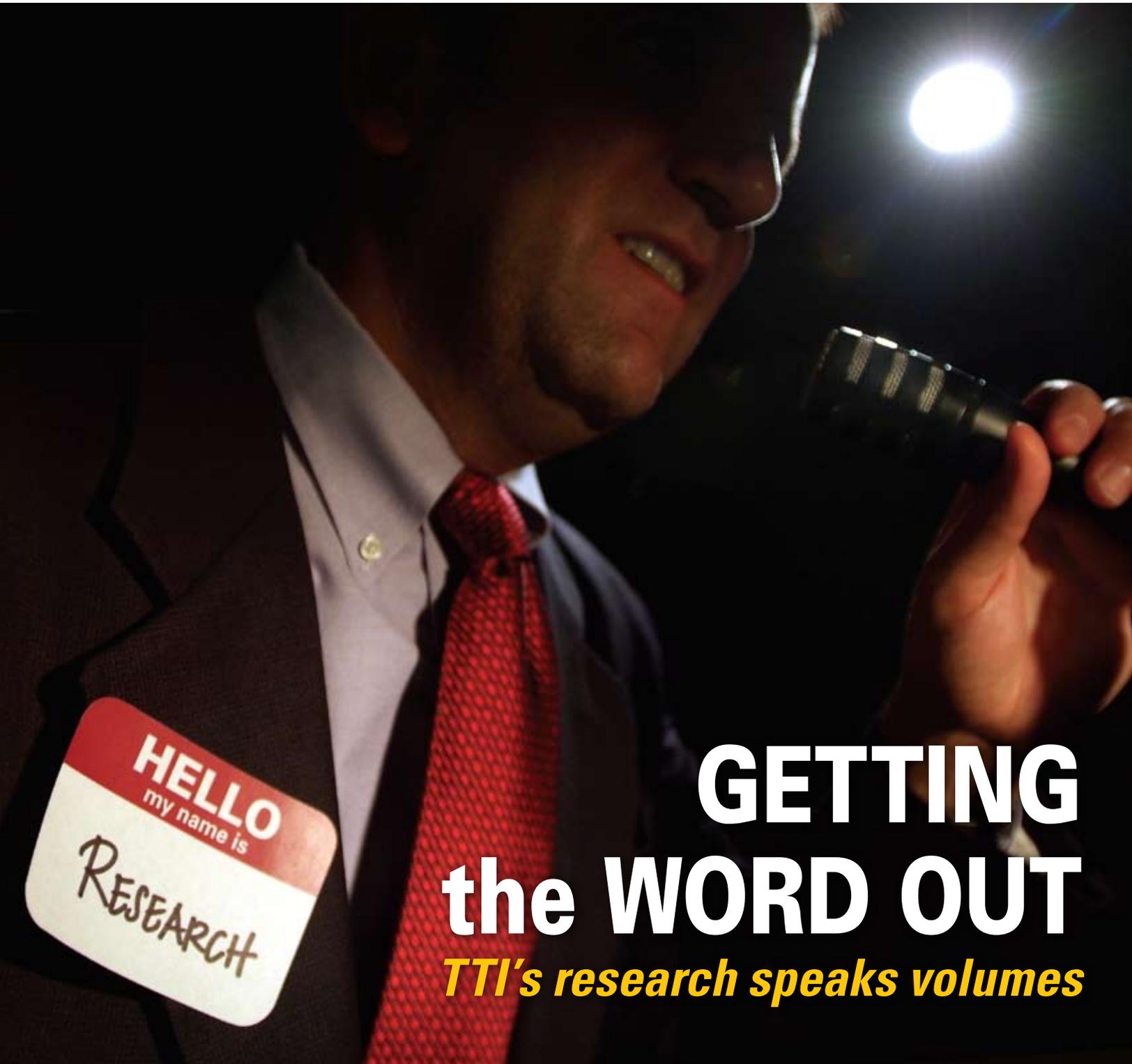


# Researcher

VOL. 44 | NO. 2 | 2008



**GETTING**  
**the WORD OUT**  
*TTI's research speaks volumes*



**ON THE COVER:** Through workshops, conferences and webinars, TTI researchers disseminate their findings to peers in the transportation community.



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TEXAS TRANSPORTATION  
**Researcher**

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## ACTIVELY SHARING RESEARCH KNOWLEDGE

Recall the experiences from just about any year of your formal education. Most of the time, we observed passively while teachers tried to share knowledge with us. At other times, we were actively engaged and mutually involved in the process of learning. Each method worked, but certainly the latter produced the clearest understanding, the strongest retention and — most importantly — the best application of the knowledge we were gaining. That was true then, when the lesson involved language and math skills; it's also true now, when the lesson involves the sharing of research knowledge.

TELL ME SOMETHING, AND I'LL FORGET.

SHOW ME SOMETHING, AND I MAY REMEMBER.

INVOLVE ME, AND I'LL UNDERSTAND.

—CHINESE PROVERB



by *Dennis Christiansen*  
TTI Director



It is that activity, the sharing of research knowledge, which ultimately leads to the innovation David Laney wrote about in the last issue of this publication. Knowledge sharing is the essential process — not unlike cooking, manufacturing or refining — that turns a commodity into a valuable and widely used product.

And just as in the case of learning about fractions and grammar, knowledge sharing is most effective when both parties are actively engaged in the learning process. That's not as simple or easy as it may sound because those who conduct research and those who implement it have different responsibilities and priorities. Each group looks at problems and challenges through a slightly different lens. New knowledge, innovative products and enhanced processes must be of use and benefit in practical applications.

Through Texas Transportation Institute's (TTI's) efforts, transportation professionals everywhere benefit from that practical, real world approach to knowledge sharing in a number of ways, illustrated in part by the examples that follow.

The annual Transportation Short Course, co-hosted each year by TTI and the Texas Department of Transportation, provides an environment for more than 2,000 practitioners to gain a comprehensive update on a broad range of topics,

including transportation policy, right-of-way issues, traffic management, construction and maintenance, freight movement, public transportation, rail, and other topics.

Conferences dedicated to specific transportation modes, such as aviation, ports and waterways, public transportation, and rail transportation, promote interaction between public and various industry sectors and provide forums to discuss emerging safety, technology and operational issues.

Webinars offer the opportunity to reach larger audiences more efficiently by employing the latest in communication technology, reaching around the world if necessary, without giving up direct interaction between presenters and participants.

Each of these applications share one thing in common: their effectiveness is dependent upon meaningful engagement. They go beyond telling and beyond showing. They rely upon involvement.

Think back again on your years in school. Chances are that those courses in which you learned the most and earned the highest grades were those in which you enjoyed the greatest involvement with your teachers and classmates. That's a good way to run a classroom, no matter how old the student. ■



# The road doctors

**G**ot a road that's ailing? Many older ones are. Perhaps the proper treatment requires a radical and expensive replacement of the entire roadway. But what if a less expensive procedure can cure what's ailing that road . . . how's a pavement engineer to know?

Using tools such as falling weight deflectometers (FWD) and ground penetrating radar (GPR), Tom Scullion, Texas Transportation Institute (TTI) senior research engineer and manager of TTI's Pavement Systems Program, diagnoses road problems using non-destructive test data and custom software. Over the past decade, he has developed a set of unique investigation tools. Scullion and Andrew Wimsatt, head of TTI's Materials and Pavements Division, now teach other pavement engineers and maintenance personnel how to analyze and cure road failures.

"We went to a lesser depth repair. That reduced cost. We ended up adding more miles to that contract. We worked with the budget we initially had, and we're taking care of more miles. Motorists get to drive on a better riding roadway and get to use it sooner."

*Jo Ann E. Garcia,  
Transportation Engineer,  
TxDOT Laredo District*

"One of the biggest challenges facing district design engineers and area office engineers is figuring out what to do with worn-out roads, and hopefully how to fix them without resorting to major surgery," says Scullion. The workshop is designed to do just that.

The biggest obstacle in proper, cost-effective road rehabilitation is determining the root cause of the road failure. "Over the last 10 or 15 years, we've developed some very useful tools in the research arena. The tools we have include structural testing with FWDs and testing with GPR, dynamic cone penetrometers and other strength testing techniques," notes Scullion. The workshop teaches designers how to integrate and use the data obtained from these devices to diagnose pavement problems.

Prior to conducting a course for the Texas Department of Transportation (TxDOT), Scullion contacts the host district and asks about problem pavements in the area. "We use these tools while we're there or ahead of time to collect data.

We go through all the basics in the class, what the tools do and how to use them. At the end of the workshop, we then show the students the data from their actual projects. The class is very hands-on and practical," Scullion explains.

Scullion and Wimsatt teach three workshops each year for TxDOT personnel. In 2008, Austin, Beaumont and Laredo participated. One Laredo site investigated by Scullion was an IH-35 access road. The surface exhibited alligator cracking. Based on

information collected and used in the class, the district was able to change its rehabilitation plans, and the citizens of Laredo benefited.

Jo Ann E. Garcia, transportation engineer in the TxDOT Laredo District and a student in the recent Laredo class, explains: "We went to a lesser depth repair. That reduced cost. We ended up adding more miles to that contract. We worked with the budget we initially had, and we're taking care of more miles. Motorists get to drive on a better riding roadway and get to use it sooner."

Scullion's goal is to introduce new technologies to road maintenance personnel. "These tools we developed in research can really help them," says Scullion. "It's the best way to select the optimum repair strategy."

When it comes to sick pavements, the "Road Doctors" have perfected the cure. Scullion observes, "It's pretty straightforward designing new highways. We pretty much know what works and what doesn't work. The real challenge is figuring out what to do with these old, worn-out roads." ■

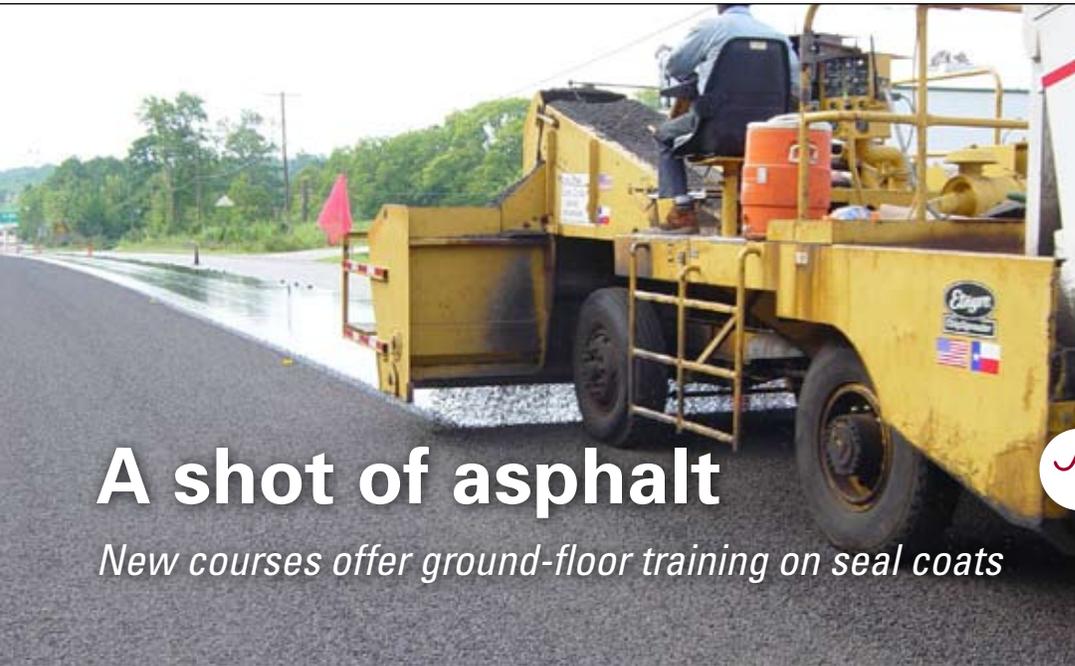
"It's pretty straightforward designing new highways. We pretty much know what works and what doesn't work. The real challenge is figuring out what to do with these old, worn-out roads."

*Tom Scullion,  
Senior TTI Research Engineer*



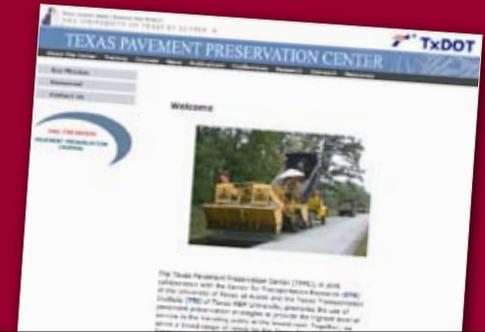
**MORE INFORMATION**

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# A shot of asphalt

*New courses offer ground-floor training on seal coats*



Also see the Texas Pavement Preservation Center website at <http://www.utexas.edu/research/tppc/index.html>.

**W**ith a tight budget and thousands of miles of paved roads to care for, the importance of effective preventive maintenance is a priority for the Texas Department of Transportation (TxDOT). Seal coats, the process by which a layer of liquid asphalt is applied to an existing roadway and then covered with aggregate, play an important role in TxDOT's preventive maintenance program.

The Texas Pavement Preservation Center, a joint collaboration of the Center for Transportation Research (CTR) of The University of Texas at Austin and the Texas Transportation Institute (TTI), recently completed a series of seal coat training courses for TxDOT employees. The courses were based on a revised curriculum created from the recently updated *Seal Coat Manual*.

"Presently, a lack of knowledge about when to apply a preventive maintenance treatment, which materials to use

and which methods are preferable is pervasive throughout the field of road management," says Yetkin Yildirim, director of the Texas Pavement Preservation Center. "Our goal is for these courses to give the students the tools they need to make these important decisions."

The pilot course was originally taught in the fall of 2007, and the group quickly realized that the amount of material presented was not always applicable to the audience.

"After our original pilot course, we realized we had two different audiences for one class," says Cindy Estakhri, research engineer at TTI. "So the decision was made to create two one-day courses."

The resulting courses are "Seal Coat Inspection and Application," created for practitioners, and "Seal Coat Planning and Design," intended for engineers. The courses cover such topics as

- pavement preservation concepts,
- duties of the inspector or crew chief,
- pre-seal coat activities,
- equipment inspection,
- application process,

- guidelines for treatment selection,
- material selection and plan preparation, and
- public perception and complaints.

There are also several hands-on lab activities, such as an aggregate application board test and an on-site asphalt distributor, to assist student learning of the general operation procedure.

The two courses were taught in Fort Worth, Austin and Lubbock this spring. Based on the course evaluations, they were a big success. The evaluative scale was 1-5, with 5 being excellent. In the practitioners' course, 79 percent of the participants rated the course 4 or higher. And in the engineers' course, 87 percent of the participants rated the course 4 or higher. Pending a few minor updates, the pilot courses are approved for CEU certification and will be offered from the TxDOT training center beginning this fall.

"The results from the evaluations show that we are on the right track," says Estakhri. "By combining the field experiences of our instructors with the technical information in the course manuals, the students are getting a lot of good information in a one-day course." ■



Students in the seal coat workshop observe a demonstration of how to operate a distributor.



**MORE INFORMATION**

For more information, please contact Cindy Estakhri at (979) 845-9551 or [c-estakhri@tamu.edu](mailto:c-estakhri@tamu.edu).

# Early and often

## *The importance of coordination in land development*

**A** ride down many state highways in Texas — IH-35 for example — yields an obvious conclusion to the driver: land is being developed along these corridors faster than ever. This rapid development brings with it many issues such as access management, right-of-way preservation and drainage. For this reason, early coordination between the Texas Department of Transportation (TxDOT) and local cities and counties is critical to ensuring that developments occur in accordance with future plans and applicable regulations.

A series of workshops recently conducted for TxDOT employees by researchers at the Texas Transportation Institute (TTI) sought to bridge this potential gap. The “TxDOT Involvement in Local Development Review” workshops were produced to expose TxDOT staff to the benefits and importance of local-state coordination in the review of land development that impacts state roadways. The workshops served as a follow-up implementation project from the research project entitled “TxDOT Involvement in the Local Development Process.”

“Early involvement in the process is especially helpful, particularly for fast-growing, urban districts like ours,” says Brian Barth, director of Transportation Planning and Development for TxDOT’s Dallas District. “Involving TxDOT in the process during the preliminary plat stage, when there is still some flexibility, is beneficial for everyone involved.”

The workshops covered all phases of the local development process, discussed when and how TxDOT should be involved, and included interactive class exercises using local development project examples. They also provided useful information on TxDOT development in local platting and site review for the following key reasons:

- to protect and preserve state rights-of-way,
- to manage on-system access via site development plans and subdivision plats, and
- to improve local-state coordination related to the inclusion of state roadways in local regional thoroughfare plans.



An instructor and participants discuss a platting exercise.

“One of the things we did was to provide TxDOT with insight into how local decisions impact their interests through the subdivision and development process and to show them opportunities for input and coordination,” says TTI Research Scientist Ed Hard. “We also used case studies to review developments that occurred along a growing TxDOT roadway over a 10-year period to show how many sites could have developed differently had there been better coordination. In some cases, coordination could have saved TxDOT and taxpayers a lot of money.”

Judging by the positive evaluation scores and active class participation, the workshops are being well received. To date, workshops have been held in 18 TxDOT districts.

TTI researchers are currently working on the next progression in the project, which examines the development of partnerships to manage and preserve corridors. A report was completed last year, and workshops are currently under development.

“We are trying to get everyone on the same team,” says Hard. With increasing project costs and development pressures, it’s more important than ever for TxDOT and local communities to work together. “We are all in this together with the goal of better coordination between transportation and land use planning and creating aesthetically pleasing corridors with less congestion.”

“We are trying to put everyone on the same team. With increasing project costs and development pressures, it’s more important than ever for TxDOT and local communities to work together.”

*Ed Hard,  
TTI Research Scientist*



### **MORE INFORMATION**

For more information, please contact Ed Hard at (979) 845-8539 or e-hard@tamu.edu.



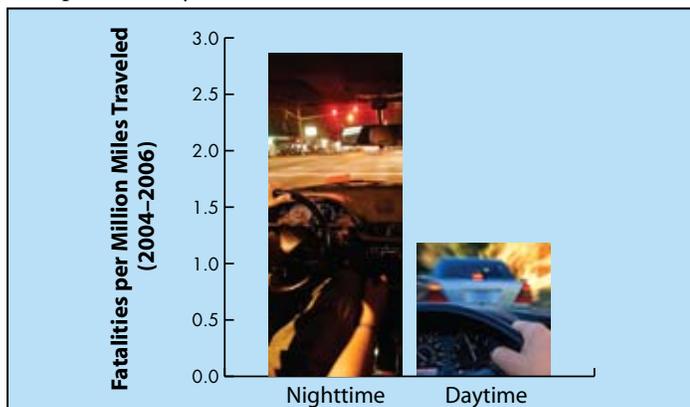
# Shining a light on nighttime crashes:

*TRB's 18th Visibility Symposium encourages collaborative solutions*

Seeing the road ahead is just about the most important requirement for driving safely. And just as importantly, a driver's ability to process and understand what he or she sees is vital to maintaining a safe driving environment.

Since 1968, the Transportation Research Board (TRB) Visibility Symposium has united stakeholders in the transportation community — from researchers and practitioners to transportation agency personnel and industry professionals — to discuss the current state of the practice in visual communication of transportation information.

“Transportation professionals come from all over the world to learn from one another about the latest visibility concerns, discuss lessons learned through practice, and pose questions that have yet to be answered,” says Paul Carlson, research engineer and division head of the Texas Transportation Institute’s (TTI’s) Operations and Design Division. Carlson serves as chair of the TRB Committee on Signing and Marking Materials and was technical director for the 18th Biennial TRB Visibility Symposium hosted by TTI and held in College Station, Texas, on April 17-19, 2007. Nearly 80 professionals representing five countries participated in the 18th Visibility Symposium, which was sponsored by seven TRB research committees.



Nighttime visibility of traffic control devices is becoming increasingly important as our population ages. By the year 2020, about one-fifth of the U.S. population will be 65 years of age or older. In general, older individuals have declining vision and slower reaction times. Signs that are easier to see and read at night can help older drivers retain their freedom of mobility and remain independent. *Source: National Safety Council.*

Despite the national emphasis on highway safety, crash rates are still staggering. In particular, nighttime crash rates are three times that of daytime rates. While there is general agreement that a reduction in the visibility associated with the roadside environment impacts the rate and severity of crashes, no definitive correlation between the two has yet to be established. Clarifying the relationship between those two factors is one of the symposium’s main missions. Sharing information among visibility experts can help reduce the number of nighttime crashes...and lives can potentially be saved.

Five technical sessions and 17 presentations covered topics such as roadway lighting, traffic control device design, pavement markings, pedestrian and roadway visibility, design and performance of road signs, and development of human factors guidelines for road systems.

“One thing we emphasized this year was demonstrating visibility challenges and new research technologies,” explains TTI Senior Research Scientist Sue Chrysler, who assisted Carlson in organizing the symposium. “We had our latest research equipment and technologies available for hands-on demonstrations. We also set up a work zone to show firsthand some of the visibility issues associated with lighting a nighttime work zone. TTI’s Proving Grounds Research Facility provided a perfect venue for this meeting.”

Technology demonstrations exemplify just how important the symposium’s organizers believe participant interaction is to the learning process. Similarly, the symposium’s structure provides a sparse agenda that encourages follow-up discussions and open communication between attendees.

“The extended conversations and technology demonstrations help participants to better understand the issues and challenges of visibility as related to nighttime crashes,” says Rich Cunard, TRB engineer of traffic and operations. “Without this symposium, research efforts would be less focused and solutions would undoubtedly be slower in coming.”

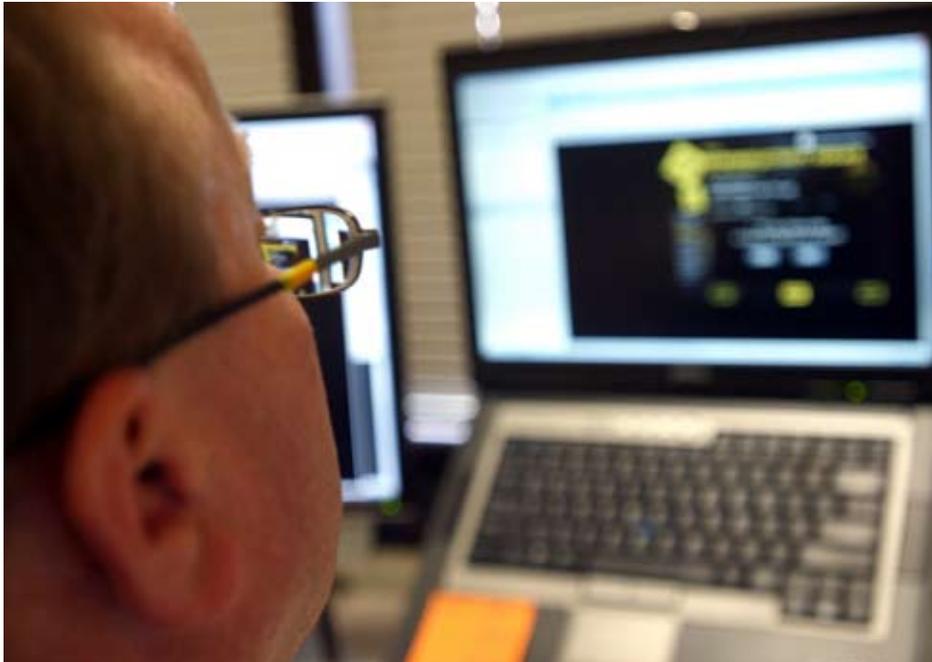


**MORE INFORMATION**

For more information, please contact Paul Carlson at (979) 847-9272 or p-carlson@ttimail.tamu.edu.

# Webinars encourage global knowledge exchange

**T**raditionally, professionals have had to travel to a distant hotel conference room if they wanted to share information face to face. Yet with today's escalating travel costs, making that trip is increasingly and often prohibitively expensive.



Webinars provide a convenient, cost-effective alternative to in-person seminars. Technologies like Voice-over-Internet protocol are helping make the human connection — so vital to effective information exchange — in new ways.

Web-based seminars (or webinars) now provide a convenient, cost-effective alternative to in-person seminars. Individuals interact online to share information, answer questions and facilitate knowledge exchange — all without leaving the comfort of their offices (or even their own homes).

“In the old days, seminars were limited, in a way, by those who could afford to get there,” explains Gary Thomas, research engineer and director of the Texas Transportation Institute’s (TTI’s) Center for Professional Development. “A seminar in Houston might attract lots of Texans, but no participants from, say, California, Maine or even China. As a result, the information exchanged was often very localized.”

Webinars enable anyone in the world who has an Internet connection to plug

in to the conversation. That geographic diversity promotes a corresponding diversity of opinion and experience. And that range of expertise leads to better solutions for everyone.

TTI, for example, hosts monthly seminars for the Federal Highway Administration’s (FHWA’s) Travel Model Improvement Program (TMIP) for both U.S. and international participants. Approximately 200 people log on monthly to share their own experiences with other experts in the field. Some 75 percent of those are repeat attendees.

“We often speak of a global economy,” says Thomas, “but we rarely acknowledge that what makes that economy work is a global transportation system. Bringing together experts from around the world helps synergize that system, making it more reliable, more efficient and safer.”

High-speed Internet connections enable the use of more advanced technologies to facilitate interaction. Voice-over-Internet protocol (VoIP) — which allows people to talk over the Internet — is fast becoming a standard way for people to connect. Anyone with a microphone and Internet connection can join a webinar, and that kind of access is particularly attractive to international participants. Videoconferencing — or the ability to interact with another person by seeing and hearing them in real time — is also becoming more common in webinars, and Thomas says that’s important.

“Webinars pose challenges to instructors,” he says. “When instructors can’t see participants, they lose that nonverbal feedback so often important to clear communication. Videoconferencing connects one human to another, and while it’s not the same as being face to face, it minimizes the likelihood of miscommunication.”

Thomas cites misinterpreting an e-mail as a contemporary communication problem due to limited interaction. The sender might intend the content to be a joke, but the receiver — perhaps after a rough day of his own — takes offense because there’s no tone or cue, other than the words themselves, to interpret. In e-mail we’ve tried to approximate those cues — those subtleties of human expression — by using symbols called “smileys.” So, even in our technologically advanced Information Age, we add the simplest of facial expressions to improve how our audience interprets content. Everything old truly is new again.

“Webinars are not just cost-effective forums for sharing information,” says TMIP Outreach Manager Sarah Sun of the FHWA’s Office of Environment, Planning and Realty. “They use what’s often viewed as impersonal technology to show us that most basic of interactive learning tools we so often take for granted. Webinars show us the human face.” ■



**MORE INFORMATION**  
For more information, please contact Gary Thomas at (979) 458-3263 or g-thomas@tamu.edu.

# Engineering the future

*STI pairs minds with opportunity*

**Imagination.** Every good idea begins with it. And inspiring young people to think about the future begins with sparking their imaginations.



A team at an STI camp held earlier this year in El Paso works to construct a package that prevents an egg from breaking when dropped.

“STI is filled with success stories every year,” says Jasek. “And this year was no exception. We had a great group of young people who got a lot out of it.”

Part of the key to success involves carefully pairing enthusiastic, knowledgeable mentors with curious students. That energetic interaction has proven key to learning and often fires the imagination of students eager to set goals for their professional futures. Professionals take the students on field trips to see how traffic operations work, how laboratory research impacts their daily driving lives, and how various transportation modes work together to form a cohesive system. Through discussions with mentors, students learn firsthand about opportunities for careers in transportation. Often, students admit, transportation careers are more than they had ever imagined.

“Participants get hands-on experience at the institute that really shows them what it’s like to be an engineer,” explains Raghava Kommalapati, civil engineering professor and Prairie View STI’s director. “Our goal is to get them to think about the future of transportation and how they can make that dream a reality.”



A camp participant builds a straw tower using only straws, paper tubes and tape.

The Texas Transportation Institute (TTI) coordinates the Summer Transportation Institute (STI) program, which aims to keep those good ideas flowing for years to come. Thinking about the future — and, specifically, the infinite possibilities of a career as a transportation professional — is the main mission of STI.

“We try and make engineering the future interesting for our students,” explains Debbie Jasek, director of the STI program and TTI associate research specialist. “We educate them about the rewards

of engineering, and while you can make a good living at it, there’s more to it than that. You can make a difference as well.”

More than 200 students, a record number, attended the 11th annual STI held in June. Schools that hosted program activities included Paul Quinn College in Dallas, Texas A&M University-Kingsville and The University of Texas at El Paso. Funded by the Federal Highway Administration and administered through the Texas Department of Transportation, the Texas program is also conducted at Prairie View A&M University and Texas Southern University.

Students, ranging from sixth to 11th graders, take part in activities that focus on engineering or transportation. For example, after learning about buoyancy, students build canoes out of cardboard and packing tape. The canoe races are judged on which boat, with two students aboard, can travel the longest before sinking. The students also create their own cement and build bridges made of Popsicle sticks. Through activities like these, STI staff and counselors bring to life concepts that can seem stuffy and boring in math and science classes.



**MORE INFORMATION**

For more information, please contact Debbie Jasek at (979) 845-5239 or [d-jasek@tamu.edu](mailto:d-jasek@tamu.edu).



One of the activities at the STI involves construction of cardboard canoes to test buoyancy.

# Breaking ground: *TTI celebrates construction of new state headquarters*



Holding the artist rendition for TTI's State Headquarters and Research Building are (left to right) TAMUS Chancellor Mike McKinney, Vice Chancellor and Dean of Engineering Kem Bennett, TAMUS Board of Regents Chairman Bill Jones, TxDOT Executive Director Amadeo Saenz, TTI Director Dennis Christiansen, TTI Council Chair David Cain, Senior Vice President of Trinity Industries Rex Cottle and TTI Director Emeritus Herb Richardson.



For updated photos of the construction,  
visit <http://tti.tamu.edu/statehq/>.



TxDOT Executive Director Amadeo Saenz speaks at the construction celebration ceremony for TTI's future State Headquarters and Research Building.

**O**n April 30, friends and supporters from around the Lone Star State joined the employees of the Texas Transportation Institute (TTI) to celebrate the construction of the agency's new state headquarters.

Many of the 36 members of the TTI Council attended the celebration, with Texas A&M University System (TAMUS) dignitaries and Texas Department of Transportation (TxDOT) officials joining council members on the stage for the ceremony. The council is comprised of distinguished, high-level transportation professionals from across the state of Texas.

The celebration was held under a large tent on the recently completed parking lot for the new building, despite 30 mph wind gusts. TTI Agency Director Dennis Christiansen moderated the event.

"Today we are pleased to be celebrating another milestone in our 58-year history," said Christiansen. "Our first state headquarters building will accommodate the growth that TTI has experienced."

"Transportation decisions have never been as important as they are today," said Mike McKinney, chancellor of the A&M System. McKinney pointed out that Texas does not have the infrastructure to handle the expected future population growth. Improving that infrastructure is a primary concern for the state since its population is increasing by some 1,500 people per day. "It's that simple. We've got to find ways of funding it," he said.

Rex Cottle, Trinity Industries senior vice president, detailed the two-

decade relationship between TTI and Trinity Industries, a relationship that has produced numerous roadside safety products implemented around the world. "You, your researchers and staff are really jewels in the crown of the state of Texas," said Cottle. "We are most appreciative of being a part of this celebration."

The three-story, 66,000-square-foot building will house a traffic control materials research facility, TTI's administrative offices, and research and support space. The \$18.8 million building will be located next to TTI's Gibb Gilchrist Building in the Texas A&M University Research Park.

"It is not this building that we celebrate here today, but the work that will be done in this building, the lives that will be saved, the families that will be spared grieving for the loss of a loved one, the product that will be moved, and the jobs that will be created and preserved," Bill Jones, chairman of the A&M System Board of Regents, told the crowd.

TTI's State Headquarters and Research Building is scheduled for completion in the fall of 2009. ■



**MORE INFORMATION**

For more information, please contact Terri Parker at (979) 862-8348 or [t-parker@tamu.edu](mailto:t-parker@tamu.edu).

**TTI Council briefed on the state of TTI**

Some members of the TTI Council witnessed their first crash test at TTI's Proving Grounds Research Facility on May 1 as part of the council's 2008 annual meeting held this year in College Station. The meeting corresponded with the construction celebration for TTI's State Headquarters and Research Building, held the day before.

The anti-ram crash test for the U.S. Department of State involved a 15,000-pound truck traveling at 50 mph. Although the crash test was a highlight of the gathering, the subject of transportation challenges facing Texas and the nation dominated much of the discussion during the TTI Council's all-day meeting.

In his first presentation to the advisory council as executive director of TxDOT, Amadeo Saenz discussed the funding challenges facing the agency. TTI researchers updated the members on various initiatives at the Institute. Assistant Agency Director Steve Roop provided an update on the Universal Freight Shuttle, Research Engineer Tim Lomax presented highlights of the *Urban Mobility Report*, and Senior Research Engineer Russell Henk discussed the Teens in the Driver Seat program.

Later, during a roundtable discussion, the members talked about big-picture transportation issues and the role that TTI should play in addressing those challenges. "TTI has been approached with increasing frequency by legislators and other leaders to provide input and analysis for statewide transportation issues," Associate Agency Director Bill Stockton told the council. "But oftentimes, a funding source is not available to support the type of research that is needed."

Securing a broader funding base is one of TTI's current strategic goals. ■

# The best of all roads

Workshops aim to educate transportation planners and designers on the big picture



The series of photos above shows a recently completed construction project in El Paso, Texas, with improved aesthetics along the roadway.

**C**ontext...cooperation...collaboration...compatibility... compromise...consensus. Those are but a few of the key terms that are heard during the context sensitive solutions (CSS) workshops currently underway throughout the state of Texas. Sponsored by the Federal Highway Department (FHWA), the Texas Department of Transportation (TxDOT) and local metropolitan planning organizations (MPOs), the goal of the workshops is to educate transportation planners about the concept of CSS.

“CSS involves developing a transportation project design that accounts for the diverse needs of a transportation facility given its relative environment,” says FHWA Statewide Planning Engineer Kirk Fauver. “It is an approach that considers the total context within which a transportation improvement project will exist.”

The workshops tie in with the FHWA Strategic Plan, which includes several goals developed to encourage state departments of transportation to reinforce their CSS policy by partnering with the American Association of State Highway and Transportation Officials (AASHTO) to implement a joint CSS action plan at the national level.

In 1998, a national conference called “Thinking Beyond the Pavement” was held in Maryland. It was a gathering of transportation professionals who brainstormed ideas to make streets and highways function better for their community with more compatibility

and less adverse impact. The conference crystallized principles that had been successfully used and packaged them under the moniker of CSS.

An example of such success was a Fort Worth project that was to be constructed in a highly visible area of town and had many objectives such as increased capacity, safety, historic preservation, park protection and improved aesthetics. When this project restarted in the late 1980s, involvement of diverse stakeholders resulted in a better coordinated effort and led to the stakeholders becoming part of the solution and facilitating difficult decisions.

“These workshops are intended to provide a first level of training to people involved in transportation facilities planning and design,” says Texas Transportation Institute (TTI) Senior Research Engineer Brian Bochner. “TxDOT employees are the primary audience, but the workshops are also

attended by transportation professionals from MPOs, cities, counties and other transportation agencies. We’ve even had elected officials, consultants, architects and chamber of commerce officials attend.” TTI is one of the CSS workshop team members.

The topics covered in the one-day workshop include understanding good and bad examples of past and current CSS projects, designing major urban thoroughfares and discussing what information is needed to enable agencies to increase use of CSS. The CSS team customizes the workshop for the city the class is held in and also invites local speakers to share stories about their projects. So far, the workshops have been conducted in Corpus Christi, Arlington, Lubbock, El Paso, Austin, Weslaco and San Antonio.

“Streets or roads create an environment that may be associated with the area, such as quality of life and economic development. So the idea of CSS is to take into account all of the objectives and issues and make the best selection of those in trying to develop a transportation project,” says Bochner. ■



#### MORE INFORMATION

For more information, please contact Brian Bochner at (979) 458-3516 or b-bochner@ttimail.tamu.edu.

# Turning the roundhouse into a roundtable:

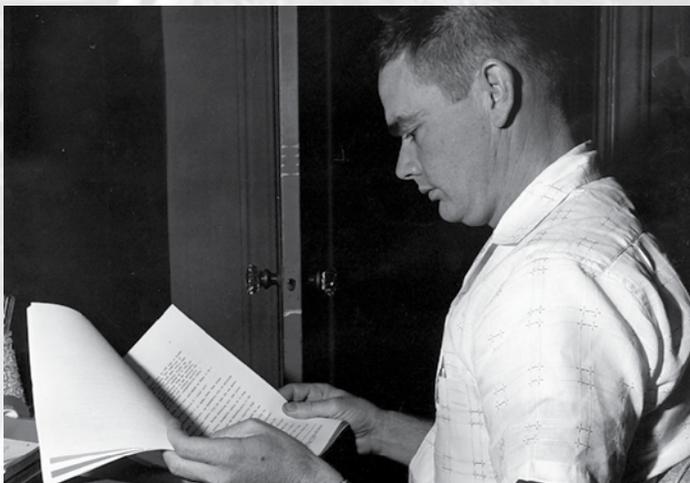
## *The National Highway-Rail Grade Crossing Safety Training Conference*

**W**hen the unstoppable force of a train meets the very moveable object of an automobile, the obvious dangers associated with highway-rail grade crossings can be deadly. In 2007, 338 people were killed and another 1,014 injured at these crossings in the United States.

A wide variety of stakeholders from the public sector, including state and federal transportation agencies, and the private sector, such as railroad companies, industry researchers, consultants and suppliers, have a common interest in improving safety at the more than 250,000 highway-rail grade crossings in the United States. Together they've helped decrease incidents at grade crossings in the last decade by 28 percent. But there's work left to do. Bringing together these stakeholders is the aim of the biennial National Highway-Rail Grade Crossing Safety Training Conference, hosted by the Texas Transportation Institute's (TTI's) Rail Research Program.

"The conference brings participants up to date on the latest technologies and improvements to crossing safety from a technical and research point of view," says Ron Ries, the staff director of the Highway-Rail Crossing and Trespass Division of the Federal Railroad Administration. "It's an excellent forum to get people together from across the country to share ideas. There are regional conferences, but this is one of the few national conferences where this can happen."

The 2007 conference, held in San Antonio, featured the theme "The Legacy Continues" and was dedicated to the late Hoy A. Richards, former TTI senior research scientist and leader



The 2007 conference was dedicated to the late Hoy Richards, shown here reviewing a report during his early years at TTI.



The next National Highway-Rail Grade Crossing Safety Training Conference will be held in New Orleans, LA, in the fall of 2009.

in the highway-rail grade crossing area for more than 40 years. His enthusiasm and persistence for promoting safety at highway-rail grade crossings were instrumental in the formation of the Railroad Highway Grade Crossing Committee at the Transportation Research Board and

the ITS User Service 30 for Highway-Railroad Intersections.

"Hoy Richards was a true pioneer in highway-rail grade crossing safety," says Steve Roop, TTI assistant agency director in the Multimodal Freight Transportation Program. "The success in improving safety at these hazardous intersections is due in great measure to his efforts."

Richards' legacy also includes the Rail Safety Conference. He founded the conference in 1969 to get stakeholders together to improve rail safety. "The conference is an opportunity for group discussions in a roundtable format," says Darin Kosmak, the railroad section director with the Traffic Operations Division of the Texas Department of Transportation. "The last conference wasn't just made up of presenters. The roundtables allowed more interaction, which worked well. The last roundtable gave a summary of all the session presentations."

Dave Peterson, senior manager of industry and public projects for Union Pacific Railroad, has attended the conference continuously since the early 1990s. "It's an excellent source for disseminating information on changes in the rail safety arena on a national basis," says Peterson. "What works on one side of the country might work on the other side. The conference helps share successes and failures, and raises the level of awareness of rail safety issues." ■

"What works on one side of the country might work on the other side. The conference helps share successes and failures, and raises the level of awareness of rail safety issues."

*Dave Peterson,  
Senior Manager of Industry  
and Public Projects,  
Union Pacific Railroad*



**MORE INFORMATION**

For more information, please contact Jessica Franklin at (979) 845-5817 or [j-franklin@ttimail.tamu.edu](mailto:j-franklin@ttimail.tamu.edu).



# You may experience some turbulence

*2008 Texas Aviation Conference addresses economic realities*

Some things you just take for granted. And some things you don't even realize you had until they're gone. Access to air travel, for example. Or even access to affordable goods flown to market by the air cargo industry.

The Texas Department of Transportation's (TxDOT's) 26th Annual Texas Aviation Conference brought aviators, airport managers and business interests from around the state to Austin, Texas, to discuss the current status of the industry. This year's conference set records, with 567 aviation leaders in attendance and an unprecedented 70 exhibitors sponsoring the event.

"The 2008 conference was particularly important in light of all the things happening in transportation today," observes Texas Transportation Institute (TTI)

Associate Research Scientist Jeff Borowiec, who is conducting interagency agreement projects for TxDOT's Aviation Division. "The conference brings together individuals with diverse interests and provides the opportunity to network and learn what others are doing throughout the state."

Most people don't realize just how important the aviation industry is to the Texas economy. A 2005 TxDOT study found that aviation is responsible for maintaining some 61,000 jobs and funding \$2.5 billion in payroll. With 300 public general-aviation and 27 commercial-service airports in the Texas airport system, Texas is home to two of the top 10 busiest airports in the country, generating some \$8.7 billion in economic output for the state. Texas' gross state product ranks the second highest in the nation, and aviation contributes significantly not only to the state's economy, but also to the nation's financial well-being.

"Aviation is obviously a vital part of the Texas economy," confirms Borowiec. "Given today's economic realities, in some ways, it's fighting for its very survival."

This context framed the issues of concern at the conference. Participants discussed the economic impact of

currently rising fuel costs and the collateral effects on shipping and consumer travel. According to one presentation, intrastate service in Texas appears particularly vulnerable to cutbacks. A large number of smaller,

"Improving infrastructure, mitigating operational costs, ensuring safety — all these are central issues for the aviation industry, now more than ever. This conference helps us synergize the way aviation works in Texas."

*Dave Fulton,  
TxDOT Aviation Division Director*

commercial-service airports in Texas are served by aging, turboprop aircraft, and the rising costs of doing business make serving these small communities more difficult.

Other presentations focused on the challenges of securing and holding onto federal funding, a primary source of financing projects at local airports. Three workshop sessions covered various aspects of the aviation industry, from airport security to wildlife management to risk management for municipal airports.

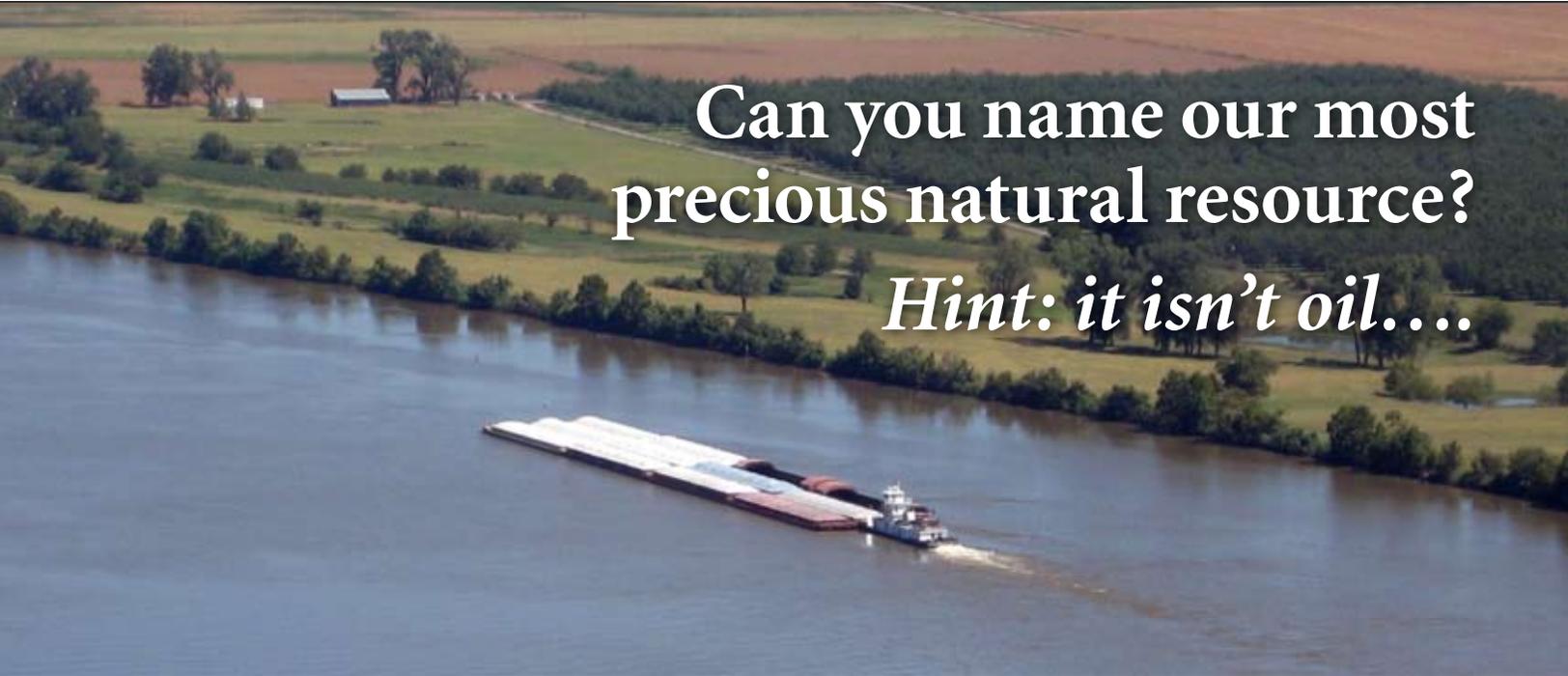
"Improving infrastructure, mitigating operational costs, ensuring safety — all these are central issues for the aviation industry, now more than ever," says Dave Fulton, director of TxDOT's Aviation Division. "This conference helps us synergize the way aviation works in Texas. Without it, we'd have a lot harder time working together to meet the needs of Texans." ■



The 2009 Texas Aviation Conference is scheduled for May 11-13 and will be held again in Austin.



**MORE INFORMATION**  
For more information, please contact Jeff Borowiec at (979) 845-5200 or jborowiec@tamu.edu.



# Can you name our most precious natural resource?

*Hint: it isn't oil....*

**I**n the not-too-distant future, water might just prove more valuable to our national transportation system than gasoline.

Rising gas prices are making it harder for truckers to make ends meet. Shipping goods in general is becoming ever more expensive, and those costs are being passed on to consumers. In short, the old way of moving goods to market is straining family and industry budgets alike.

For some goods, our nation's waterways offer a transportation solution — driving down shipping costs through competition, getting more vehicles off

“The conference helps TTI and the transportation community find out what areas we need to research. We get good feedback on what issues we can address in our research to help ports and waterways in the state of Texas.”

*Jim Kruse,  
TTI Director of the Center for Ports and Waterways*

the roads, enhancing safety and improving air quality. But in order to compete, ports need every advantage they can get, and that means industry professionals working together to advance waterways as a transportation mode.

The Texas Ports and Waterways Conference, a three-day event, is designed to do just that. The Texas Department of Transportation (TxDOT) began holding

the conference in the mid-1990s. In 2004, the Texas Transportation Institute (TTI) stepped in to host the conference, and now TxDOT and TTI sponsor the conference in alternate years.

Held in Galveston July 23-25, 2008, this year's conference focused on providing practical, timely information on port facilities in Texas. Presentations addressed current legislation, infrastructure financing, the energy situation in Texas and the effects of climate change on ports. The Port of Galveston helped TTI host the event and hosted a reception.

“The conference gets government entities together with ports and waterway users,” says Jim Kruse, the director of TTI's Center for Ports and Waterways. “It also informed waterway users of current issues that could affect them.”

Each past conference has brought together approximately 100 industry professionals, including government officials, port authorities, engineers, consultants, carriers, shippers, academia and others who deal with the development and management of port facilities in Texas. The format includes

presenters who allow extensive question-and-answer sessions to encourage discussion of the subject area. The conference is designed to also allow time for networking and interacting with speakers, maximizing that personal contact that keeps key stakeholders informed of issues relevant to waterways.

“The quality of attendees that the conference attracts is outstanding,” says John Roby, the director of customer service for the Port of Beaumont. “You can have a CEO at the same table with shippers, transportation people, consultants, academia — our industry is not focused on one area. There are a lot of different people involved in the marine and maritime industry, and the conference attracts everyone we need to talk to. I learn not only from the presenters but also from other attendees.”

And the attendees have a lot to teach TTI as well. “The conference helps TTI and the transportation community find out what areas we need to research,” says Kruse. “We get good feedback on what issues we can address in our research to help ports and waterways in the state of Texas.”



**MORE INFORMATION**  
For more information, please contact Jim Kruse at (713) 686-2971 or [j-kruse@ttimail.tamu.edu](mailto:j-kruse@ttimail.tamu.edu).

# GONE TO TEXAS!

*Mobility demands meet historic trends at the Texas Transportation Forum*



Tom Johnson, executive vice president of the Associated General Contractors of Texas, addresses the general session. Also present, sitting left to right, are Texas Transportation Commissioner Ted Houghton, TxDOT Executive Director Amadeo Saenz and Congresswoman Eddie Bernice Johnson.



Governor Rick Perry speaks at the closing luncheon.



The panel takes questions from the audience.



**W**hen asked where they were headed to homestead in the 19th century, many Americans famously answered, “Gone to Texas!” Back then, wagon trains were lucky to find wheel ruts to follow to the Lone Star State. These days the roads are just a little bit better, but that old saying — and concerns over how to manage traffic once those folks get here — are just as relevant.

With new businesses “moving to Texas in droves,” Governor Rick Perry urged state lawmakers to come up with solutions to ease congestion during the Third Annual Texas Transportation Forum in Austin, April 20-22. “If we can’t find a way to move their people, goods and services — they are going to leave.”

Perry’s warning was part of his keynote speech to the 1,276 people in attendance. The governor told the crowd that Texas’ population is growing by 1,500 people each day, which is the equivalent, the Aggie graduate said, of filling Texas A&M’s Kyle Field stadium every 55 days. The two-day forum was dominated by conversations about comprehensive development agreements, deteriorating infrastructure, the motor fuels tax and the debate over earmarks in transportation bills.

Speakers like State Representative Mike Krusee, chairman of the House Transportation Committee, gave examples of why “the system is failing.” The legislator from Central Texas told the crowd that over the last 25 years, vehicle miles traveled increased 100 percent, yet highway lane miles only increased 3 percent. Krusee also said that there has been a 425 percent increase in travel delay.

Other keynote speakers included Congressman John Mica and Congresswoman Eddie Bernice Johnson, who both serve

on the House Transportation and Infrastructure Committee.

The forum was hosted by the Texas Department of Transportation (TxDOT), Associated General Contractors of Texas, Texas Good Roads/Transportation Association and Texas Transportation Institute (TTI).

“TTI is pleased to be one of the co-sponsors of this annual statewide forum,” said TTI Director Dennis Christiansen. “As we look toward the future, we will be addressing transportation issues through a variety of new partnerships and approaches. This forum is an excellent way to bring together individuals from local, regional and state government, as well as the private sector, to discuss how we will develop and operate the Texas transportation system.”

The opening session of the forum included a video tribute to the late chair of the Texas Transportation Commission, Ric Williamson, who died December 30, 2007. Williamson was an adamant supporter of public-private partnerships. “With his passing, we certainly lost a clear, passionate voice,” said Governor Perry. “But the challenges that he vigorously fought to overcome have not gone away. If anything, those challenges have grown larger.”



**MORE INFORMATION**

For more information, please contact Terri Parker at (979) 862-8348 or [t-parker@tamu.edu](mailto:t-parker@tamu.edu).

## TTI aids Mexican government with GPR

In an effort to make sure its new road construction meets specifications, the Mexican state of Coahuila has turned to the Texas Transportation Institute (TTI) for help in obtaining a ground penetrating radar (GPR)-equipped vehicle. Officials from Coahuila took possession of the system June 4. TTI also trained Mexican transportation personnel to operate the system and its software, COLORMAP and PAVECHECK. The software was developed by researchers at TTI lead by Tom Scullion, manager of TTI's Flexible Pavements Program.

GPR is a nondestructive geophysical method that "sees" underground and produces a record of subsurface features—without drilling, probing, digging or coring. Since 1988, researchers at TTI have been developing, testing and implementing GPR technology for the Texas Department of Transportation (TxDOT) to use in its road repair and

maintenance activities. GPR can monitor changes in layer thickness of pavements and detect areas of either trapped moisture or air voids beneath the roadways. Keeping track of these factors is vital to efficient roadway maintenance.

"We are receiving worldwide interest in GPR," Scullion says. "An official from the Malaysian government visited just a week ago to take a look at our Texas system." Scullion acknowledges TxDOT's efforts to spread the word about GPR as being a big reason for the technology's growing popularity. "We are excited

about having GPR in Mexico," said Ricardo de León Garcia, Coahuila's verification director. "It will allow us to inspect new and old roads very quickly, and will save us time and money." Garcia says the GPR vehicle cost his government \$82,000 but will more than pay for itself in the long run. ■



Standing in front of a ground penetrating radar-equipped van destined for Mexico, TTI Flexible Pavements Program Manager Tom Scullion (middle) is flanked by members of the Coahuila government. From left to right are engineers Luis Gerardo Ramos Canceco, Miguel Angel Espinoza Aguilar and Jose Luis Gallegos Valdez. Director of Verification Ricardo de León Garcia is at the far right.

## TTI's Richmond remembered for humor, humanity

Greg Richmond, long-time Texas Transportation Institute (TTI) employee and director of TTI Human Resources, lost his courageous, three-year battle with cancer on June 25. Richmond was undergoing cancer-related surgery at the time of his death.

In an e-mail he wrote to employees the week before he left for the surgery, Richmond, 54, described the rare procedure and why it was taking place at the University of Florida in Gainesville. At the end, Richmond quipped, "Because the Aggie softball team eliminated the Florida softball team at the Women's College World Series this year, we have decided that we will not wear any Aggie clothing or caps until after the surgery has been completed. I don't think anyone there would let that fact cloud their judgment or refuse their services, but we figure there is no reason to take the chance."

To the many friends he made while working at TTI over the past 30 years, that kind of humor was classic Greg Richmond. "He faced his battle head-on," says his friend and colleague, Wally Simpson, human resources manager. "He never felt sorry for himself, and he always looked on the bright side of things. Over the last three years, because of his unbelievably positive attitude, we often forgot that he was ill and struggling. This is a sad time for all of us."

Nominated for his tireless service to fellow employees and his dedication to their well-being, Richmond received the TTI/Trinity Charles J. "Jack" Keese Career Achievement for Agency Support Award last year.

Richmond served on the Texas A&M University System Employee Benefits Advisory Committee as its chairman, the Personnel Administrators of Texas Senior Colleges



The late Greg Richmond (center) is shown in 2007 receiving a TTI career award. The TTI Human Resources director is flanked here by Trinity Industries Senior Vice President Mark Stiles (left) and TTI Director Dennis Christiansen (right).

and Universities as treasurer and president, the Human Resources Council and the A&M System's Diversity Council. He was also a volunteer for his daughters' school activities, including serving as president of the school's parent-teacher organization (PTO).

"Greg was a major reason why TTI functions so smoothly," says Director Dennis Christiansen. "But he was much more than our director of Human Resources. He was a friend and a solid force that we all admired and appreciated. Our hearts go out to his family and his numerous friends." ■

### Little receives major recognition



Little

Senior Research Fellow Dallas Little has been recognized by the Association of Asphalt Pavement Technologists due “to his many services to the association, for his research efforts, his publications, and because of the high esteem in which he is held.” The association’s

award of recognition is presented each year and represents the fourth award Little has received from the organization.

“It is very special for me personally to be so honored by this preeminent department and distinguished colleagues with whom I have had the pleasure of working,” said Little, an alumnus of the University of Illinois at Urbana-Champaign (UIUC). “I have the honor of holding a (master’s) degree from UIUC, which makes this all the more special.” ■

### 82nd Short Course

The 82nd Annual Texas Department of Transportation Short Course will be held at Texas A&M University’s Rudder Auditorium October 14-15. Both TxDOT and the Texas Transportation Institute are proud of this long-standing record of collaboration and cooperation. Over the years, the Short Course has provided a unique opportunity for these two agencies to exchange important technical information that improves transportation in Texas. ■



★ TRANSPORTATION SHORT COURSE ★

Register for this event at <http://tti.tamu.edu/conferences/find.htm>.

### Upcoming Statewide Traffic Safety Conference

Researchers, engineers, law enforcement personnel and many others are facing challenges to do more to help reduce the estimated 43,000 deaths occurring on our highways each year.

In an inaugural conference focusing entirely on safety, the Texas Transportation Institute’s Center for Transportation Safety (CTS), the Houston-Galveston Area Council and the Texas Department of Transportation are organizing the first Statewide Traffic Safety Conference in Houston November 17-19, 2008.

Topics at the conference will include young and old driving behaviors, alcohol and safety planning. Motorcycle, pedestrian and bicycle safety, as well as crash data, enforcement technologies and freight safety, will also be highlighted.

“Progress is being made every year in making transportation safer,” says CTS Director John Mounce. “It’s our hope that this conference will highlight the things that are working and focus more attention on areas that still need improvement.” Engineering issues and federal safety initiatives will also be discussed.

Register for this event at [http://tti.tamu.edu/conferences/traffic\\_safety/](http://tti.tamu.edu/conferences/traffic_safety/). ■

### Federal funding accelerates teen driving safety

With over 100 Texas high schools in some phase of deploying Teens in the Driver Seat (TDS) initiatives, new federal funding totaling \$343,000 — announced by U.S. Representative Ciro Rodriquez in April — will help the Texas Transportation Institute’s teen driver safety program continue to grow.

TDS is America’s first peer-to-peer program that alerts young drivers to the distractions and behaviors that are responsible for the majority of teen crashes: driving at night, using a cell phone, texting, having too many teen passengers, speeding, not wearing a seat belt, and drinking and driving. Every year, 6,000 teenagers die in U.S. car crashes. That’s more than 16 dead teens every day.

“We are, in fact, facing an epidemic and a public health crisis,” Rodriquez said at a San Antonio news conference April 7. “There is an important role for law enforcement and parents, but the most important role is the one taken on by young drivers. That’s what Teens in the Driver Seat is all about, and I want to congratulate the young people behind me.”

The funding for TDS was part of a National Highway Transportation Safety Administration special appropriation approved by Congress. ■



Former Texas Transportation Commission Chairwoman Hope Andrade speaks at a news conference, along with U.S. Representative Ciro Rodriquez, announcing federal funding for the Teens in the Driver Seat program.

## Students learn TTI Message: Transportation can be fun

A group of 61 students — who normally would not have the opportunity to learn about engineering — toured the Texas Transportation Institute (TTI) for a behind-the-scenes look at transportation research, including crash testing, driving simulation and transportation technology. The idea was to focus on areas of interest for 12- to 14-year-olds and perhaps open their eyes to exciting careers in transportation.

The students from a Harker Heights middle school are part of the Advancement Via Individual Determination (AVID) program. AVID's goal is to reach out to "average" students who are capable of succeeding in college but may not have the right motivation to reach their full potential.

"It was very rewarding to see these young people asking questions and being engaged," says TTI Associate Research Engineer Melisa Finley, who organized the tour. "For many of the kids, you could tell a light went on. I think TTI sparked their interest." ■



Middle school students tour Texas A&M University as part of their introduction to transportation engineering at TTI.

## TTI Day emphasizes leadership and teamwork

It was clear that the 15th TTI Day, held April 29, was aptly named "Mission: Possible" after hearing Agency Director Dennis Christiansen's state of the institute presentation. Christiansen emphasized numerous positive developments and initiatives for the Texas Transportation Institute (TTI), including:

- a 40 percent increase in non-Texas Department of Transportation expenditures;
- about \$1 million in international contract work;
- the successful dissemination of the *2007 Urban Mobility Report*, which received lead story status from every major TV network and newspaper in the country;
- the current negotiations underway for implementing TTI's Universal Freight Shuttle; and
- the overwhelmingly positive results from the employee Survey of Organizational Excellence.



Keese-Wootan Fellowship Award (left to right): Katie Turnbull, Doxie Wootan, Suzie Edrington, Byung-Jung Park, Joe Keese, Veronica Castelo Branco, Jan Keese and Dennis Christiansen.

Christiansen credited the staff for the past year's accomplishments. "There's no doubt that the people in this room are TTI's greatest resource," he said. ■

## 2008 TTI DAY AWARD WINNERS

**TTI/Trinity Administrative Professional Staff Award**  
Walter R. Simpson III

**TTI/Trinity Administrative Support Staff Award**  
Marilyn Keller

**TTI/Trinity Administrative Technical Support Award**  
Brad Hoover

**TTI/Trinity Research Support Staff**  
Linda S. Chatham

**TTI/Trinity Research Technical Support**  
Nada Trout

**TTI/Trinity New Researcher Award**  
Jodi L. Carson, Ph.D., P.E.

**TTI/Trinity Researcher Award**  
Anthony Voigt, P.E.

**TTI/Trinity Senior Researcher Award**  
Gerald (Jerry) Ullman

**TTI/Trinity Charles J. "Jack" Keese Career Achievement for Agency Support Award**  
Susan Adams

**TTI/Trinity Charley V. Wootan Career Achievement for Research Award**  
Joseph Wade Button

**TTI/Trinity TTI Team Award**  
2007 Transportation Short Course Planning Committee

## TECHNICAL REPORTS

"Verification of the Load-Thickness Design Curves in the Modified Triaxial Design Method," by Emmanuel Fernando, **0-4519-1**, June 10, 2008.

"Evaluation of Traffic Control Devices: Fourth-Year Activities," by Gene Hawkins, **0-4701-4**, June 20, 2008.

"Traffic Signal Warrants," by Gene Hawkins, **0-4701-P2**, April 17, 2008.

"Evaluation of Chevron Markings on Freeway-to-Freeway Connector Ramps in Texas," by Tony Voigt, **0-4813-2**, April 25, 2008.

"Hurricane Evacuation Traffic Operations," by Andy Ballard, **0-4962-1**, April 9, 2008.

"Improving Lab Compaction Methods for Roadway Base Materials," by Stephen Sebesta, **0-5135-2**, March 6, 2008.

"Crash Testing and Evaluation of F-Shape Barriers on Slopes," by Nauman Sheikh, **0-5210-3**, March 18, 2008.

"Studies to Improve Temporary Traffic Control at Urban Freeway Interchanges and Pavement Marking Material Selection in Work Zones," by Jerry Ullman, **0-5238-2**, April 9, 2008.

"Engineering Design Data Management — Practices and Framework Development," by Cesar Quiroga, **0-5246-1**, March 25, 2008.

"Engineering Design Data Management — Recommendations for Engineering Processes," by Cesar Quiroga, **0-5246-2**, March 25, 2008.

"Prototype Engineering Data Management Processes and Procedures," by Cesar Quiroga, **0-5246-P1**, March 25, 2008.

"Prototype Engineering Process Integration with the GAIP GIS Architecture," by Cesar Quiroga, **0-5246-P2**, March 25, 2008.

"Vibration Reduction and Control for Traffic Cameras: Technical Report," by Ali Abolmaali, **0-5251-2**, May 19, 2008.

"Evaluation and Recommended Improvements for Mix Design of Permeable Friction Courses," by Alex Alvarez Lugo, **0-5262-3**, April 9, 2008.

"Feasibility Study for Development of Marine Exposure Site: Technical Report," by Kenneth Reinschmidt, **0-5266-1**, June 20, 2008.

"Managed Lane Strategies Feasible for Freeway Ramp Applications," by Beverly Kuhn, **0-5284-2**, March 3, 2008.

"Public Transportation Solutions for Regional Travel: Technical Report," by Carol Lewis, **0-5345-1**, March 7, 2008.

"A Guidebook for Effective Use of Archived Operations Data at Transportation Management Centers," by Praprut Songchitruksa, **0-5485-P1**, March 7, 2008.

"Enhancements to PIA System for Real-Time Control at Isolated Traffic Signals: Technical Report," by Nadeem Chaudhary, **0-5507-1**, May 2, 2008.

"Management of Hazardous Materials Transportation: Literature Summary," by Jeff Warner, **0-5929-P2**, March 4, 2008.

"Evaluation of Stabilization of Sulfate Soils in Texas," by Pat Harris, **5-4240-01-1**, June 17, 2008.

"Construction Details and Initial Performance of Two High-Performance Base Sections," by Tom Scullion, **5-4358-01-1**, May 2, 2008.

"Operator's Manual for FlexPrep Twin Blade Saw," by Fujie Zhou, **5-4467-01-P2**, June 16, 2008.

"RAM — Roller Acceleration Monitoring System," by Tom Scullion, **5-4774-01-P2**, June 5, 2008.

## TTI PUBLICATIONS

A full catalog of TTI publications and other products is online at <http://tti.tamu.edu/> publications. You can find the publications by searching for either the title or publication number listed here. Most of these publications are available as free downloads in portable document format (PDF).

Printed, bound versions of these reports are also available through the URL above. Publication prices vary depending on length. The Texas Transportation Institute accepts checks, money orders and credit cards.



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