

INTERNATIONAL

International Community Helps FHWA Improve Tunnels in U.S.

Although tunnel construction and safety is an infrastructure priority in the United States, Europe and Japan are developing many of the recent key innovations. Through its participation in the World Road Association (PIARC), and its Committee on Road Tunnel Operations, FHWA has managed to introduce significant improvements and cost-saving innovations



to tunnel construction in the past few years.

By interacting with colleagues in the Committee on Roads Tunnel Operations, FHWA researchers were able to introduce the longitudinal jet fan ventilation system to the U.S. highway community.

This system, when compared to the transverse ventilation system currently being used in the

United States, will significantly reduce a tunnel owner's capital costs and future maintenance and operational costs.

The longitudinal system has been successfully installed in three tunnel projects in the United States: Cumberland Gap, bordering Kentucky and Tennessee; Bunyard Road in Arkansas; and the exit ramps on the Central Artery/Tunnel Project in Boston, MA. Additionally, the
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The Bunyard Road Tunnel, AK project is one of the first in the United States to incorporate the longitudinal jet fan mechanical ventilation system.

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. 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.

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SAFETY

Night Demonstration at TFHRC Reinforces Importance of Worker Visibility

Safety organizations are continually looking for ways to reduce risks for occupational workers exposed to the hazards of low-light and nighttime conditions. In an effort to better identify and measure this risk, the AAA Foundation for Traffic Safety recently conducted a nighttime visibility demonstration that emphasized the importance of making sure tow truck operators are visible to motorists while working near roadway traffic at night.

Results showed that people in work zones and pedestrians on highways need to be concerned about being visible to motorists. Children, older people, and active people (such as inline skaters and bicyclists) are at higher risk of being undetected by a motorist when they are on or near the roadway in low-light or nighttime situations. Dr. Scott Osberg, director of research at the AAA Foundation for Traffic Safety explained, "Being seen in poor weather and by impaired drivers is a very real concern for all involved."

The purpose of the nighttime demonstration was to determine whether tow truck operators would be more inclined to wear safety garments if they were shown, through a visibility demonstration, that individuals are more easily seen by motorists at night when they are wearing the



Tow truck operators participated in a demonstration to show how reflective clothing allows the wearer to be more visible at night.

reflective apparel. This demonstration allowed tow truck operators to see the enhanced nighttime performance of the various garments. The reflective garments were easily visible in the dark compared to the non-reflective garments typically worn by tow truck operators.



In a simulated nighttime road situation created at FHWA's Turner-Fairbank Highway Research Center (TFHRC), a standard tow truck was positioned at the side of the road. Three models stood on the right side of the roadway—two wore reflective garments and a third model, positioned between the other two, wore no reflective material at all. Twenty-five participants compared how well they could see the models at distances of 700, 500, and 300 feet while approaching the roadside vehicles with "low-beam" lighting and

recorded their observations.

Participants recorded that, in the dark, they could not detect the model who wore no reflective clothing. Osberg commented: "Where's the guy in the middle?" which reinforces the notion that

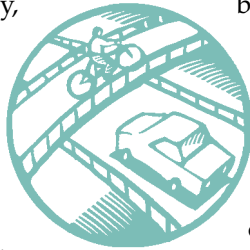
individuals who do not wear the reflective clothing are nearly invisible on a roadway at night.

The demonstration was a cooperative partnership between the AAA Foundation for Traffic Safety and FHWA, which

provided access to the facility and reviewed test procedures. Monarch Textiles, Headlights Corp., and 3M provided garments and conducted the demonstration. **Sam Tignor**
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Virginia's "Smart Road" Opens

The world's first all-weather road test facility build especially for scientific research in the transportation field opened on March 23 in Blacksburg, VA. The facility, known as the "Smart Road," is the result of a partnership between the Virginia Department of Transportation (VDOT), the Virginia Tech's Transportation Institute, and FHWA. VDOT owns the land on which the facility is built; Virginia Tech operates the facility. FHWA participated in the design and funding of an experimental highway lighting system.



mounting heights. The system will serve as a test facility for new and novel highway lighting designs, visibility studies, as well as to evaluate the interaction between fixed lighting, headlighting, and signing, and roadway markings under different weather conditions. TFHRC designed and built the computer-based lighting control system that allows for instantaneous changes of many of the lighting parameters from a central command post.

The test tract cost \$12-\$15 million

and was funded by VDOT but is reimbursable by FHWA.

More than 70 research projects are underway now at the facility for both private industry and government agencies.

The Smart Road test facility is the result of a movement started in the 1980s to connect Blacksburg to Interstate 81 and Roanoke to the north. Smart Road is projected to be a part of Interstate 73, eventually linking Blacksburg to I-81.

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The present length of the "Smart Road" is a 1.7 mile stretch of a two-lane roadway equipped with 400 electronic sensors, video cameras, and 75 weather towers that can create rain, snow, and icing conditions. It features 14 instrumented pavement sections and embedded magnetic strips for measuring lane-keeping and driver behavior.

The experimental lighting system section is 1.2 km long and provides for a wide variety of luminaire selections, pole spacings, and changes in



Smart Road opened on March 23 in Blacksburg, VA.

ACI, FHWA Partner to Improve Concrete Durability

The Transportation Equity Act for the 21st Century (TEA-21) encouraged the Secretary of Transportation to carry out collaborative research and development of innovative solutions to transportation problems and to stimulate the deployment of new technology. Cooperative agreements are one contracting technique used by FHWA to accomplish this mandate. Under these agreements, federal funds are matched by industry efforts to accomplish activities.

The American Concrete Institute (ACI) and FHWA have entered into a Cooperative Agreement that establishes a partnership to transfer the latest knowledge on the identification, mitigation and prevention of alkali-silica reaction (ASR) and other materials related deterioration of portland cement concrete to the highway community. FHWA Executive Director, Tony Kane and ACI's President, Jo Coke formally acknowledged the partnership in ceremonies on February 28.

Alkali-silica reaction (ASR) and other types of deterioration are responsible for premature failure and additional maintenance on concrete pavements and bridges. Repair and replacement of deteriorated concrete is costly as well as inconvenient to the highway user.



FHWA Executive Director Tony Kane, ACI President Jo Coke, and ACI Executive Vice President Jim Toscas acknowledge the ACI-FHWA Partnership.

Through research programs, including the Strategic Highway Research Program (SHRP), and field experience, researchers have developed procedures and technologies that can prevent deterioration in new construction. Methods that mitigate damage in existing structures and pavements also exist, but their use is not widespread.

In order to eliminate or reduce the damage caused by deterioration, agency personnel, contractors, consultants, and materials suppliers must understand the deterioration phenomenon, know how to identify the specific types

of deterioration, and apply the latest technology to prevent or reduce the deterioration.

Previous FHWA workshops have addressed these issues, but there is a need to gather together the latest information and transfer it widely to the highway community. The FHWA/ACI partnership formed by this cooperative agreement seeks to accomplish this task.

Guided by a task group of experts, an ACI team will develop a two-day workshop and present it in 25 locations around the country.

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FHWA Researcher Recognized as Engineer of the Year

Phillip Yen of FHWA's Bridge Design and Hazard Mitigation Team has won FHWA's Engineering Excellence Award for 1999. The nomination was based on Yen's work in the earthquake engineering research program.

Under his direction, the research and development program defined the state-of-the-practice in seismic retrofitting of bridges and the seismic design specifications that are now being used in

the United States.

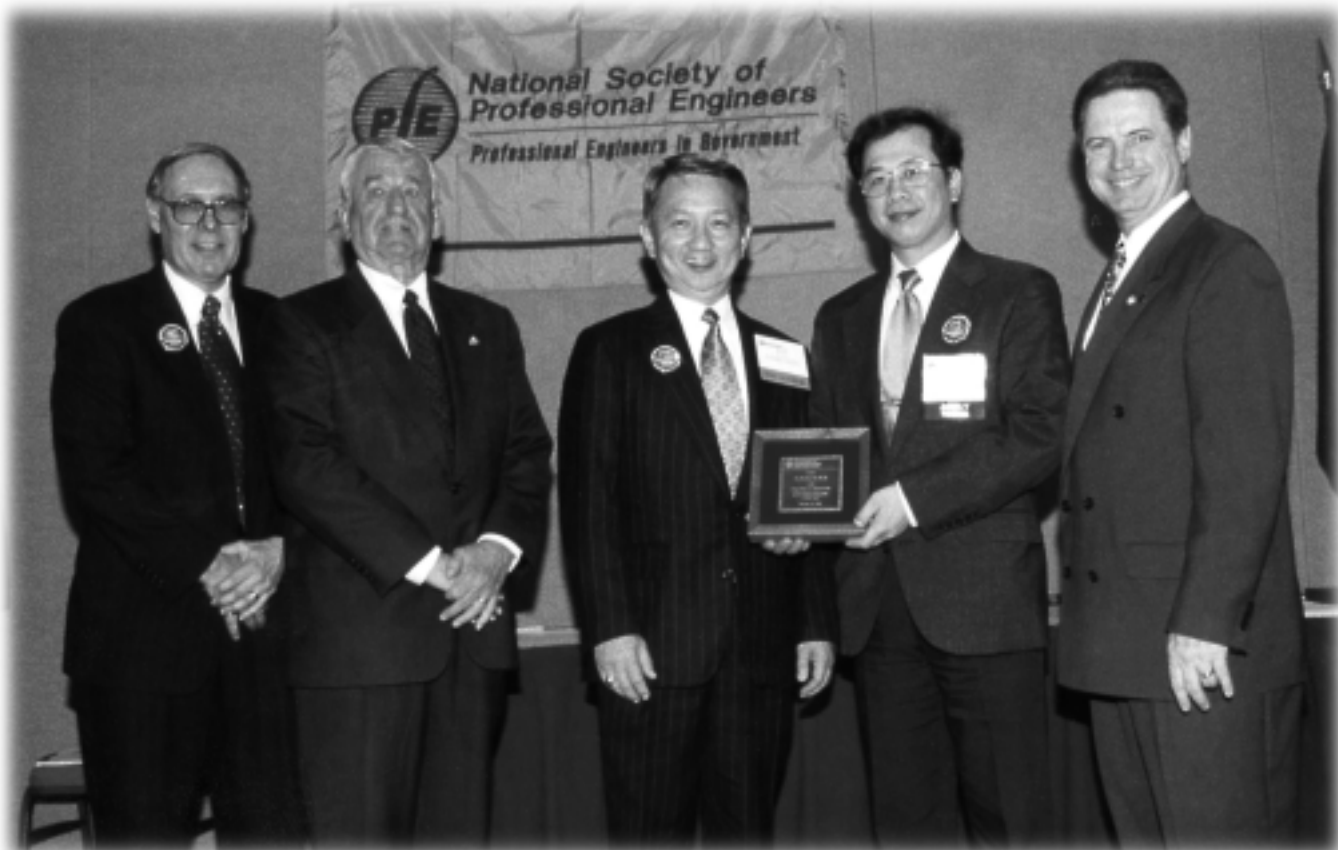
Yen was a key member of an FHWA earthquake reconnaissance team that made a significant contribution to Turkey and Taiwan by helping those countries recover from the earthquakes they experienced last year.

By virtue of being the highest ranked of the three Engineering Excellence winners, Yen was also named FHWA Engineer of the Year and was nominated for the

National Society of Professional Engineers' (NSPE's) Federal Engineer of the Year award. As a result of this nomination, the NSPE recognized Yen as the Federal Engineer of the Year for FHWA.

Yen and his team are part of FHWA's Office of Infrastructure R&D.

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Phillip Yen is presented with the Federal Engineer of the Year for FHWA award. (Pictured here from left to right) Larry Emig, P.E., chair, Professional Engineers in Government; J. David Waugh, P.E., president, National Society of Professional Engineers; T. Paul Teng, P.E., director of the Office of Infrastructure R&D; W. Phillip Yen, Ph.D., P.E., research structural engineer, Office of Infrastructure R&D; and Patrick J. Natale, P.E., executive director, National Society of Professional Engineers.

New Center of Excellence Established by University of Arizona

The University of Arizona established Advanced Traffic and Logistics Algorithms and Systems (ATLAS), a center of excellence for research and development of algorithms and systems in transportation operations and logistics management. The goal of ATLAS is to apply modern computational and communications technologies to the development of algorithms, software, and systems to advanced traffic management and logistics management.

ATLAS has set up a steering committee made of State and Federal DOT employees and university researchers.

Current projects within ATLAS are funded by US DOT and FHWA earmarks, FHWA contracts, ADOT contracts, the city of Tucson, the City of Tempe, and other public and private sector partners.

ATLAS investigates and develops appropriate algorithms, software, and systems in traffic-adaptive signal control; traffic-adaptive ramp-meeting; speed control and route advisories through variable message signing; demand management through congestion pricing; real-time dynamic network load prediction and control; incident detection and management; and region-wide dynamic traffic management, among others.

In the advanced traffic-management area, researchers are developing Real-time Hierarchical Optimized Distributed Effective System (RHODES) for traffic adaptive signal control. There are several on-going and new projects dealing with RHODES, including field testing at an interchange in Tempe, AZ.

Planned traffic management

projects include the development and integration of a real-time traffic prediction method for traveler information systems, deployment and integration of transit signal priority for an arterial, and deployment and integration of route advisory and limited traffic signal coordination/preemption for emergency vehicles.

In addition, researchers are investigating the development of approaches for remote sensing of transportation flows and the development of a client/server architecture for the RHODES algorithms so that external entities outside the ATLAS facilities may test real-time traffic control on a simulation model.

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(Continued from front page) system is planned to be used for the Whittier Access Tunnel, AK; the Wolf Creek Pass Tunnel, CO; and the Port of Miami Tunnel, FL.

Since accepting the longitudinal jet fan mechanical ventilation system into road design criteria in the United States, builders have saved about \$40 million. Tunnels currently under design are expected to net an additional \$10 million in estimated savings. More savings will likely



result from future tunnel projects like the Devil's Slide Tunnel, CA; the I-710 project, CA; and from possible tunnel alternatives for the Gowanus Expressway Project, NY.

The Committee on Roads Tunnel Operations operates in four-year work cycles. In the last cycle, which ended in 1999, the committee published two important publications: *Reduction of Operational Costs of Road Tunnels* and *Fire and Smoke Control in Road Tunnels*. Both titles

are available from PIARC at www.piarc.org.

The next work cycle begins in 2000. The committee will emphasize the disciplines of emergency egress, ways to deal with nitrous oxides emissions, and reduction of operational costs in tunnel operations. Each element offers the potential for providing major economic and safety benefits to the tunnel community in the United States.

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TECHNOLOGY MARKETING

Marketing Connects Us With Customers Needs

Marketing is a relatively new term in the technology innovation environment. The concept, which is often mistaken for disreputable salesmanship, was typically rejected by technical staff. Many of them thought marketing tarnished the integrity of their work. However, marketing activities in FHWA are logical, manageable, and repeatable. Marketing is a natural extension and application of technical perspectives and skills.

Essentially, marketing is the science of making and keeping satisfied customers — a process of developing and implementing products and programs geared to the needs of the user. Marketing means working smarter, capitalizing on our strengths, and using the right tools for the job. Our customer-focused activities at

FHWA show the value of marketing in fulfilling our mission and reaching agency goals.

A recent example of marketing activity was the Pavement Technology Delivery Workshop, held in the Midwestern Resource Center, March 27–31. The goal of this workshop focused on the delivery aspect of the marketing process: mobilizing an informed field staff to promote and deliver pavement technologies to their customers.

Staff from FHWA Resource Centers and Divisions received presentations from pavement experts and appropriate tools with which to convey information about a variety of pavement technologies. Their customer base, ranging from researchers to practitioners in

State DOT's, local governments, and industry, differed in the depth of information required and the types of tools need to convey it.

During this gathering, discussions focused on the problem of having limited time and resources to deploy technology. Developing a marketing plan was suggested to prioritize different technologies presented in the workshop and to set realistic objectives.

Although this workshop focused on key products of research and development ready for delivery, the mechanics of marketing clarified the process of how to get the right product into the right hands in a timely manner.

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PROFESSIONAL DEVELOPMENT

NHI Offers New Courses

ITS Procurement (#13620) is a new one-day workshop targeted at changing the way state project managers and procurement officials deal with the funding of ITS projects. This course is aimed at eliminating the “normal” low-bid approach to ITS procurements.

This concern was emphasized in a letter that FHWA Executive Director Anthony Kane sent last year to the directors of FHWA's

Resource Centers. Kane wrote that “we recognize that many transportation agencies are not accustomed to using innovative procurement methods, and are therefore not experienced in their execution. That is why it is essential that you elevate this issue with our partners.”

ITS Procurement will cover the following topics: examining differences in requirements for procurement from construction

and ITS, looking at local barriers to ITS procurement needs, and determining what options might work best for local needs.

The target audience for this course is state highway agencies, FHWA divisions, and local transportation agencies. This course is free of charge until October 1, 2001.

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NHI Holds Instructor Conference

In an effort to recognize the vital part that instructors play in the training process, the first National Highway Institute (NHI) Instructor Conference will be held October 18–20. This will serve as a forum for open communication and exchange of information that will help all of NHI’s instructors better serve the training needs of the transportation community. The conference will be held at the Cheyenne Mountain Conference Center in Colorado Springs, CO.

The class is designed for contractors, subcontractors, and FHWA staff who are actively involved in the development and delivery of NHI training programs. The conference will include interactive

workshop sessions for instructors to refine their skills in instructional design and delivery.

Some workshop topics include “How to Effectively Use Visual Learning Tools,” and “How to Take Instructor-Centered Material and Present It in a Learning Centered Classroom.” This is also a forum for soliciting ideas about ways to improve NHI and is a means of providing information about changes taking place within the training community.

Jim Bagnola, a motivational speaker, whose area of expertise is leadership will speak to conference participants. Bagnola is a senior partner in The Leadership

Group, an organization dedicated to transforming cultures from a “do as you are told” environment to a “do whatever it takes” mindset. Donald Kirpatrick, an internationally recognized expert on evaluating training effectiveness, will discuss Level 2 evaluation, as discussed in his book *Evaluating Training Programs: The Four Levels*. Level 2 evaluation discusses what participants actually learned in class. Karen Medsker, chair of the Human Resources Department of the School of Business at Marymount University, will speak on Instructional System Design.

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