

## SAFETY

### FHWA Crash Tests Curb-Mounted Bridge Rail

**F**HWA crash tested a pick-up truck with a Massachusetts Type S3 Steel Bridge Railing system. This bridge rail, when mounted behind a 200-mm-high curb and a 1525-mm-wide sidewalk, had been evaluated in a series of three crash tests and met the requirements of Test Level Four (TL-4) in National Cooperative Highway Research Program Report 350 (NCHRP 350). However, researchers wanted to see if the experiment could be conducted without the sidewalk and with the bridge rail mounted directly on a 200-mm-high curb (see figure 1).

To keep the railing geometrics the same with respect to impacting vehicles, the steel posts were shortened by 200 mm before

mounting them on the curb.

The Massachusetts Type S3 Steel Bridge Railing system is a beam-and-post system consisting of three tubular steel rail elements bolted to wide-flange steel posts. Vertical pickets consisting of 25 mm x 25 mm steel tubes are used to close the gaps between the rails in order to meet the AASHTO guidelines for pedestrian protection.

The pickup truck impacted the bridge rail at a nominal speed of 100 km/h and an impact angle of 25 deg. The bridge rail contained and redirected the test vehicle upright. It came to rest 85.3 m down from the impact point and

was in line with the bridge rail (see figure 2). The bridge rail received minimal damage.

Tire marks were on the face of the curb at post number 5. To the right of post number 5, two pickets pulled out of the bottom bolts. Cracks radiated around post number 5 and under the concrete deck.

The test results met the evaluation criteria for Test No. 4-11 in NCHRP Report 350. The next crash test will be a strength test with the single unit truck.

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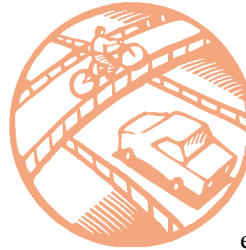


Figure 1 — Bridge rail before the crash test.



Figure 2 — Bridge rail and pick up after the crash test.

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).

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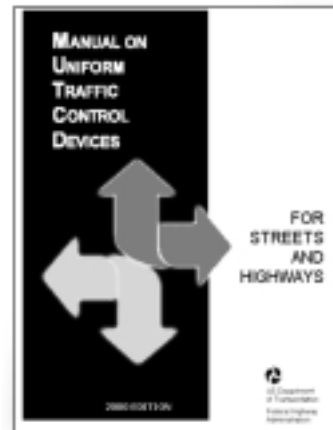
## FHWA Rewrites Manual on Uniform Traffic Control Devices

FHWA's Office of Transportation Operations is rewriting the *Manual on Uniform Traffic Control Devices* (MUTCD). The MUTCD contains standards and guidance for the design and use of signs, pavement markings, traffic signals, and of other traffic control devices.

It's been more than 20 years since the last MUTCD was rewritten in its entirety. The evolution of innovative technologies, roadway developments, and new applications of traffic control devices caused FHWA to reexamine the information in the most recent edition of the MUTCD. A major rewriting and reformatting effort of this manual has been underway since 1995.

The MUTCD is listed in Volume 23 of the Code of Federal Regulations (CFR), part 655. All changes to the MUTCD must be made using the Federal Register rulemaking process. This process allows the public to offer commentary on the proposed changes. FHWA has published notices of proposed amendments in the *Federal Register* for the following parts of the MUTCD:

- Part 1—General Provisions.
- Part 2—Signs.
- Part 3—Markings.
- Part 4—Signals.



**A Millennium Edition of the MUTCD will be under construction throughout 2000.**

- Part 7—Traffic Control in School Areas.
- Part 8—Traffic Control at Highway-Rail Grade Crossings.
- Part 9—Traffic Control for Bicycle Facilities.
- Part 10—Traffic Control for Light-Rail Transit (New).



FHWA plans to publish all notices of proposed amendments for the remaining parts of the MUTCD by March 2000. The remaining parts include a new Part 5—Traffic Control for Low-Volume Rural Roads, and Part 6—Traffic Control for Work Zones. FHWA also plans to publish a notice of proposed update information for Parts 1, 3, 4, and 8. Comments from the

public, for all parts of the MUTCD, must be received by June 2000. FHWA will review and summarize the comments and prepare a final rule position, which will be published in the *Federal Register* in December 2000.

In an effort to increase public awareness of the MUTCD, FHWA is publishing the Millennium MUTCD in both hard-copy and electronic format (CD-ROM and Internet).

The *Federal Register* notices and the proposed text are available at the following Internet locations:

- *Federal Register* home page:  
<http://www.nara.gov/fedreg>.
- MUTCD home page:  
<http://www.fhwa.dot.gov/operations/mutcd>.

FHWA will expand the website to include electronic briefing presentations, which will provide an overview of the proposed

changes to the MUTCD, and a database management program that can be used to research various requests for changes in the MUTCD.

FHWA will preview the new and expanded website at the upcoming Transportation Research Board Conference scheduled for January 2000.

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## PAVEMENTS

### Ultra-Thin Whitetopping Workshop Participants Visit TFHRC

On October 4 and 5, more than 160 professionals—representing State and local governments, the concrete industry, the synthetic-fiber industry, academia, and FHWA—attended the Ultra-Thin Whitetopping (UTW) workshop held in Fairfax, VA. As part of the workshop, participants toured the TFHRC's Accelerated Loading Facility (ALF) in McLean, VA, where a UTW study has been underway since May 1998. The UTW workshop was sponsored by the American Concrete Pavement Association (ACPA), the concrete industry, and FHWA.

UTW is a rehabilitation process in which a thin layer of portland cement concrete (50- to 100-mm thick) is placed over a prepared surface of cracked and/or rutted asphalt pavement.

The workshop presenters discussed the history, uses, and

applications of UTW.

The tour to TFHRC allowed participants to view the experiment and the condition of UTW after load repetitions had been applied. Under a cooperative research agreement with

FHWA, ACPA built eight full-scale lanes of UTW overlay on previously tested asphalt pavements. The tests, which include the collection of data on UTW performance and response, are scheduled to continue through November 1999.



**UTW test sections were constructed in May 1998 at TFHRC. Loading began soon afterward using the ALF machines. (ALF machine pictured in background.)**

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## FHWA Team Investigates Kocaeli Earthquake

On August 17, a devastating 7.4 magnitude earthquake, which lasted 45 seconds, struck Turkey. The epicenter was in the province of Kocaeli near the industrial city of Izmit. The earthquake resulted in at least 15,000 deaths and caused the collapse and destruction of thousands of buildings and other structures within approximately a 100-km radius centered on the city of Golcuk.

The Turkish Road Directorate (KGM) Director General Dincer Yigit requested technical assistance from FHWA to help assess the performance and behavior of motorway bridges and structures because the KGM used the AASHTO Standard Specifications for Highway Bridges for bridge design. FHWA's Office of International Programs and the Office of Infrastructure requested that an FHWA investigative team be established and dispatched to Turkey to cooperate with Turkish road officials. Three FHWA bridge engineers—James Cooper, Hamid Ghasemi, and Phil Yen, all from FHWA's Office of Infrastructure Research and Development—a consultant, Roy Imbsen, and a CALTRANS bridge engineer, Saad El-Azazy comprised the FHWA team.

The FHWA team departed for Turkey on September 27. On September 29, the team met with Director General Yigit and his technical staff to discuss details of the mission. Yigit requested the team provide opinions on the seismic safety of structures on the

Trans European Motorway (TEM) and recommend any seismic retrofitting strategies that may increase the safety of the existing bridge network. Because of the destruction of so many buildings and structures, the Director General explained that the KGM wanted an independent evaluation on the performance of motorway structures after the earthquake. Specifically, the FHWA team, cooperating with their KGM counterparts, was asked to do the following:

1. Assess the seismic safety of a major tunnel under construction in Bolu, a town about 125 km west of Ankara, which experienced ground shaking of about 0.2 to 0.25 g (9.81 m/s<sup>2</sup>). The tunnel and two major viaducts are on the last 24-km section of the TEM that is under construction.
2. Assess the seismic safety of Viaduct #1 near the Bolu tunnel, which is nearly complete and

Viaduct #2, which is also near the Bolu tunnel, where construction is just beginning.

3. Recommend how to repair the moderately damaged Sakarya River Viaduct located about 130 km east of Istanbul, near the epicenter.
4. Assess the seismic safety of the Hereke Viaducts on the TEM, which experienced lower levels of seismic shaking without damage, and recommend retrofit measures.
5. Assess the seismic safety of general classes of bridges on the motorway with emphasis on older motorway bridges in and around Istanbul.

The team completed its mission on October 14. They made 20 site visits and a number of briefing and technical presentations at KGM headquarters in Ankara.

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**Turkish Road Directorate (KGM) Director General Dincer Yigit (5th from the left) requested that an investigative team, including researchers from FHWA, be dispatched to Turkey to provide opinions on the seismic safety of structures affected by the earthquake.**

## ENVIRONMENT

### Detention Ponds Reduce Impacts of Highway Contaminants

Researchers in Virginia, Tennessee, Florida, Washington, and California are testing how effective best-management practices, such as using detention ponds, are in removing highway-related contaminants.

Experimental wet-detention ponds in Washington have been found to remove much of the sediment load and heavy metals in highway runoff.

In Tennessee, a combination of a wet-detention pond and peat-



filter system was found to remove in excess of 80 percent of the polyaromatic hydrocarbons of the typical first flush of highway runoff water. (Polyaromatic hydrocarbons represent distinct highway contaminants related to operations of highway vehicles).

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Samples were taken from this culvert in Tennessee to determine how effective detention ponds are in removing highway-related contaminants.

## TECHNOLOGY TRANSFER

### FHWA Attends ASCE Exposition in Charlotte

The American Society of Civil Engineers (ASCE) held its annual Conference and Exposition October 17-20 in Charlotte, N.C. The FHWA marketing staff attended, along with nearly 1200 civil engineering professionals. FHWA was one of approximately 100 exhibitors and had two standard-size display booths. One booth highlighted many of the civil engineering projects and activities within FHWA's Core Business Units and TFHRC labs. The other display booth focused on FHWA Demonstration Project 84, "Corrosion Detection in Reinforced Concrete Structures."

In addition to the standing

displays, a variety of publications, including FHWA's *Public Roads* magazine were distributed, as well as the CD-ROM, "Pavement Recycling Guidelines for State and Local Governments" and the Long-Term Pavement Performance (LTPP) database software "DataPave 2.0."

About 20 visitors signed up as new registered users of the DataPave software, and more than 2 dozen people became new *Transporter* subscribers.

Next year's ASCE annual meeting will be held in Seattle, WA.  
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Copies of the CD-ROM, as well as a printed version, are available at no cost. Please fax your request to the FHWA Report Center, (fax: 301-577-1421). Please specify order numbers—CD version: FHWA-SA-98-042CD; printed version: FHWA-SA-98-042.

## U.S. Transportation Excellence Reaches an International Audience

FHWA sponsored and coordinated a USA Pavilion in Kuala Lumpur, Malaysia for PIARC's (the World Road Association) 21st World Road Congress Exhibition, held October 3-8.

U.S. transportation associations joined FHWA in the USA Pavilion to support its theme, "Transportation Excellence for the 21st Century," with exhibits of information and technology useful to an international market.

Barrier Systems International displayed its moveable barrier system, which can shift concrete barriers quickly to route traffic around work zones or to reconfigure highways for increased capacity and reduction of traffic delays.

FHWA's National Highway Institute promoted training resources available to the international transportation community. Visitors to the USA Pavilion were able to browse FHWA's websites and links at two computer stations and to look for information about training, ongoing research, or technical resources.

AASHTO and McTrans provided catalogs of publications and software available from those organizations. ITS America and the Institute of Transportation Engineers invited World Road



**FHWA took part in the USA Pavilion in Kuala Lumpur, Malaysia, at PIARC's (the World Road Association) 21st World Road Congress Exhibition.**

Congress delegates to future conferences of interest.

Daktronics, Inc., an American firm in a joint venture in Malaysia, exhibited its changeable message sign technology in the Pavilion.

A library of CD-ROMs was available to attendees interested in further exploration of intelligent transportation systems (ITS) technologies, road safety design, or transportation statistics.

This year marked the tenth anniversary of the United States participating in PIARC, and is the third time a U.S. Pavilion was at this event. The World Road

Congress is held every four years. Previous venues included Marrakesh, Morocco (1991), and Montreal, Canada (1995).

PIARC aims to facilitate international cooperation and works to improve knowledge transfer, with priority given to developing countries and countries in transition. FHWA, by participating in the USA Pavilion, reinforced that universal message. The conference gave international delegates and exhibitors the opportunity to meet, share new information, and discuss innovative technology.

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## FHWA Co-Sponsors Weather Information Symposium

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**A**s part of groundbreaking efforts to bring the highway and meteorological communities together, FHWA and the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) are co-sponsoring the Symposium on Weather Information for Surface Transportation: Delivering Improved Safety and Efficiency for Tomorrow. The conference will be held November 30 – December 2, in Silver Spring, MD.

The goal of the symposium is to determine what weather information is necessary for decision-makers to make the appropriate judgments concerning surface transportation. By establishing national needs and requirements for weather information, individuals can make appropriate decisions that can ultimately improve the safety, health, and productivity of the Nation's citizens.

This is the first time the needs of the highway community are being brought to the attention of the

meteorological community. This work will continue as FHWA documents the weather information needs of all road users and operators. Ultimately, this will lead to new products and services from the meteorological community, such as route-specific road condition forecasts. This work is being conducted under the Weather and Winter Mobility program in the Office of Transportation Operations.

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**The Symposium on Weather Information for Surface Transportation will help determine what weather information is necessary for decision-makers to make the appropriate judgments concerning surface transportation.**



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## DOT Adopts New Vision for Transportation Research

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**T**he U.S. Department of Transportation (DOT) has adopted a new research strategy.

"We intend to aim so high that we will be forced to establish stretch goals that will push the transportation technology envelope to higher heights than we presently dream or imagine," Secretary Slater said. "We hope to identify possible technological innovations, [but] innovation requires more than new ideas. It requires bringing these new ideas to the marketplace."

*Transportation Science and Technology Strategy*, a report by the National Science and Technology Council in 1997, is the foundation on which the redirected DOT research program has been built. This strategy

established a four-tiered approach to research: strategic planning and assessment, strategic partnership initiatives that address recognized national needs, enabling research supporting long-term national transportation goals, and transportation education and training.

In May 1999, DOT released its Research and Development (R&D) Plan, which emphasizes a coordinated research program.

"Much will be gained by assuring that the department's separate R&D programs occur within a common framework of goals and guidance. . . . It is equally as important that these activities be carefully coordinated with the needs of transportation users, as well as with the research efforts of others engaged in this common endeavor," the report said.

Oliver McGee, the new Deputy Assistant Secretary for Transportation Policy, describes the new strategy as "a little bit more innovative in scope and a little more entrepreneurial."

The new DOT research strategy emphasizes a spirit of innovation, department-wide cooperation, and partnerships that will produce the technologies and systems that, as Secretary Slater said, "offer genuine promise for meeting the transportation challenges of the next century."

*Adapted by Bob Bryant, Bob.Bryant@fhwa.dot.gov, (202) 493-3191, from an article (by David Smallen) that will be published in the January/February 2000 issue of Public Roads magazine.*