

Keeping Texans Informed  
During Construction Projects

Helping TxDOT Build  
Better Bridges

Improving Traffic  
Incident Management

TEXAS TRANSPORTATION

VOL. 50 | NO. 3 | 2014

# Researcher



*TTI Helps Texas  
Communities Meet  
Transportation  
Challenges*

Texas A&M  
Transportation  
Institute

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# TEXAS TRANSPORTATION Researcher

VOL. 50 | NO. 3 | 2014

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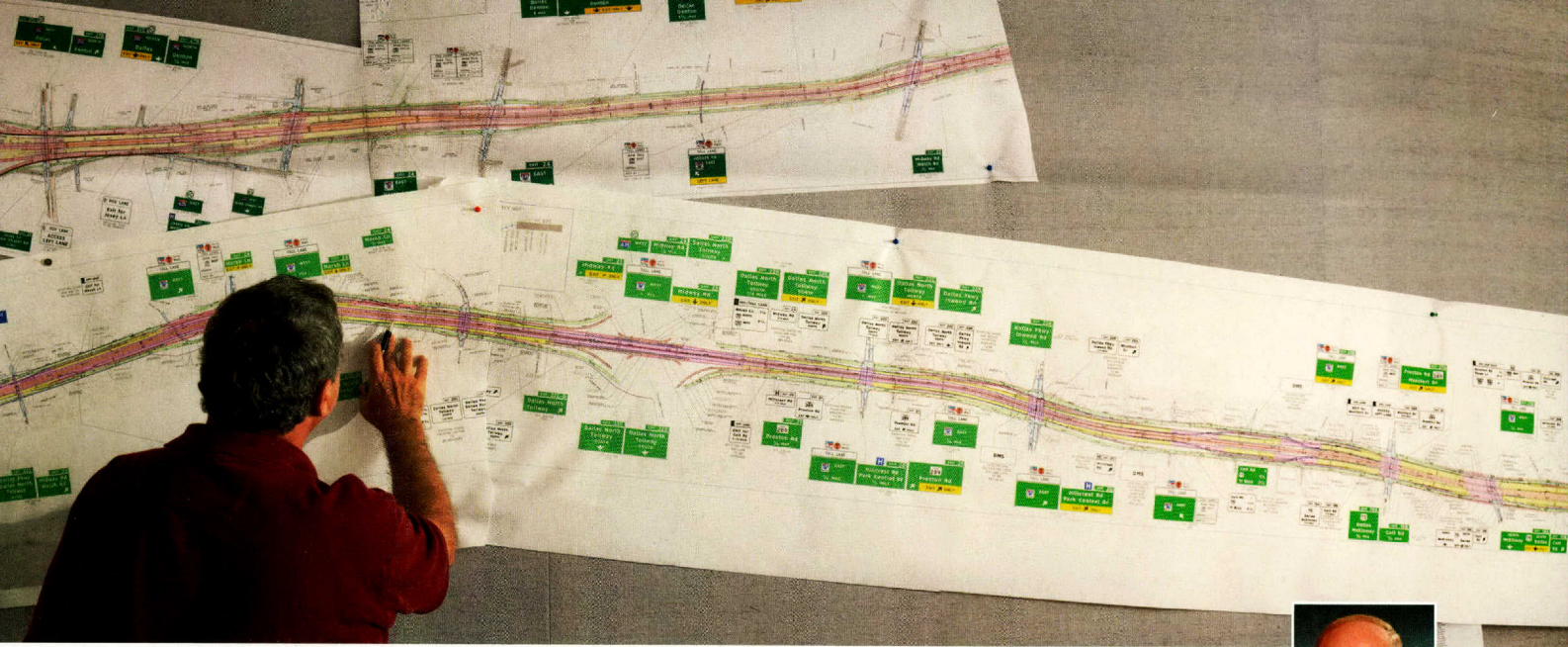
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# TTI Helps Texas Communities Meet Transportation Challenges

by Dennis Christiansen  
Agency Director

**Transportation research is not an end unto itself.** It's a means by which the system we have can be transformed into the system we need. By proposing, testing and refining new ideas that improve and extend our transportation system, we make that system safer, help stretch dollars farther, and better serve the interests of the general public.

No matter how useful research findings might be, though, getting them implemented is complicated. Technology evolves. Established procedures have to be rewritten, and practitioners must be educated on how to apply them. If a new policy impacts drivers directly, making them aware of what's changed and sometimes garnering public support for it are necessary. Understanding the specific needs of a community is vital to applying research solutions effectively and efficiently at a statewide level.

That's why Texas A&M Transportation Institute (TTI) researchers work directly with urban and rural communities around Texas to put into practice our research findings. Nothing brings home the pain of living in a congested urban environment like sitting in the traffic jam yourself. Applying those solutions around the state — wherever they're most needed — creates a stronger, more responsive transportation system for all Texans.

This issue of the *Texas Transportation Researcher* looks at how TTI research is helping communities around Texas and, in many cases, directly benefiting their economies. Stories in this issue show how we're facilitating infrastructure improvements in Fort Worth, as well as cross-border trade in El Paso. A TTI-designed monitoring system operating along a 6-mile stretch of the Sugar Land rail line is facilitating the safe, timely response of emergency personnel by making them aware of approaching trains. Institute researchers in San Antonio have made recommendations on how roads — never designed for the kind of heavy use that developing the Eagle Ford Shale play has required of them — can be better built to last longer.

Along a 96-mile stretch of I-35, TTI staff are assisting the Texas Department of Transportation Waco District as the department mitigates the inconveniences associated with highway construction during the massive,

multi-billion dollar I-35 Expansion Project. Meanwhile, in our state capital, TTI researchers are working with local transportation planners to troubleshoot Austin's growing traffic congestion, a problem that will only be made worse if, as predicted, the region's population more than doubles in the next 20 years.

As part of The Texas A&M University System, TTI's mission is to serve the best interests of all Texans, wherever they live. We do that best when we work closely with those who can benefit most from the research we perform. We take our work personally because it directly affects the lives of millions of commuters, shippers and business owners in Texas and beyond. And that's how we at TTI make the Lone Star State a better place to live, work and travel. ■

# TTI ADVISORY COUNCIL

## *Advancing the Vision*

The Texas A&M Transportation Institute (TTI) Advisory Council is comprised of a small group of high-level transportation professionals from across Texas and every sector of the transportation world. The council, which meets annually, offers a tremendous service to the Institute by advising on transportation issues and trends and supporting TTI's research programs and initiatives. TTI profiles several council members in each issue of *Researcher*. ■



*Heiligenstein*

### **Mike Heiligenstein**

*Executive Director  
Central Texas Regional Mobility Authority  
Austin, Texas*

Mike Heiligenstein leads the implementation of innovative, multimodal transportation solutions that reduce congestion and create transportation choices that enhance quality of life and economic vitality in

the Central Texas region. He has been with the Central Texas Regional Mobility Authority (CTRMA) since its inception as an independent government agency in 2002.

Before taking the helm at CTRMA, he served the citizens of Williamson County for 23 years as a public official. During his years of public service, Heiligenstein initiated and helped supervise \$1.5 billion in capital improvement projects. He serves as the 2014 president of the International Bridge, Tunnel and Turnpike Association.



*Trevino*

### **Oscar Trevino**

*President and Owner  
O. Trevino Construction  
North Richland Hills, Texas*

Oscar Trevino owns and manages O. Trevino Construction, which has a strong background in heavy/highway contracts and an emphasis on concrete paving. He has served as mayor of

North Richland Hills, Texas, since 2002.

He serves on several boards and committees, including the Coalition for Better Transportation, the executive committee of the Tarrant Regional Transportation Coalition, the National League of Cities transportation infrastructure and services steering committee, and the North Richland Hills Capital Improvement Program committee.



*Trietsch*

### **Gary Trietsch**

*Director  
Harris County Toll  
Road Authority  
Houston, Texas*

As director of the Harris County Toll Road Authority

(HCTRA), Gary Trietsch leads the improvement of mobility in the greater Houston metropolitan area by ensuring excellence in the operation of urban toll highway systems, while upholding a commitment to leadership, public service and quality of life.

Prior to joining HCTRA, Trietsch served as vice president for the Dannenbaum Engineering Company for five years and spent 40 years with the Texas Department of Transportation (TxDOT), serving the last 13 years as the Houston district engineer. At TxDOT, he managed projects covering six counties and having a \$1 billion budget, including one of the largest freeway traffic management systems in the United States — Houston TranStar.

# Keeping Texans Informed During Construction Projects



## THE I-35 EXPANSION PROJECT IN CENTRAL TEXAS

### For travelers and business owners, construction projects —

whatever their long-term benefits — can be an annoying, frustrating experience. Exits closed, access limited, traffic slowed down in work zones — mitigating the effects of those necessary evils is what a mobility coordinator does on behalf of the Texas Department of Transportation (TxDOT). In one case, the Texas A&M Transportation Institute (TTI) is helping TxDOT get the word out about its massive I-35 Expansion Project to those who use the interstate the most.

Driven by citizen input, the I-35 project is expanding a 96-mile stretch of the interstate from Hillsboro to Salado in TxDOT's Waco District. At an estimated cost of \$2.5 billion, the overall effort is made up of 17 smaller construction projects and is targeted for completion in 2018. Ultimately, a project this size affects hundreds of thousands of citizens living nearby, tens of thousands of businesses, and millions of travelers over its lifespan. For business owners situated beside I-35, changes resulting from construction can seem threatening since they potentially limit a customer's ability to get to their stores for what can often be a significant period of time.

"By visiting with them, we can help them prepare for what's coming and work with them to figure

out how to maintain access for their customers during construction," says TTI Research Engineer John Habermann, one of three TTI mobility coordinators supporting TxDOT on the project.

"Reconstructing almost 100 miles of interstate is a massive job for the department, and at the end of the day we at TxDOT want to be as responsive and helpful as we can to our fellow Texans," Jodi Wheatley, Waco District's information specialist for the project, says. "That would be much more difficult without TTI's logistical support and technical know-how. Maybe even impossible." ■



For more information, contact **John Habermann** at (512) 994-9450 or [j-habermann@tti.tamu.edu](mailto:j-habermann@tti.tamu.edu).

### Research Makes a Difference

TTI research has significantly mitigated the impact of construction along I-35 by improving safety, informing travelers and innovating technology to accomplish both those goals. Here are just three examples:

**End-of-queue warning system:** TTI helped TxDOT implement a first-of-its-kind, portable, dynamic-warning system that uses sensor data and programming to warn travelers of slow or stopped traffic ahead of them, thereby increasing safety by decreasing the likelihood of rear-end collisions.

**Red-bordered speed-limit signs:** TxDOT deployed these signs based on the Institute's findings regarding their effectiveness to increase visibility and make drivers more aware they're entering zones with reduced pavement width and no shoulder recovery options.

**Roadway speed trailers:** Using visual feedback to drivers (not unlike trailers you might have seen in your neighborhood), these devices are often combined with enforcement by the Texas Department of Public Safety to encourage driving at responsible speeds, especially through work zones. ■



# TTI Helps Keep Americans Safe at Home and Abroad

**How do you keep a terrorist from bombing an embassy with a fast-moving car or truck fitted with explosives?** The terrorist tactic goes back more than 30 years when the U.S. Marine barracks were bombed in Beirut, Lebanon. Today, embassies, consulates, and other facilities and bases here and abroad are protected with bollards and other protective barricades — many of them developed and tested at the Texas A&M Transportation Institute (TTI).

“We have been working with the U.S. Department of State since 2001 developing various devices like bollards and wedges, all designed to keep vehicles from entering a facility,” TTI Associate Research Engineer William Williams says. Williams designed the latest perimeter security device, which was tested at TTI’s Proving Grounds facility September 24.

Although the existing devices being used now work well, there have been some issues related to installation, especially in third-world countries.

“We need a device that not only is more aesthetically pleasing, but one that does not interfere with underground utilities, which are sometimes buried less than 2 feet deep,” says

Russell Norris, a State Department engineer with the Bureau of Diplomatic Security’s Physical Security Division.

Although the so-called bent pipe design seems simple enough, it had to meet State Department requirements and stop a 15,000-pound truck traveling at 50 miles per hour. The test would only be a success if the truck bed did not go more than 1 meter past the barrier.

The new design is a 12-inch-diameter pipe made of 1-inch-thick steel that spans 15 feet in length and is 42 inches tall. The two ends of the pipe are placed in a foundation 18 inches thick and surrounded by 10,000 pounds of concrete. The weight of the whole system is about 50,000 pounds.

The unclassified crash test, which lasted less than a minute, was viewed by State Department officials, researchers and media representatives. When the truck slammed into the barrier, the impact of the collision was so great it forced the truck’s engine into the cab. The bed crashed forward into the cab from the other direction. In slow-motion video, you can see the barrier and its foundation lift slightly but quickly settle back into place. The truck’s frame and front tires went underneath the top of the pipe, stopping a few feet past the barrier. But the bed, loaded with 50-gallon barrels, was prevented from entering the protected area. Video of the crash

## State Department Crash Test Goes Viral



TTI hosted visiting media representatives to witness the crash test. From left to right: Michelle Hoelscher (TTI), Richard Cole (TTI), Aman Batheja (*Texas Tribune*), Gail DeLaughter (KUHF Houston Public Radio), Steve Fullhart (KBTX-TV), Dug Begley (*Houston Chronicle*), and Terri Parker (TTI).

was aired on news websites and quickly spread to international publications.

“We’ve conducted about 150 crash tests of anti-ram and anti-terrorist perimeter barriers, fences and gates for the State Department,” says Dean Alberson, TTI assistant agency director and program manager for the Institute’s Crashworthy Structures Program. “This one seemed particularly dramatic, especially watching the debris field in the slow-motion version of the video.” Alberson helped initiate a five-year cooperative agreement with the State Department in 2010.

“One of the biggest accomplishments we’ve had working with TTI is the barrier system that addressed some of the shortcomings we saw in the commercial sector,” Norris says. “A lot of effort went into harmonizing our standards with the United Kingdom’s vehicle crash standards and the ISO [International Organization for Standardization] to harmonize vehicle barrier crash protocols and procedures.” ■



For more information, contact **Dean Alberson** at (979) 458-3874 or [d-alberson@tamu.edu](mailto:d-alberson@tamu.edu); **William Williams** at (979) 862-2297 or [w-williams@tamu.edu](mailto:w-williams@tamu.edu).

**A**s part of a tour of the Texas A&M Transportation Institute, members of the media were invited to watch the crash test of the perimeter barrier newly designed for the U.S. State Department. A truck, once used to deliver ice cream in Texas, was a proxy vehicle for a terrorist attack and carried 50-gallon barrels, where bombs might otherwise be, strapped to the bed.

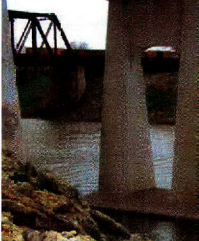
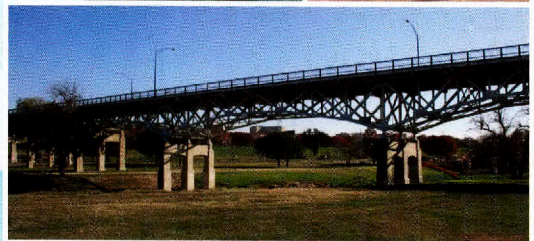
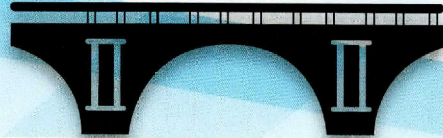
Various video full-speed and slow-motion versions of the crash test, including side and front views, were shared with those media representatives who attended. Within hours after it appeared on their websites, the video was shared on social media. Other news organizations called asking for interviews and permission to show the crash test.

The next day and throughout the week, international media got involved, doing their own stories. The video was seen in the United Kingdom, Canada, Australia, Germany, the Czech Republic and Sweden, just to name a few. The video has been viewed on sites belonging to the *Houston Chronicle*, *Texas Tribune*, and *The Daily Mail*, among others. ■

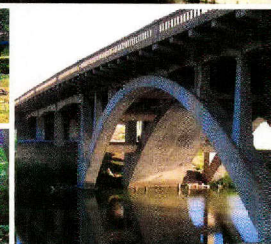
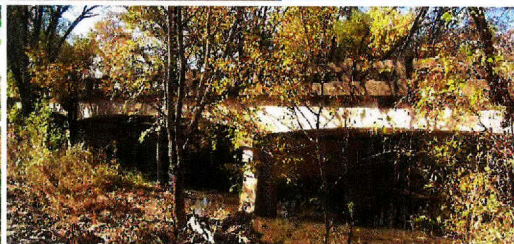
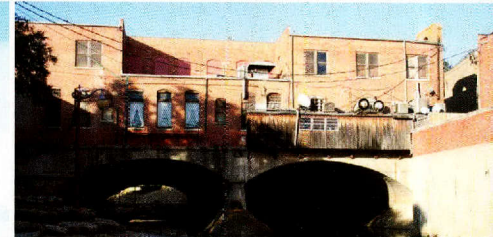
# HELPING TxDOT BUILD



# BUILD



## BETTER BRIDGES



## BRIDGE TO THE PAST

**One often hears the phrase, “They just don’t build ‘em like they used to.” It’s true of many things, including bridges.**

In Fort Worth, Texas, local historic preservation groups expressed concerns that historically significant bridge structures in the area could be endangered due to infrastructure upgrades demanded by modern traffic.

In 2011, the West 7th Street Bridge — built in 1913 to carry traffic over the West Fork of the Trinity River — was identified for replacement due to severe deterioration. Historic interest groups and local citizens expressed their concerns about the loss of the old structure.

To help address these concerns, the Texas Department of Transportation’s Fort Worth District turned to Texas A&M Transportation Institute (TTI) Research Engineer Mary Beth Hueste and her colleagues to assist Tarrant County, the City of Fort Worth and Historic Fort Worth, Inc., a nonprofit dedicated to historic preservation, in developing a system to rank historic bridges in the area.

One of the first issues was determining how many bridges in the area were historic due to age, type of construction, type of bridge rail and overall design, among others considerations. From this, a quantitative rating system was used to assess a bridge’s historic qualifications. After TTI assembled a list of 2,860 bridges in Tarrant County, the top 37 historic bridges were identified and ranked.

“The purpose of the research was to identify older bridge structures in Tarrant County that should be retained and kept in operational condition due to their historic value, and to provide a framework for developing preservation plans,” Hueste says. In addition to her position with TTI, Hueste is an associate

professor and holder of the E.B. Snead ’25 Career Development Professorship II in the Zachry Department of Civil Engineering at Texas A&M University.

A significant challenge in maintaining historic bridges is to preserve the historic integrity, aesthetic value, commercial value and functionality of bridges while limiting expenditures. In the case of historic bridges, nearly every element of every bridge would benefit from some level of service beyond routine maintenance. Reality and reduced maintenance budgets may limit some work that bridge owners may want to perform.

“Preventive maintenance is the key to preserving these historic structures. Waiting until problems occur can require more maintenance dollars over time and reduce the chances of keeping a bridge in service,” Hueste notes. This new framework for prioritizing significant bridge structures will allow for more of them to be preserved and eventually qualify for inclusion on the National Register of Historic Places maintained by the U.S. National Park Service. ■





TTI and TxDOT personnel examine the new design at TTI's Proving Grounds facility.

## BRIDGE TO THE FUTURE

**The Texas Department of Transportation (TxDOT) is always looking for ways to stretch road-building dollars.** So, the department tasked Texas A&M Transportation Institute (TTI) Research Engineers Mary Beth Hueste and John Mander, both professors in Texas A&M University's Zachry Department of Civil Engineering, with designing and testing a new bridge design for spans of 50 feet or shorter.

For two years, Hueste and her team designed and constructed a bridge at TTI's Riverside Campus Proving Grounds Research Facility. The bridge uses a new concrete spread-slab beam-bridge design instead of the more traditional Texas design that places beams adjacent to each other. Using fewer beams is expected to reduce construction costs.

The test bridge was instrumented with multiple load cells, strain gages and string potentiometers. "We have load cells placed at each beam end so we can determine how the load is being distributed," Hueste explains. "These data give us more insight into the performance and the best practices for designing this type of bridge."

After construction and instrumentation, dynamic load tests were conducted with heavy vehicles, including dump trucks and

water tankers, both loaded. Researchers measured the vertical deflections of the bridge under heavy loading.

"As we look at the difference in vertical movement from one beam to another, we get a better idea of how that load is being distributed," Hueste notes. Data obtained from these tests will be used for computer modeling and development of design guidelines.

The results will allow TxDOT to use this new method instead of the conventional side-by-side slab beam technique, currently the norm. Hueste says the use of the new system is expected to be more cost effective, providing safe, long-lasting bridges that save scarce highway construction dollars. ■



For more information, contact **Mary Beth Hueste** at (979) 845-1940 or [mhueste@tamu.edu](mailto:mhueste@tamu.edu).

## Bridge Preservation Project Receives Award

**H**istoric Fort Worth, Inc., a non-profit preservation association, presented TTI Research Engineer and Professor of Civil Engineering Mary Beth Hueste, her colleagues and TxDOT with a Preservation Achievement Award Sept. 25. The award recognizes the Tarrant County bridge preservation program created by TTI and TxDOT. The Historic Fort Worth award ceremony was held during the association's annual fundraiser called Preservation is the Art of the City.

"This program was developed because of TxDOT's desire to take a proactive role in ensuring historic bridges in Tarrant County are preserved," Hueste says. "We appreciate the important community input provided by Historic Fort Worth throughout the project. This award highlights the value of the project in identifying the historic bridges in Tarrant County. Our team is very honored to receive this recognition." ■



Tevfik Terzioglu, TTI graduate student, installs load cells and bearing pads for the bridge during testing.

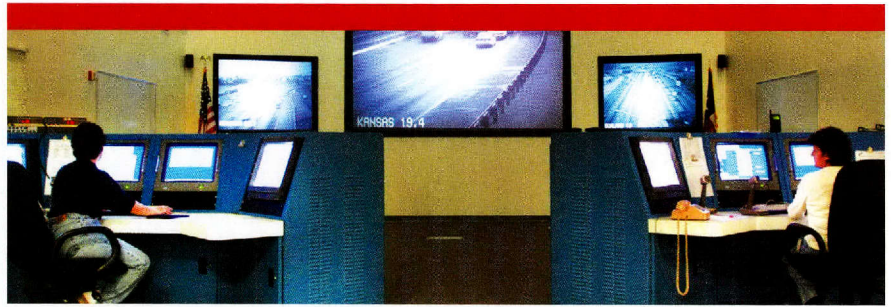
# Improving Traffic Incident Management

**Have you ever seen** the YouTube videos of traffic in China? Pedestrians, cyclists and drivers alike approach intersections willy-nilly, with no traffic signals regulating them. Sometimes, only human reflexes and constantly honking horns keep crashes from happening. And even with traffic signals and conscientious attention by drivers, crashes still occur.

In American cities, local traffic incident management (TIM) centers like TransVista in El Paso are responsible for monitoring the local transportation system and alerting first responders about incidents. Because traffic incidents can be so distracting for travelers — and distractions can lead to more crashes — it's incumbent upon agencies like TransVista to strive for improved traffic incident management and even reduction where possible.

The Federal Highway Administration (FHWA) annually assesses TIM centers nationwide to help them improve operations. In response to feedback regarding TransVista's operations, the Texas Department of Transportation (TxDOT) engaged the Texas A&M Transportation Institute (TTI) to help improve TransVista's day-to-day operations.

"Our objectives were to help the center better gauge how efficiently it's clearing incidents off the road and to identify potential strategies for improving overall performance," explains David Galicia, a TTI assistant research scientist with the Center for International Intelligent Transportation Research. "In short,



Local traffic management centers like TransVista in El Paso are responsible for monitoring the local transportation system and alerting first responders about incidents.

**"Our objectives were to help the center better gauge how efficiently it's clearing incidents off the road and to identify potential strategies for improving overall performance."**

*David Galicia,  
TTI assistant research scientist*

efficient operations mean incidents get cleared more quickly. And fewer distractions for drivers mean safer roadways for everyone."

Currently 11 states, including Texas, are working together to develop nationally relevant TIM performance measures. Stakeholders involved in the process include both law enforcement and transportation professionals.

TTI found that TransVista is already good at collecting, integrating and sharing data among local stakeholder groups. The center also has effective procedures for incident clearance. What TransVista needs, researchers found, is to develop performance measures, establish more formal agreements with stakeholders, and provide incident information to travelers.

"Several strategies we're recommending to improve center operations include establishing after-incident reviews, facilitating communication among stakeholder groups, taking a more active role in crafting legislation to mitigate the impact of

incidents, and holding coordinated stakeholder trainings," says Galicia.

As recommended by TTI, phase 1 of TransVista's internal improvement process should include:

- initiating a TIM team questionnaire with each stakeholder agency,
- performing an incident data assessment, and
- producing a summary of findings.

Phase 2 will focus on developing performance measures that, once implemented, build continuous operational improvements into the agency's procedures and policies.

"TTI has laid the groundwork for TransVista to make real improvements in its incident response procedures," says Thelma Ramirez of TxDOT's El Paso District. "This research will also contribute to the national dialogue facilitated by FHWA in establishing TIM best practices nationwide." ■



For more information, contact **David Galicia** at (915) 532-3759 or [d-galicia@tamu.edu](mailto:d-galicia@tamu.edu).

# Time Is Money: Cutting Shipping Times Without Compromising Security

## Getting goods to market

incurs costs for manufacturers, costs inevitably passed on to consumers. But if manufacturers paid less through expedited shipping practices, consumers could benefit too.

Researchers with the Texas A&M Transportation Institute's (TTI's) Center for International Intelligent Transportation Research have studied how goods are shipped from maquilas (Spanish for "manufacturers") in Ciudad Juarez, Mexico, to their distribution centers in El Paso, Texas. Is it possible to cut down shipping times — much of which is spent waiting at the border for inspection by U.S. Customs and Border Protection (CBP) — without compromising security? The project was conceived by the County of El Paso and implemented by Transcore and Secure Origins, with TTI providing technical oversight.

For the past two years, TTI researchers assisted the County of El Paso in the implementation and monitoring of a federally funded demonstration project to monitor and track shipments originating in Ciudad Juarez from a command center in El Paso via technologies like video cameras and GPS. One example of how the system helped to ensure security is if a trailer's doors

were opened along the route, an alarm would sound at the command center. When that occurred, the command center would investigate the incident and, if warranted, notify CBP.

"Essentially, we tracked nearly 25,000 commercial shipments and over 400 hazmat shipments traveling from Mexico to the United States," explains TTI Associate Research Scientist Roberto Macias. "Not a single security breach occurred over the life of the project."

This successful demonstration project shows that trucks can be confidently secured from their points of origin in Mexico until they reach their U.S. destinations. What comes next in terms of concept implementation is up to the industry and CBP to decide. While the monitoring system was validated by the project, its component equipment has, for the moment anyway, proven cost prohibitive in the short term.

For the long term, numerous benefits have come out of the project. For example, shippers and carriers now have a set of best practices to follow if and when such a system is actually deployed. And the project

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**"TTI's expertise was vital in successfully testing a systems engineering approach to facilitating trade without compromising security."**

*Bob Geyer,  
El Paso County transportation manager*

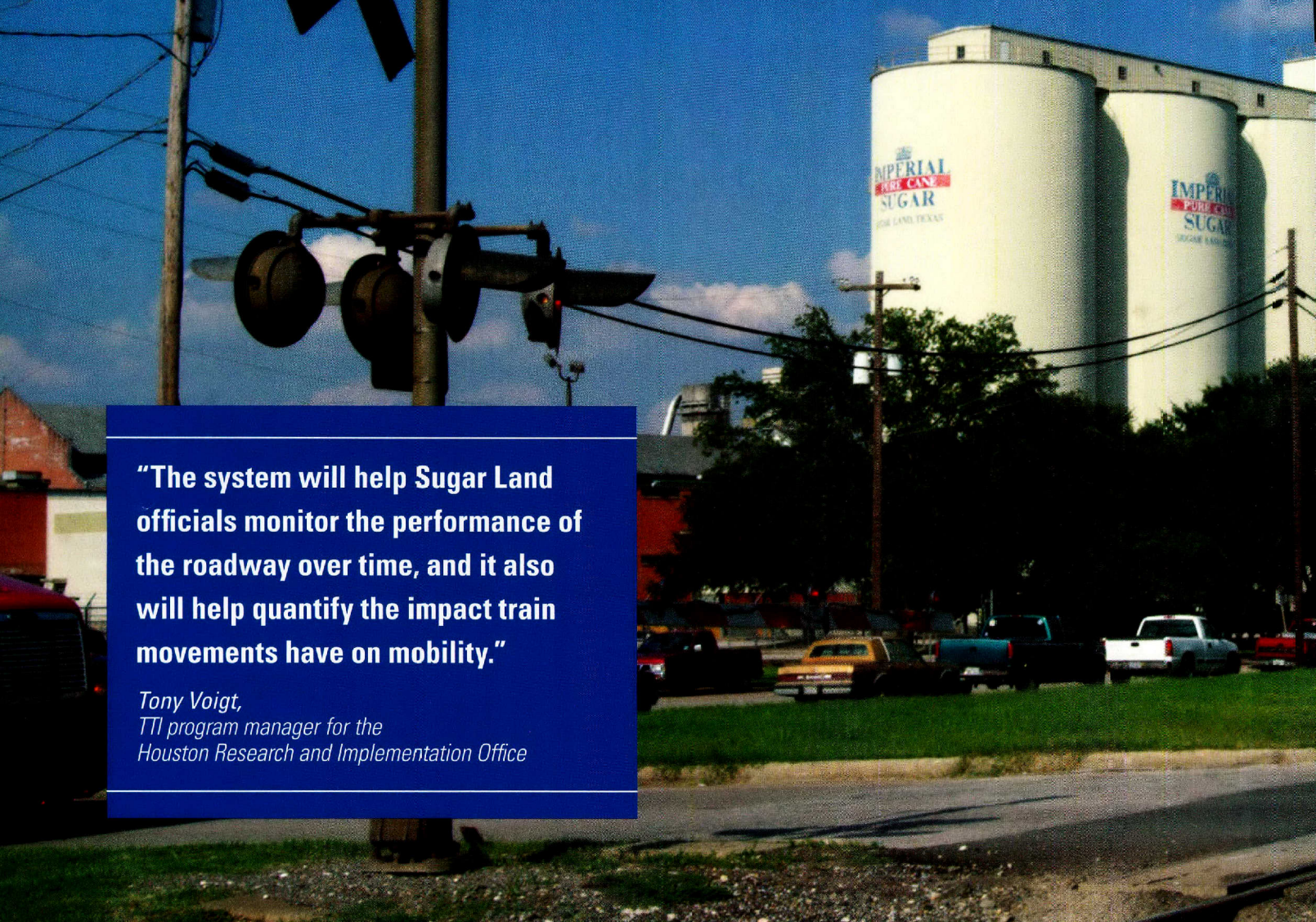
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enabled Mexican manufacturers and trusted carriers to develop a closer working relationship with CBP, which can only facilitate such collaborations in the future.

"TTI's expertise was vital in successfully testing a systems engineering approach to facilitating trade without compromising security," explains Bob Geyer, transportation manager for El Paso County, sponsor of the project. "We've got the template. Now what we need is a cost-effective way to implement it." ■



For more information, contact **Roberto Macias** at (972) 994-2202 or [r-macias@tamu.edu](mailto:r-macias@tamu.edu).



**“The system will help Sugar Land officials monitor the performance of the roadway over time, and it also will help quantify the impact train movements have on mobility.”**

*Tony Voigt,  
TTI program manager for the  
Houston Research and Implementation Office*

# TTI-Developed Sugar Land Rail-Monitoring System Reestablished

**The Sugar Land rail-monitoring system is back in operation**, alerting emergency personnel of approaching trains along a 6-mile section of US 90-A. This is the same system that is credited with averting a disaster in 2003 when police dispatchers were able to notify rail officials that a truck containing sodium hydroxide was stalled on a crossing.

Developed by the Texas A&M Transportation Institute (TTI), the system consists of five Doppler radar units. It monitors the speed and approximate length of the trains and predicts when and how long a crossing will be blocked. The system provides critical information for emergency personnel along this busy train and commuter route. The system had to be removed when construction began to



widen the four-lane highway to eight lanes. Following completion of the construction project, the city funded the reinstallation of the rail-monitoring system last year.

In describing the corridor that borders the city’s industrial area, Sugar Land Traffic Operations Manager Jason Vaughn



says first-responder personnel find the system helpful in determining the best route to an emergency location.

In addition to the train-monitoring system, the city asked TTI to help it gauge the adjoining highway traffic with the same Bluetooth® equipment that is used in Houston's traffic monitoring system. Also developed by TTI, the vehicle-monitoring system measures travel times and average speed of the vehicles along US 90-A. (Traveler and rail information for US 90-A can be found on both the Houston TranStar website and the City of Sugar Land website.)

"The system will help Sugar Land officials monitor the performance of the roadway over time, and it also will help quantify the impact train movements have on mobility," says Tony Voigt, TTI program manager for the Houston Research and Implementation Office. "Currently, there are about 50,000 vehicles that travel the corridor each weekday. As for the number of trains, that is about 40 to 50 per day, but the number is expected to increase to over 60 per day in just a few years."

There's little doubt that train traffic will grow along the Sugar Land corridor. Rail construction is under way now that will double the tracks and train capacity.



"There has been a dramatic increase in rail freight movement in Texas because of population growth and the oil boom," says TTI Research Scientist Leonard Ruback, who designed the Doppler rail-monitoring system for Sugar Land. "I would not be surprised to see more cities try to monitor their rail traffic because of the added pressure it puts on mobility, especially on their emergency services." ■




For more information, contact **Tony Voigt** at (713) 613-9208 or [t-voigt@tamu.edu](mailto:t-voigt@tamu.edu).



DESIGNING AND MAINTAINING

# Tougher

Roadways FOR Texas



**Oil and gas production has increased dramatically in Texas** in recent years, and every indication is that this trend will continue into the foreseeable future. The state now has 48 percent of all active drilling rigs in the United States. Many of these rigs are in the Eagle Ford Shale play in South Texas. Recent estimates suggest that this play could soon become the most productive in the country. Drilling and production activity is also high in other parts of the state.

The energy boom has had a huge, positive economic impact. However, developing wells requires shipping lots of heavy equipment, materials and products via truck to and from the job site. Many state, county and local roads were not built to sustain the high volume of heavy-truck traffic currently driving on them. The demands on the roads are reducing the life of valuable transportation infrastructure, resulting in the degradation of pavements and other infrastructure such as shoulders, clear zones, driveways and drainage structures.

Danny Magee, director of transportation operations for the Texas Department of Transportation's (TxDOT's) Laredo District, says, "In terms of the heavy-truck traffic these roads are seeing, it takes the equivalent of 8 million passenger vehicles to set up one oil well. Then, 2 million vehicles per year just to maintain production on that particular well. A lot of these wells are built on ranches that are off farm-to-market roads that were never built to sustain that volume of traffic."

The Texas A&M Transportation Institute (TTI) has been working with divisions and districts of TxDOT to understand the patterns and impacts associated with heavy loads on roadway structures. The Institute is also providing recommendations on how to design and maintain roadways into the future.

TTI Senior Research Engineer Cesar Quiroga says TxDOT districts, as well as counties and cities, want to take a more proactive approach — before construction starts on an oil or gas well — by building more lead time into a project to allow them to better prepare for the upcoming demand on roads.

"If we can forecast where energy developments will take place over the next year or two and predict what kind of truck traffic will happen in terms of the number of trucks, routes and wheel loads, we will be in a much better position to anticipate the impact on the roadway system and prepare proactively," he says. "This kind of information will help everybody: TxDOT, counties, cities and the energy industry. Just as importantly, the citizens of the state will benefit."

This need has spurred the Comprehensive Transportation and Energy Systems Initiative at TTI, which will take a multidimensional, multidisciplinary approach to developing a framework to address critical transportation needs in all areas where energy developments interact with the transportation system. In the short term, the initiative

will involve meeting with stakeholders and preparing a strategic research plan to include, among other strategies, public outreach; improvement of pavement structures; operations and safety; and roadway, environment and design improvements.

"Everything is connected," says Quiroga. "We need to identify needs where better practices can result in more sustainable developments and more effective management of the transportation infrastructure. Good roadway conditions also mean lower overall operating costs for all users of the road."

Texas researchers are also learning from other states. The American Society of Civil Engineers (ASCE) recently hosted its first-ever Shale Energy Engineering Conference. TTI researchers played a prominent role in the conference by helping to organize and manage the infrastructure track. Attendees had the opportunity to hear what other states experiencing similar energy booms are doing not just to mitigate damage from the increased truck traffic, but also to develop and implement technologies and better coordination practices.

"While Texas is a dominant player in energy development, we don't know everything," says Quiroga. "The ASCE conference gave us a unique opportunity to learn from each other and to identify areas of synergy and future collaboration — a win-win for all participants." ■



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**"Everything is connected. We need to identify needs where better practices can result in more sustainable developments and more effective management of the transportation infrastructure. Good roadway conditions also mean lower overall operating costs for all users of the road."**

*Cesar Quiroga,  
TTI senior research scientist*



# Modeling the Effects of Austin Chamber's "All of the Above" Approach to Traffic Challenges

**IN ITS 2013 MOBILITY REPORT**, the Austin Chamber of Commerce makes extensive use of a study by the Texas A&M Transportation Institute (TTI) that models a strategy scenario designed to address the region's mobility challenges.

TTI Research Scientist Tom Williams, Senior Research Engineer Ginger Goodin and Research Specialist Byron Chigoy were responsible for the study, which illustrates the individual and cumulative effects of five strategies aimed at reducing Austin's Travel Time Index. The index measures the difference between travel during congested and uncongested times. Austin's current index of 1.31 indicates a trip in congested conditions requires 31 percent more time than the same trip in uncongested conditions. Austin-region travel delay has roughly doubled since 1994, when the index was 1.16.

"The Austin Chamber engaged the Texas A&M Transportation Institute to model a scenario of strategies to mitigate traffic congestion," the report states. "This report provides greater detail on the findings, but one conclusion is certain: there is no single strategy that will reduce traffic by itself. Each strategy builds upon another in a comprehensive manner to reduce traffic."

The TTI study forecasts what the index could be in 2035, depending on whether specific strategies are adopted. If no steps are taken and no additional capacity is built, the index would climb to 2.17, meaning that a trip during congested hours would require more than twice the time needed for the same trip taken off-peak. Applying a combination of strategies could reduce the anticipated delay, step by step. Those strategies include

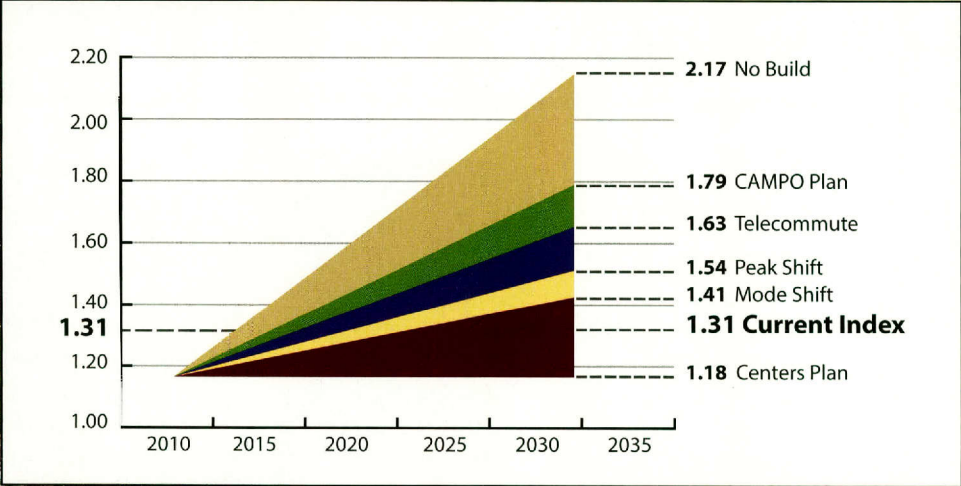
- adopting the Capital Area Metropolitan Planning Organization's (CAMPO's) 2035 plan, containing improvements and expansion of both roadways and transit, and adding two managed lanes to I-35, which would result in an index of 1.79;
- increasing the proportion of the regional workforce that is telecommuting by 10 percent, which would limit the growth of the index to 1.63;
- shifting the time of travel outside of the routinely congested periods (peak shift), which would result in an index of 1.54; and
- removing an additional 11 percent of single-occupant vehicles from roadways by changing modes to walking, biking or transit (mode shift), which would result in an index of 1.41.

**"The Austin Chamber clearly sees the link between transportation efficiency and economic prosperity. We're eager to continue the work that will help inform the policy discussions that Austin's business leaders are now advancing."**

*Tom Williams,  
TTI research scientist*

I-35 in Austin, Texas.





*This wedge chart depicts clearly that if we hesitate to act now, Austin's congestion problem grows worse — day by day.*

Each of these strategies would limit the degree to which the index would worsen over the next two decades. Adding yet one more strategy would actually bring the index below the current 1.31 level. That approach would involve a mixture of land-use development approaches that create residential and employment “centers” in which people live much closer to where they work, shop and recreate. The above strategies and the centers plan together could potentially lower the index to 1.18 — reflecting traffic conditions similar to those in the early 1990s.

The value of each strategy is an estimate and not intended to be a precise prediction, and the values will vary from one urban area to another, depending on local conditions. Ultimately, researchers say, the model can help decision makers and travelers understand the concept of an “all of the above” approach to mobility improvement like the one embraced by Austin business leaders.

“The reality is that there are many trip-reducing strategies that can help reduce congestion in addition to those modeled in this study,” says Williams. “But there are some key messages this study conveys: First, the solutions to congestion lie in both capacity improvements and demand reduction. Next, there’s a timeline to this problem. And finally, the wedge chart helps to compare the levels at which each strategy can be effective at reducing roadway congestion. This helps the region set its sights on effective goals.

“The Austin Chamber clearly sees the link between transportation efficiency and economic prosperity,” continues Williams. “We’re eager to continue the work that will help inform the policy discussions that Austin’s business leaders are now advancing.” ■



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## TTI Earns Telly Award for Documentary

TTI and the Texas Lyceum were jointly honored with a 2014 Telly Award for the documentary *Decision Time*. The production highlights the Lyceum's 2013 Public Conference on Texas Infrastructure held in Austin, Texas, in April 2013. The conference encouraged leaders from across the state to discuss complex issues and future challenges related to transportation infrastructure and funding.

"As a statewide leadership organization, the Texas Lyceum strives to highlight key issues facing Texas, including our transportation infrastructure. We were honored to partner with TTI to produce *Decision Time*. Winning a Telly for this work takes this honor to the next level," says Dennis Speight, Lyceum 2013 Public Conference co-chair.

The 30-minute production was narrated by Bob Phillips of the *Texas Country Reporter*. TTI staff involved in the production were David Martin, Bernie Fette, David Dennis, Clyde Hance, Richard Cole and Terri Parker. The project was funded in part through TTI's Mobility Investment Priorities Project and the Institute's Transportation Policy Research Center.

"TTI is honored to have worked with our partners at the Texas Lyceum in contributing to the conference, and we're pleased to be recognized with this prestigious award," says TTI Agency Director Dennis Christiansen. "The production is an excellent summary of the state of transportation in Texas and what lies ahead." ■



## TTI Facilitates Traffic Flow for Aggie Games with New App

Fans at last year's football game between Texas A&M University and the University of Alabama were treated to an epic game. After the game, unfortunately, many were also part of an epic traffic jam. TTI Research Fellow Tim Lomax is leading a project that has already produced a transportation plan and developed a smartphone app called Destination Aggieland. Both will help mitigate that problem in the future.

Texas A&M University System Chancellor John Sharp commissioned the Kyle Field Transportation Plan to help improve the overall game weekend experience for fans without compromising safety. "Our team [at TTI] has created traffic plans for many big events on an international scale, and I am happy to have them lending their expertise here at home. This will be a big step forward in 2014 and again in 2015," Sharp says.

The plans include changing traffic and shuttle-bus routes, improving signal timing, creating more defined and safer pedestrian paths, and providing more efficient pre-pay parking options. All this information is available on the Destination Aggieland app, which is free for download in multiple venues, including the Apple App Store, Google Play, and the university's iPhone app, TAMUmobile. ■

## Stevens Receives Young Engineer of the Year Award

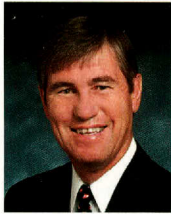
On June 26, Charlie Stevens, TTI research engineer with the Center on Tolling Research, was honored as the 2014 State of Texas Young Engineer of the Year by the Texas Society of Professional Engineers (TSPE) at its state conference in San Antonio. TSPE gives the award annually to a young engineer, age 35 and under, based on "technical ability, professional achievements, civic and humanitarian activities."

"As a young professional, you must seize every opportunity for professional growth that is made available to you," Stevens said in his acceptance speech. "You shouldn't be afraid to fail, and that fear is the single greatest barrier to advancement." ■



Charlie Stevens receives the Young Engineer of the Year award from TSPE President Trish Hatley.

## Briaud Receives Distinguished Member Status at ASCE



Briaud

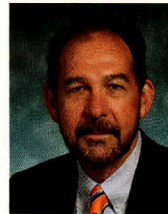
**T**TI Research Engineer Jean-Louis Briaud has been selected as a Distinguished Member of the American Society of Civil Engineers (ASCE), the society's highest honor. ASCE, representing 145,000 members worldwide, selected 11 members for its 2014 Distinguished Member class.

They will be formally inducted at the Global Engineering Conference in Panama City, Panama, this fall.

Briaud was nominated and selected for "his varied and pioneering contributions in the field of geotechnical engineering and for his eminent leadership and international service to the geotechnical engineering profession." In addition to heading up the Geotechnical and Geoenvironmental Group at TTI, Briaud is the Spencer J. Buchanan Chair in the Zachry Department of Civil Engineering. He has served in various leadership roles, including as president of the International Society of Soil Mechanics and Geotechnical Engineering. ■

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## Villa Appointed to Dept. of Commerce Board



Villa

**J**uan Villa, manager of TTI's Mexico City Office, was recently appointed to the International Trade Administration's Advisory Committee on Supply Chain Competitiveness.

Established in 2011, the committee provides the secretary of commerce with detailed advice on the elements of a comprehensive national freight infrastructure and freight policy to support the U.S. supply chain and export competitiveness. The committee's work is intended to further the Obama Administration's export, economic and job growth goals.

"In addition to the Freight Movement and Policy Subcommittee, I am going to be involved in the Trade Competitiveness Subcommittee," says Villa. "One of the more interesting points that came out of our initial meeting on June 10 was the emphasis the Department of Commerce is putting into North American trade, particularly trade and transportation with Mexico. This is good news for TTI because it provides us the opportunity to get involved with various stakeholders from the private and public sectors and to understand their needs, which could eventually lead to additional research work for the Institute." ■

## A&M System Engineers Collaborate at National Innovation Summit

**E**ngineering professionals throughout The Texas A&M University System met in Washington, D.C., at the third annual National Innovation Summit and Showcase June 16–18. The National Innovation Summit is the world's largest showcase of new, industry-vetted technologies ready for commercialization and supports the White House and congressional calls for innovation commercialization initiatives.

TTI was represented by Research Engineer and Assistant Agency Director Dean Alberson and Senior Research Engineer Paul Carlson, who also heads up TTI's Operations and Design Division. Representatives from the Texas A&M Engineering Experiment Station (TEES), Texas A&M Engineering Extension Service (TEEX) and the Texas A&M System Technology Commercialization Office attended the summit.

"The cross-pollination of discovering how different agencies could potentially collaborate was a great by-product of the summit," says Alberson.

Texas A&M Engineering also had an exhibit booth at the showcase, which provided industry representatives with information about each of the agencies present.

"There is a lot of potential for follow-up, particularly with our system colleagues, TEES and TEEX," notes Carlson. "I've never attended an event where we had representatives from all the major A&M System engineering agencies. That to me was probably the most beneficial part of this meeting — the connections we made with our peers." ■

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## 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.

### RESEARCH VIDEOS

Access the research topics listed below via the URLs shown.

*TTI Partners with the U.S. State Department to Protect Americans Worldwide:*  
<https://vimeo.com/106825832>

*Better Preparing the El Paso Region's Transportation System for Extreme Events:*  
<https://vimeo.com/106293407>

*Connected Transportation Is Just up the Road:*  
<https://vimeo.com/97270483>

*TTI's Sediment and Erosion Control Laboratory:*  
<https://vimeo.com/74722165>

*TTI and the Mobility Investment Priorities Project:*  
<https://vimeo.com/75786359>

*Women Leaders at TTI:*  
<https://vimeo.com/77974866>

### TECHNICAL REPORTS

*ASR Testing: A New Approach to Aggregate Classification and Mix Design Verification: Technical Report*, by Anol Mukhopadhyay, **0-6656-1**, May 28, 2014.

*Developing Guidelines for Repairing Severe Edge Failures: Technical Report*, by Stephen Sebesta, **0-6271-2-1**, May 8, 2014.

*Developing Tolloed-Route Demand Estimation Capabilities for Texas: Opportunities for Enhancement of Existing Models*, by Kevin Hall,

**0-6754-1**, September 8, 2014.  
*Evaluating the Need for Surface Treatments to Reduce Crash Frequency on Horizontal Curves*, by Mike Pratt, **0-6714-1**, May 29, 2014.

*Evaluation of Binder Aging and Its Influence in Aging of Hot Mix Asphalt Concrete: Technical Report*, by Charles Glover, **0-6613-1**, May 8, 2014.

*HMA Shear Resistance, Permanent Deformation, and Rutting Tests for Texas Mixes: Year 1 Report*, by Lucinda Walubita, **0-6744-1**, May 2, 2014.

*Implementation of Curing, Texturing, Subbase, and Compaction Measurement Alternatives for Continuously Reinforced Concrete Pavement*, by Andrew Wimsatt, **5-6037-01-1**, May 7, 2014.

*Incorporating Greenhouse Gas Emissions in Long Range Transportation Planning — Final Report*, by Megan Kenney, **0-6696-1**, May 7, 2014.

*Laboratory Evaluation of Asphalt Binder Rutting, Fracture, and Adhesion Tests*, by Fujie Zhou, **0-6674-1**, May 2, 2014.

*Literature Review: Performance of RAP/RAS Mixes and New Direction*, by Fujie Zhou, **0-6738-1**, May 2, 2014.

*Maximizing Mitigation Benefits — Making a Difference with Strategic Inter-resource Agency Planning: Year One Technical Report*, by John Overman, **0-6762-1**, May 6, 2014.

*A Methodology to Support the Development of 4-Year Pavement Management Plan*, by Nasir Gharaibeh, **0-6683-1**, July 17, 2014.

*Observation Method to Predict Meander Migration and Vertical Degradation of Rivers*, by Jean-Louis Briaud, **0-6724-2**, June 30, 2014.

*Performance Testing of Coagulants to Reduce Stormwater Runoff Turbidity*, by Jett McFalls, **0-6638-1**, May 28, 2014.

*Research to Develop an ITS Strategic Plan for Texas*, by Ed Seymour, **0-6672-2**, May 7, 2014.

*Temporary Large Guide Signs*, by Roger Bligh, **0-6782-1**, May 6, 2014.

*Texas-Specific Drive Cycles and Idle Emissions Rates for Using with EPA's MOVES Model — Final Report*, by Reza Farzaneh, **0-6629-1**, May 8, 2014.

### PROJECT SUMMARY REPORTS AND PRODUCTS

*ASR Testing: A New Approach to Aggregate Classification and Mix Design Verification*, by Anol Mukhopadhyay, **0-6656-S**, May 16, 2014.

*Development of Pedestrian Crash Countermeasures and Appropriate Crash Reduction Factors (CRFs)*, by Kay Fitzpatrick, **0-6702-S**, May 8, 2014.

*A Generic Mode Choice Model Applicable for Small and Medium-Sized MPOs*, by Chandra Bhat, **0-6766-S**, May 23, 2014.

*Implementation of a Texas Mechanistic-Empirical Thickness Design System (TxME)*, by Fujie Zhou, **0-6622-S**, February 10, 2014.

*Improving DMS 9210 Requirements for Limestone Rock Asphalt*, by Cindy Estakhri, **0-6686-S**, May 29, 2014.

*Incorporating Greenhouse Gas (GHG) Emissions in Long Range Transportation Planning*, by Joe Zietsman, **0-6696-S**, May 7, 2014.

*Performance Testing of Coagulants to Reduce Stormwater Runoff Turbidity*, by Jett McFalls, **0-6638-S**, June 2, 2014.

*Review of Tolling Approaches for Implementation within TxDOT's Travel Demand Models*, by Kevin Hall, **0-6754-S**, May 22, 2014.

*Use of Recycled Asphalt Shingles in HMA*, by Fujie Zhou, **0-6614-S**, May 8, 2014.

