**Federal Highway Administration**

Research, Development, and Technology  
6300 Georgetown Pike  
McLean, VA 22101-2296

Official Business  
Penalty for Private Use \$300

HRTS

FIRST CLASS  
POSTAGE & FEES PAID  
FEDERAL HIGHWAY  
ADMINISTRATION  
PERMIT NO. G-66

---

## Missouri DOT Hosts Rural RATTs Conference 2000

---

The Missouri Department of Transportation will host the Rural Advanced Technology and Transportation Systems 2000 International Conference on August 13–16 in Branson, MO.

The Missouri Department of Transportation, ITS America and ITS Missouri are calling for interested parties to submit abstracts for papers on the application of intelligent transportation

systems (ITS) in rural areas. Abstracts will be considered for presentation at the Rural Advanced Technology and Transportation Systems 2000 International Conference. Five copies of the abstract and a completed submission form are due to the Missouri DOT by April 28. Abstracts must be typed and no longer than 500 words.

The potential topic areas include

improving safety in rural areas, regional and multi-state planning, ITS for commercial vehicles, solving rural institutional issues, emergency incident management, weather information applications, and rural ITS deployment.

For more information visit [www.itsa.org](http://www.itsa.org) or contact Pete Costello, [pcostello@itsa.org](mailto:pcostello@itsa.org), (202) 484-4668.

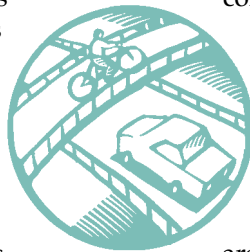


## SAFETY

### Rest Area Forum Summary Available on the Web

In June 1999, FHWA brought together representatives from State departments of transportation, State law enforcement agencies, the motor carrier industry, private truck stop operators, commercial drivers, and safety advocates to discuss issues concerning the availability and safety of parking for commercial vehicles along the Nation's highways. The report detailing events at that forum, *Rest Area Forum: Summary of Proceedings*, is now available on the Turner-Fairbank Highway Research Center's website ([www.tfhrc.gov](http://www.tfhrc.gov)) under "Safety." Hard copies of the report are available from the FHWA Report Center by calling (301) 577-0906.

The objectives of the forum were to review issues surrounding the current provision (by States and private



parties) to allow parking for commercial drivers to be used for resting; to consider a means to provide real-time information on available parking spaces at privately owned truck stops and public rest areas, and information on driver fatigue; and to identify

actions to expand the number of safe, accessible parking lots at public rest areas. The forum participants identified these concerns and recommended solutions. These recommendations, along with other details of the forum, are included in the report. **Ray Krammes**  
(202) 493-3312  
[ray.krammes@fhwa.dot.gov](mailto:ray.krammes@fhwa.dot.gov)



The newly released report, *Rest Area Forum: Summary of Proceedings* examines issues concerning parking for commercial vehicles at public rest areas.

The *Research and Technology Transporter* communicates FHWA research, development, and technology accomplishments, findings, information, and technology transfer opportunities. Its audience is transportation engineers and professionals in State and local highway agencies, State DOTs, Local Technical Assistance Programs, Divisions, Resource Centers, Core Business Units, academia, and the research community. The eight-page newsletter is published monthly by FHWA's RD&T service business unit. Editorial offices are housed at the Turner-Fairbank Highway Research Center. Comments should be sent to the editor at the address below. Field offices are encouraged to submit articles for publication via the appropriate agency technology leader from the editorial board listed below. The newsletter can be viewed online at [www.tfhrc.gov](http://www.tfhrc.gov). Subscriptions to the *Transporter* are free. Send your request to Judy Dakin at the address below, or send email to [judy.dakin@fhwa.dot.gov](mailto:judy.dakin@fhwa.dot.gov).

**Rodney E. Slater**  
Secretary

U.S. Department of Transportation

**Kenneth R. Wykle**  
Administrator

Federal Highway Administration

**Anthony R. Kane**  
Executive Director

Federal Highway Administration

#### Editorial Board

C. Burbank; E. Cleckley; K. Gee;  
A. Hamilton; E. Hempel; C. Johnson;  
D. Judycki; V. Miller; E. Morris;  
G. Ostensen; V. Schimmoller;  
K. Skelton; M. Vecchiatti; D. Wilken;  
L. Witman; F. Wright

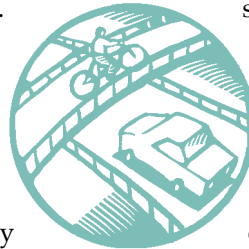
Managing Editor, Martha Soneira  
Senior Editor, Jon Schans  
Editor, Kandace Studzinski  
Design, Jean Hwang  
Distribution, Judy Dakin



U.S. Department of Transportation  
Federal Highway Administration  
Turner-Fairbank Highway Research Center  
6300 Georgetown Pike, HRTS  
McLean, VA 22101-2296  
[www.tfhrc.gov](http://www.tfhrc.gov)

## Bicycle Lanes and Wide-Curb Lanes Both Aid Bicyclists

There has been a long-standing discussion regarding which facility—bicycle lane (BL) or wide-curb lane (WCL)—is preferable. A recently completed FHWA study analyzed the impact of striped bicycle lanes and wide-curb lanes (typically 14-15 feet wide) and concluded that both facility types can and should be used to improve conditions for bicycling.



bicyclists were analyzed and coded to evaluate operational characteristics (intersection approach position and subsequent maneuvers) and conflicts with motor vehicles, other bicycles, or pedestrians were coded. Researchers separately collected data about bicyclists' experiences to learn about the age, riding habits, and experience levels of the bicyclists riding through these data-collection sites. Crash data from police were also analyzed to determine whether the reported bicycle-motor vehicle crashes paralleled the videotaped data.

The comparative study involved collecting data in Santa Barbara, CA; Austin, TX; and Gainesville, FL. Videotapes of almost 4600



There are a variety of on- and off-road bicycle facilities—each with its advantages and disadvantages. A recently published FHWA study analyzed the impact of both striped bicycle lanes and wide-curb lanes.

---

Study findings include the following:

- Occurrences of bicyclists riding the wrong-way or riding on the sidewalk were much more prevalent at WCL sites than at BL sites.
- In WCL sites, there were significantly more motor vehicles passing bicyclists on the left, causing the vehicle to encroach into the adjacent traffic lane than in BL situations.
- Proportionally more bicyclists obeyed stop signs at BL sites;

however, when a stop sign was disobeyed, the proportion of bicyclists with both “somewhat unsafe” and “definitely unsafe” movements was higher at BL sites.

- The vast majority of observed bicycle-motor vehicle conflicts were minor, and there were no differences in the conflict severity by type of bicycle facility.
- Bicyclists in WCLs experienced more bike/pedestrian conflicts while bicyclists in BLs experienced more bike/bike conflicts.

A summary of the study is provided in *Bicycle Lanes Versus Wide Curb Lanes: Operational and Safety Findings and Countermeasures Recommendations* (FHWA-RD-99-035). The document *A Comparative Analysis of Bicycle Lanes Versus Wide Curb Lanes: A Final Report* (FHWA-RD-99-034) contains a complete discussion of the research method, data collection procedures, and data analysis. Both reports will soon be available on the TFHRC website at [www.tfhrc.gov](http://www.tfhrc.gov). Limited numbers of hard copies are available.  
**Carol Tan Esse**  
(202) 493-3315  
[carol.tan.esse@fhwa.dot.gov](mailto:carol.tan.esse@fhwa.dot.gov)

## INTERNATIONAL

# International Transportation Information Resources Available on the Internet

FHWA's Office of International Programs recently released two new volumes that provide highway transportation information resources for domestic and international professionals. *Volume 1-Highway Transportation Libraries and Information Centers*, and *Volume 3-Document Delivery Suppliers*, are part of the *International Guide to Highway Transportation Information*—a multi-volume set of guides that provide highway transportation information resources for domestic and international professionals. These volumes are currently available only on the internet at [www.international.fhwa.dot.gov](http://www.international.fhwa.dot.gov).

The guides are the first two of five volumes that will update

previously published titles: *Acquiring Highway Transportation Information from Abroad, Volume 1. Final Report*, and *Volume 2 Handbook, 1994*.

Upcoming guides will identify websites (Volume 2); bibliographic and non-bibliographic databases (Volume 4); and highway transportation research centers, associations, organizations, and other professional societies (Volume 5). A final guide will also incorporate all five volumes and include an index. Information sources for member countries of the Organization for Economic Cooperation and Development (OECD) and other

selected countries are included in the guides.

The guides will aid traffic engineers, transportation planners, and intelligent transportation systems specialists, academicians, applied researchers, administrative officials, and highway transportation information and library professionals. The guides will also be of use to civil engineers or other professionals in highway construction, operations, and materials; highway safety and human factors engineers; psychologists; and social scientists.  
**Donald Symmes**  
(202) 366-9627  
[international@fhwa.dot.gov](mailto:international@fhwa.dot.gov)



## FHWA Releases Highway Funding Bulletin

**F**HWA's Office of Highway Policy Information released its annual bulletin, *Highway Funding 1997-2000*. This summarizes highway revenues and disbursements by all units of government. Total disbursements are expected to be almost \$120 billion in 2000, an increase of 17.6 percent over 1997.

Total anticipated 2000 highway-user revenues of \$101.8 billion (motor fuel, motor vehicle taxes and fees, and tolls) would fund about 85 percent of all highway disbursements.

Capital expenditures are expected to increase in 2000 to about \$58.1 billion for an increase of \$9.7 billion, or 20 percent more than 1997.

State governments will be responsible for approximately 76 percent of total capital expenditures, with capital expenditures of \$44.1 billion. If current trends continue, 28 percent of the

State government capital expenditures will be for projects on the Interstate system, and 41 percent will be used on other principal arterials. An additional 21 percent will be for projects on other arterial and collectors, while 10 percent will be used for local roads. Of the amount expended by States on all arterials and collectors, 16 percent is expected to be used for new roads and bridges, 31 percent for other capacity improvements, 45 percent for system preservation,

and 8 percent for operational and safety-related improvements.

Total funding for highways including receipts, intergovernmental payments, and disbursements for the years 1997 through 2000 are included in the *Highway Funding Bulletin*. It may be accessed on the Office of Highway Policy Information's website [www.fhwa.dot.gov/ohim](http://www.fhwa.dot.gov/ohim) under "Products and Publications" and "What's New."

**Tom Howard**  
(202) 366-0170  
[tom.howard@fhwa.dot.gov](mailto:tom.howard@fhwa.dot.gov)



The *Highway Funding Bulletin* summarizes highway revenues and disbursements. State governments will be responsible for approximately 76 percent of total capital expenditures, and if current trends continue, 28 percent of the State government capital expenditures will be for projects on the Interstate system.

## FHWA Structures Lab Tests Powder-Actuated Fasteners in Construction of Steel Bridges

Should FHWA allow the use of powder actuated fasteners (PAFs) for Federal-aid projects? Tom Everett in FHWA's Tennessee Division Office requested that the Office of Infrastructure R&D at TFHRC look into the fatigue question. Bill Wright, a research structural engineer at TFHRC, performed a preliminary review of available research on the subject.

PAFs are commonly used in building construction to attach concrete forms to steel girders prior to the pouring of the slab. PAFs are hardened nails that are fired into steel using a gun, resulting in a quick and easy attachment system for form work. When PAFs are used, concrete forms can provide significant bracing to the steel girders, resulting in an economical and safe construction system. PAFs have not traditionally been used for highway bridge construction because engineers have speculated that shooting a fastener into the steel will create a defect that could eventually result in fatigue cracking and eventually failure of the steel under repeated truck loading.

A significant amount of fatigue data has been developed at the University of Darmstadt in Germany. This data shows that the fatigue strength of steel is not significantly reduced when PAFs are fired into the steel. Based in part on this data, the Eurocode has included PAFs in their provisions

on fatigue design of steel structures. However, no data is available on how the PAFs perform after the concrete deck is in place and load may be transmitted across the fastener. This condition may be more critical for performance in bridges.

Research at the University of Texas at Austin demonstrated that PAFs can provide significant bracing and safety to steel bridges when used to fasten form work during erection. In addition, contractors in some states are requesting permission to use PAFs to reduce the cost of bridge construction. Tennessee already allows the use of PAFs and no problems have been reported to date. The advantages of using PAFs are becoming clear, but the fatigue issue remains a barrier to broader implementation.

A modest research program on PAFs was quickly initiated in the Structures Lab at TFHRC. A series of four steel beams are being tested under simulated truck loading to evaluate the fatigue

strength of steel beams with concrete decks in place. The testing will help corroborate the European data and determine if the presence of a concrete slab effects fatigue strength. The Hilti Corporation loaned equipment and provided fasteners to prepare the test beams. The research is in progress, and is expected to be completed by the end of 2000. If successful, this research should stimulate more widespread use of PAFs to improve the construction practice of steel bridges.

**Bill Wright**  
(202) 493-3053  
[bill.wright@fhwa.dot.gov](mailto:bill.wright@fhwa.dot.gov)



A lab technician drives PAFs into a steel beam at THFRC's Structures Lab.

## New Tests Developed to Measure Chloride Penetration in Concrete

Researchers at the University of Toronto developed a new method for predicting chloride ion penetration in bridges and pavements. The new method—the rapid migration test—will be used to predict the resistance of concrete to chloride ion penetration. This information will be useful in evaluating new mixes, accepting or rejecting new concrete specifications, and evaluating in-place concrete.

One of the current standard test methods used to assess the resistance of concrete to penetration of chloride ions is the rapid chloride permeability test. This test, officially known as AASHTO T 277-93, “Electrical Indication of Concrete’s Ability to Resist Chloride,” measures the charge passed through a concrete specimen subjected to 60 volts DC for six hours. Variable results have been reported with the rapid chloride permeability test when certain mineral admixtures such as

silica fume were included in the concrete mixture and when calcium nitrite (included in some corrosion inhibitors) or reinforcing steel have been present.

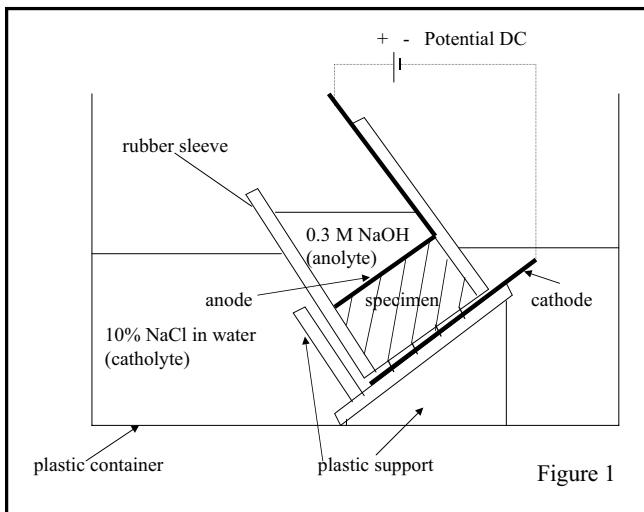
The new rapid migration test is based on a test developed by Tang and Nilsson at Chalmers Technical University in Sweden. The test specimens are 50-mm long and 100 mm in diameter as in the rapid chloride test. The rapid migration test uses the set-up shown in figure 1 with 0.3 M sodium hydroxide ponded on the top of the specimen, and a 10-percent solution (by mass) of sodium chloride at the bottom of the specimen. Similar liquids are used in the rapid chloride test, but they differ in the concentration of the solutions. For the rapid migration test, the specimen is initially subjected to 30 volts DC, and the resulting current determines the voltage to be applied for the duration of the test. The voltage is applied for three different time

periods varying anywhere from 2 to 96 hours. Following the test, the specimen is split in half and a silver nitrate spray is applied to identify the depth of chloride penetration into the specimen.

Field trials of the rapid migration test are under way at TFHRC and at the Texas DOT, Ontario Ministry of Transportation, Virginia Transportation Research Council, and at the University of Toronto. All field trials are using concrete from batches that were mixed at TFHRC. Results of the field trials and results from all phases of the research study will be documented in the final research report, due out early this summer.

*Marcia Simon*  
(202) 493-3071  
[marcia.simon@fhwa.dot.gov](mailto:marcia.simon@fhwa.dot.gov)

*Susan Lane*  
(202) 493-3044  
[susan.lane@fhwa.dot.gov](mailto:susan.lane@fhwa.dot.gov)



The rapid migration test, pictured here, is a new method for predicting chloride ion penetration in bridges and pavements.

## PROFESSIONAL DEVELOPMENT

# National Transportation Week Focuses on Workforce Issues

“**W**orkforce Issues” is the focus of this year’s National Transportation Week (NTW) to be held May 14–20. In a time when job opportunities outnumber the personnel available to fill them, a critical part of this year’s NTW is encouraging young people to pursue careers in transportation.

“There is probably no other issue which reaches across all the modes in both the public and private sector,” noted Joseph S. Toole, FHWA’s Director of Professional Development and one of the organizers of NTW. “This is an issue which very much unites all of the transportation community.”

A number of events and outreach programs are planned during NTW to reach young people. These events complement the Garrett A. Morgan Future Transportation Program, which was initiated by Transportation Secretary Rodney Slater and has already involved more than 1 million children. One such activity is the NTW poster contest being sponsored for 5th graders. Students are invited to enter their



Secretary Slater expresses his support of National Transportation Week to representatives of the more than 20 actively participating organizations.

artwork, which represents their thoughts on the theme, “*Transportation . . . Taking You Where You Want to Go.*” Prizes will be awarded to winners, and the hope is to use the winning artwork in next year’s NTW program.

More than 20 transportation organizations have come together to generate support for NTW and to coordinate plans and programs for the week. Other events for NTW include a panel discussion focusing on “Transportation in the 21st Century” with former secretaries of transportation and a reception showing historical transportation paintings by artist Carl Rakeman. A toolkit is also available, which outlines how



The newly designed National Transportation Week website, [www.ntweek.org](http://www.ntweek.org).

organizations can spread the word about NTW on a local level. For more information visit the website at [www.ntweek.org](http://www.ntweek.org) or call the toll-free phone number at (877) 558-6874.

**Joe Toole**  
(703) 235-0544  
[joe.toole@fhwa.dot.gov](mailto:joe.toole@fhwa.dot.gov)