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Paving the Way: TTI Pavement Research Provides Economic, Environmental Benefits

TEXAS TRANSPORTATION

Researcher

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Volunteering for the Future

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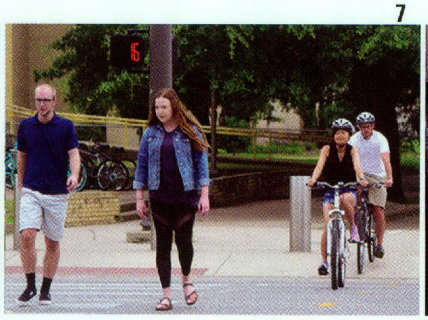
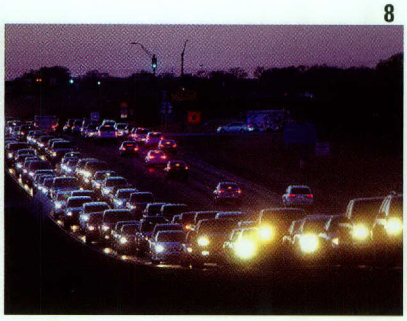
ON THE COVER: The Texas A&M Transportation Institute provides the brightest minds with the most advanced testing facilities to produce implementable transportation solutions.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TTI Celebrates the TRB Centennial

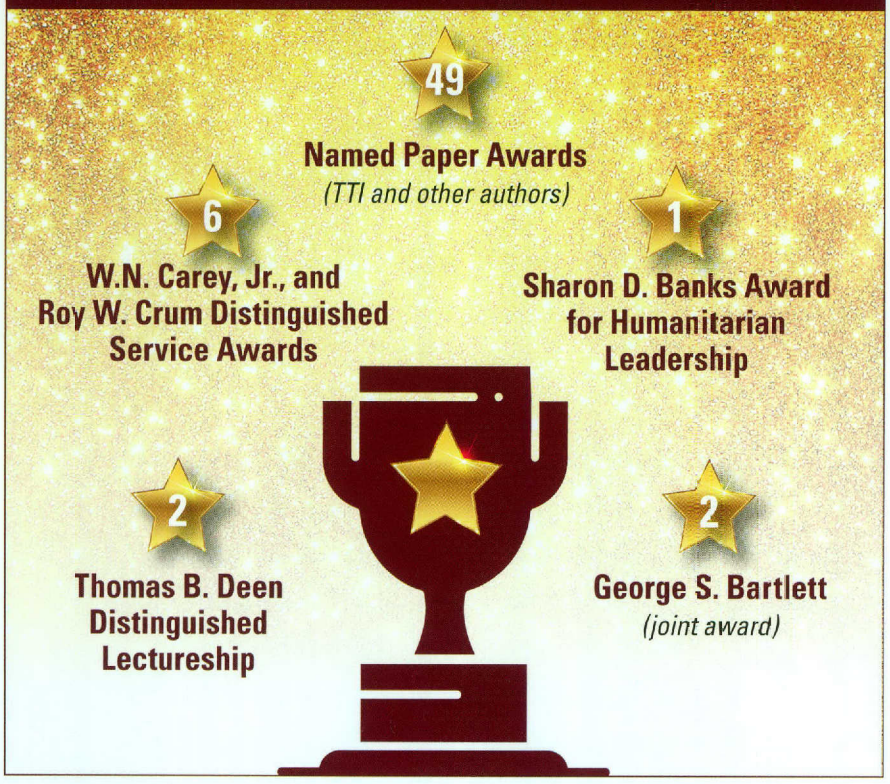
100 YEARS TRB
MOVING IDEAS: ADVANCING SOCIETY

The Texas A&M Transportation Institute (TTI) joins in celebrating the centennial of the Transportation Research Board (TRB) of the National Academies in 2020. TTI contributes to TRB's mission — to promote innovation and progress through research — in numerous ways. TTI researchers volunteer their services on TRB standing committees, conduct projects sponsored by the various cooperative research programs, provide their expertise on consensus study panels, and present state-of-the-art research findings through peer-reviewed technical papers and presentations at TRB's annual meeting and special conferences. TTI researchers serve in leadership roles within TRB, helping promote creative and collaborative problem solving, innovative approaches to transferring research results into practice, inclusiveness and diversity, and encouraging the next generation of transportation professionals. ■

TTI Volunteers Supporting TRB

3	2	10	121
Executive Committee Chairs	Technical Activities Council Chairs	Current Committee, Section and Group Chairs	Current Members of Committees

TRB Awards Earned by TTI



"I have had the opportunity to work with TTI researchers on numerous TRB committees throughout my career at the Maryland State Highway Administration and now at TRB. TRB has benefited from their creativity, innovation, and knowledge, and their commitment to collaboration, diversity, and inclusion."

Neil Pedersen
TRB Executive Director

"TTI researchers have been active in all aspects of TRB — from participating in standing committees to conducting cooperative research program projects to serving on consensus study panels to authoring papers and giving presentations. Looking to the next 100 years, TRB will continue to benefit from the leadership and involvement of TTI as it addresses emerging transportation challenges and opportunities."

Vicki Arroyo
Executive Director of the Georgetown Climate Center and Current Chair of the TRB Executive Committee

CELEBRATING THE

TRB CENTENNIAL TEXAS STYLE

March 31, 2020 ★ College Station, Texas

Featuring

Neil Pederson, *TRB Executive Director* and **Carlos Braceras**, *Director, Utah Department of Transportation and Chair, TRB Executive Committee*

TTI is hosting a celebration March 31 highlighting the participation and accomplishments of individuals and groups in Texas (universities, public agencies, consultants, industries and other organizations) to TRB over the past 100 years. The goals of the event are to:

- promote the value of transportation research;
- highlight 100 years of contributions to TRB products and services that make the transportation system better for all users;
- recognize, honor and celebrate the TRB community in Texas; and
- build support for continuing the successful Texas–TRB collaboration for the next 100 years.

REGISTER: https://events.tti.tamu.edu/conference/ttc20-trb-centennial/

After Decades of Service, **TTI Continues to Provide Leadership with TRB Committees**

As the lifeblood of the Transportation Research Board (TRB), the almost 220 standing committees cover all areas of transportation, with a variety of volunteer members from the public and private sectors. Texas A&M Transportation Institute (TTI) researchers currently serve TRB in various capacities, from committee chairs to technical paper peer reviewers to session planners, and in numerous other positions. TTI researchers have been instrumental in establishing and leading committees to address critical issues in transportation.

Fostering Dialog on Emerging Issues in Global Trade

The Committee on International Trade and Transportation was established in 1986 in response to the rapid growth in global trade. Then–TTI Associate Director William J. Harris, Jr., served as the first committee chair, establishing a strong foundation of research, collaboration and outreach. TTI Research Scientist Juan Villa continues that service 33 years later, first as committee secretary and then chair in 2017.

Given the broad scope of international trade, collaborating with other committees and diverse stakeholders has been a hallmark of the committee. Through annual meeting workshops and sessions, mid-year meetings, and conferences, the committee encourages dialog on emerging issues including the impact of new technologies, infrastructure needs, and innovative policies and programs.

From High-Occupancy Vehicle (HOV) Lanes to High-Occupancy Toll (HOT) Lanes to Managed Lanes

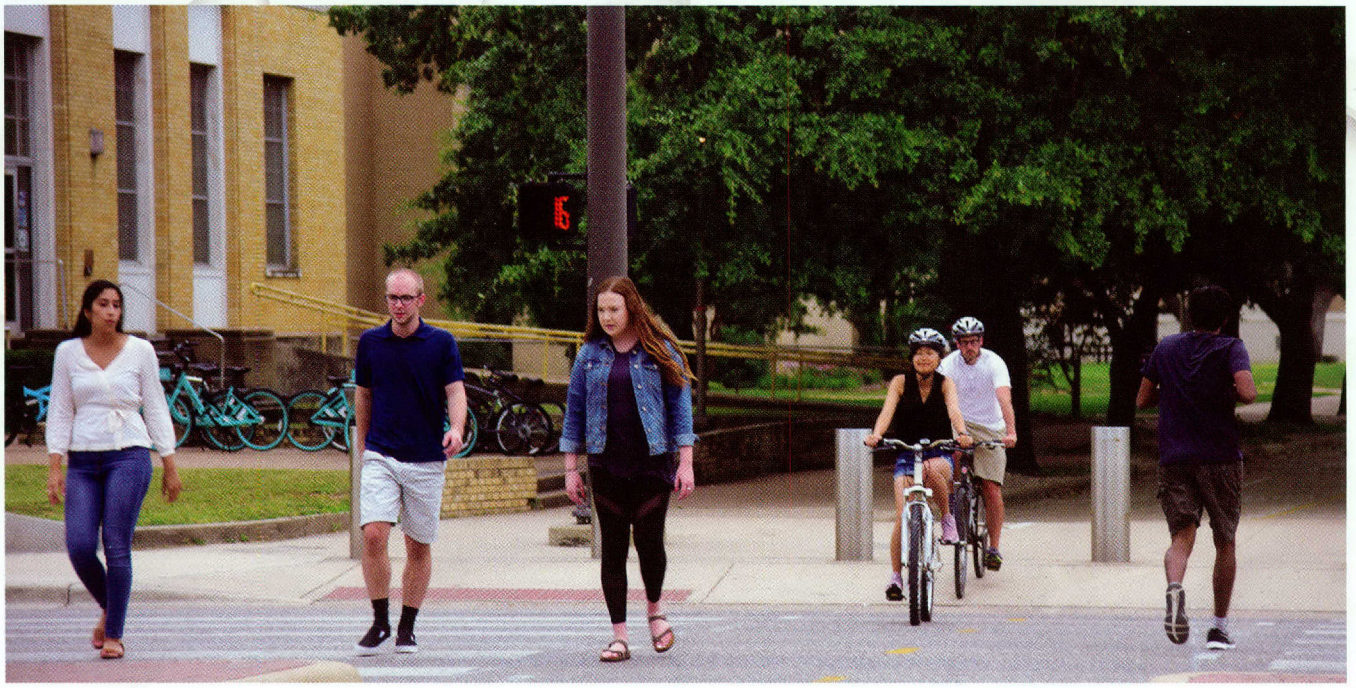
Interest generated from multiple HOV conferences in the 1980s led to the establishment of the Task Force on HOV Systems, sponsored by the TRB Committee on Freeway Operations. TTI Executive Director Emeritus Dennis Christiansen and Don Capelle of Parson Brinkerhoff served as co-chairs of the task force. Capelle became chair and Christiansen secretary when the task force became a committee in 1989.

A task force and committee member, TTI Executive Associate Director Katie Turnbull served as the second committee chair from 1995 to 2001. Through meetings and conferences across North America, the committee led in sharing best practices and lessons learned, and in developing and monitoring research needs statements for state and national programs. With the advent of electronic tolling and increased interest in congestion pricing, the committee name evolved to the HOV/HOT Committee and then the Managed Lanes Committee. TTI Senior Research Engineer Ginger Goodin provided leadership as the fourth chair from 2007 to 2013. TTI leadership continues today with Assistant Research Engineer Nick Wood serving as the committee research coordinator.

Asphalt Collaborations and Expanded Technology Transfer

Originating in the 1950s, the current Committee on Critical Issues and Emerging Technologies in Asphalt is one of the longest standing TRB committees. Chairs from TTI and Texas A&M University have included Fred Benson, TTI's first director, Executive Associate Director Jon Epps, and retired Research Engineer Joe Button, who all provided leadership at key points in the committee's history. Benson's service in the 1950s and 1960s established the initial committee focus on exploring and moving into practice innovative concepts. Epps (1980s–1990s) and Button (2000–2006) continued this tradition and provided a forum for emerging topics and expanded technology transfer.

The committee has a rich history of nurturing collaboration among academia, state departments of transportation, industry and other stakeholders, including active involvement in the Strategic Highway Research Program. The benefits are evident in the numerous committee-led TRB circulars and e-circulars, annual meeting sessions, and National Cooperative Highway Research Program projects.



Promoting Best Practices for Pedestrians and Bicyclists

Since the early 1970s, the Pedestrian Committee has been instrumental in identifying and promoting needed research, sharing best practices for safer facility designs and operations, and nurturing younger professionals. Since 2001, TTI Research Scientist Shawn Turner has been an active participant in the committee and section, serving as committee chair from 2008 to 2014 and becoming chair of the Pedestrians and Cycles Section in 2014.

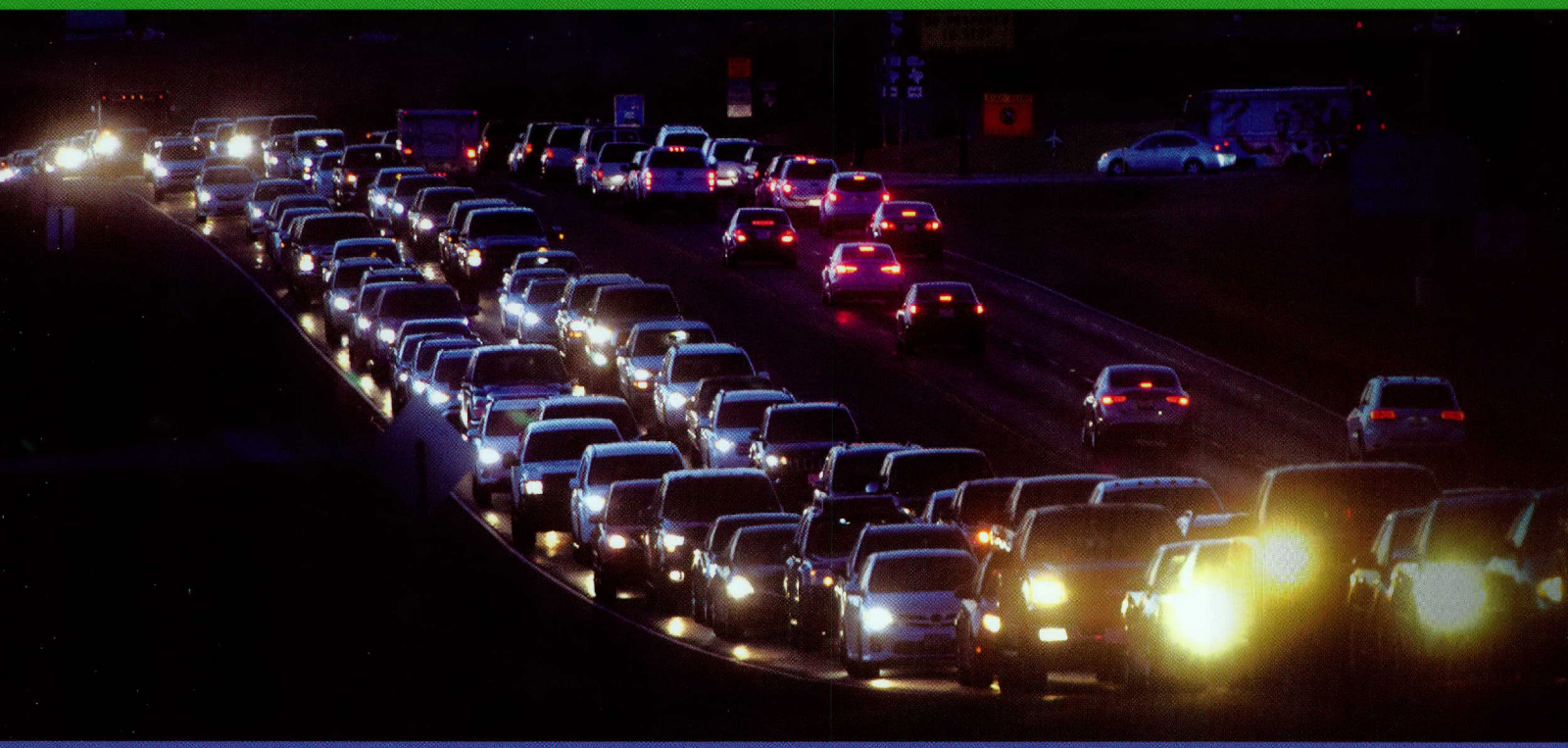
One of Turner's major accomplishments as committee and section chair was to formalize the Bicycle and Pedestrian Data Subcommittee, a joint subcommittee of the Travel Monitoring, Bicycle Transportation, Pedestrian Transportation and Travel Survey Methods Committees, in 2011. The subcommittee has led the way in identifying emerging, critical and cross-cutting issues and opportunities to enhance bicycle and pedestrian data-collection technologies, methods, and management techniques. TTI Associate Research Scientist Phil Lasley serves as the subcommittee secretary; Turner, who is completing his term as section chair, continues his volunteer service as the subcommittee paper review coordinator.

A Day in the Life of a TRB Committee

To learn more about how TRB committees function, read "A Day in the Life of a TRB Committee," previously published in *TR News* 308 in March–April 2017 and written by Katie Turnbull.

https://u.tamu.edu/turnbull-trb

For more information, contact **Katie Turnbull** at (979) 317-2473 or k-turnbull@tti.tamu.edu.



Just Like the Big Kids:

COMPAT Analysis Tool Helps Smaller Urban Areas Gauge Gridlock

Roadway congestion in Texas, like the weather, is a relative thing. How you define *severe* depends a lot on where you live.

A sheet of ice on city streets in south Texas might mean it's a day when schools are closed. The same conditions in the Panhandle mean it's a winter day ending in Y. And what constitutes a horrific traffic jam is likely very different whether you live in Austin, Abilene or Alice.

To address this confusion, it helps to have a way to gauge things. And now, transportation professionals can do that with the aid of the Congestion Management Process Analysis Tool (COMPAT), created by Texas A&M Transportation Institute (TTI) researchers and funded by the Texas Department of Transportation (TxDOT).

COMPAT links TxDOT's statewide roadway inventory database with private-sector speed data — INRIX was selected during the most recent competitive bid — and produces a range of performance measures for individual road segments. Some examples include:

- annual hours of travel delay due to congestion;
- excess fuel consumed due to congestion;
- cost of wasted time and fuel due to congestion;
- travel time index — a ratio illustrating comparison of trip time in congested versus non-congested traffic;
- planning time index — a ratio illustrating extra time needed for on-time arrival for 95 percent of peak trips; and
- additional carbon dioxide produced due to congestion.

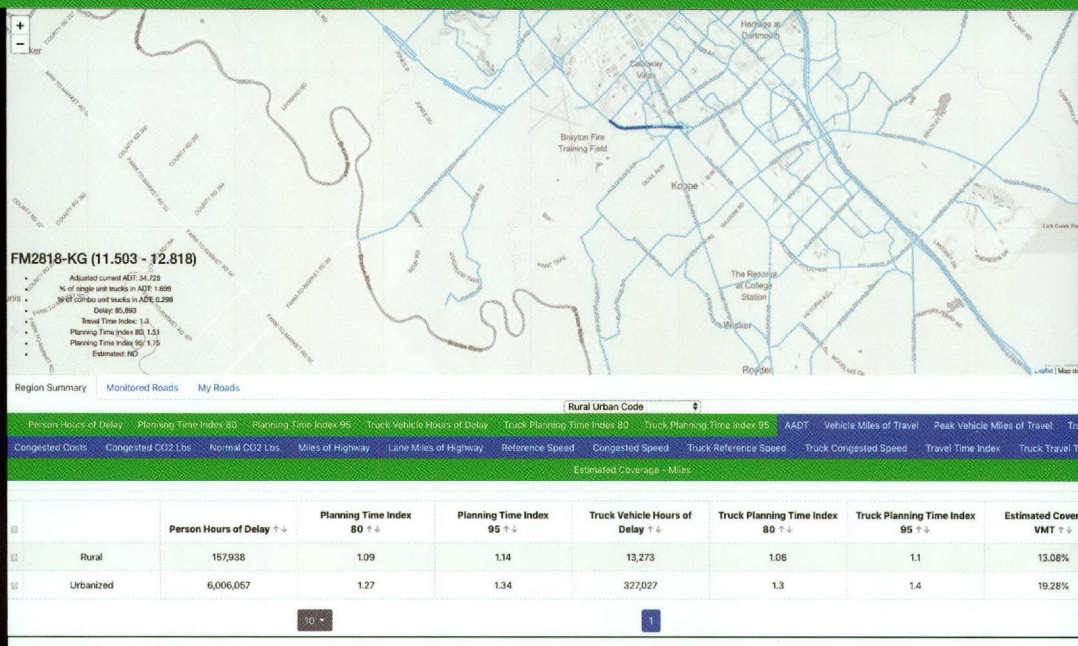
Those measures illustrate how well traffic is moving on a particular stretch of roadway on an average day, as well as how much variation occurs from day to day. Transportation professionals can use these metrics to identify, diagnose and treat problem areas through operational changes, travel options, construction or other congestion mitigation strategies.

TTI and TxDOT are providing the tool to all Texas urbanized areas (regions over 50,000 population), giving small and medium-size urbanized area agencies a capability that only major cities enjoyed in the past. This new tool will provide congestion monitoring information required by the federal government for larger urban areas.

"Speed data is much more reliably available now, but local agencies are typically quite busy and frequently understaffed, so they often haven't been able to dig into the data and put it to good use," says TTI Senior Research Scientist David Schrank. "COMPAT gives them that capability."

Applying the data to its highest and best use is essential to making the best

COMPAT can help agencies closely monitor conditions on about 105,000 centerline miles of non-local street roadways across the state (excluding local neighborhood roads and suburban cul-de-sac streets, for example). It allows analysis at both regional and corridor levels. A list of multiple road sections can be sorted by a variety of performance variables. Updated annually, the tool can provide for trend analysis over multiple years.



COMPAT users can retrieve congestion statistics for an individual road segment, multiple segments combined, or the entire metro region.

possible transportation investment decisions.

In Texas' case, the current exercise has its roots in 2009, when leaders in the Texas Legislature sought to identify the biggest urban mobility challenges facing the Lone Star State, focusing first on the most severely congested roads. Subsequently, the same leaders launched the Mobility Investment Priorities project, conducted by TTI, to determine where and how the state's limited resources could produce the greatest return, eventually helping to advance two voter-approved ballot initiatives to support new funding for the most pressing roadway needs.

What started in 2009 as a ranking of about 800 roadway sections in only the biggest urban areas now encompasses 1,854 distinct road segments spread across 66 counties representing all Texas urban areas. The number of sections in a metro region ranges from 19 in San Angelo and Texarkana to 436 in the Dallas-Fort Worth Metroplex. The vastly expanded list is a product of better data and visionary thinking at TxDOT.

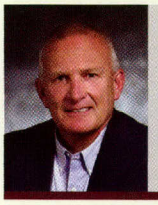
"Speed data is much more reliably available now, but local agencies are typically quite busy and frequently understaffed, so they often haven't been able to dig into the data and put it to good use. COMPAT gives them that capability."

David Schrank
TTI Senior Research Scientist

Increasing the list of monitored roadways to more than double its original size, Schrank notes, helps to illustrate how congestion is one of those *relative* things for just about any Texan. "Even smaller cities have congested roadways," he says. "And they feel the negative effects of gridlock, too."

COMPAT can help agencies closely monitor conditions on about 105,000 centerline miles of non-local street roadways across the state. COMPAT allows analysis at both regional and corridor levels. A list of multiple road sections can be sorted by a variety of performance variables. Updated annually, the tool can provide for trend analysis over multiple years.

And using the same performance measures regardless of an urban area's size, agencies can all be speaking a common language. ■



For more information, contact **David Schrank** at (979) 317-2464 or d-schrank@tti.tamu.edu.

Research and Testing FACILITIES

Smart Intersection

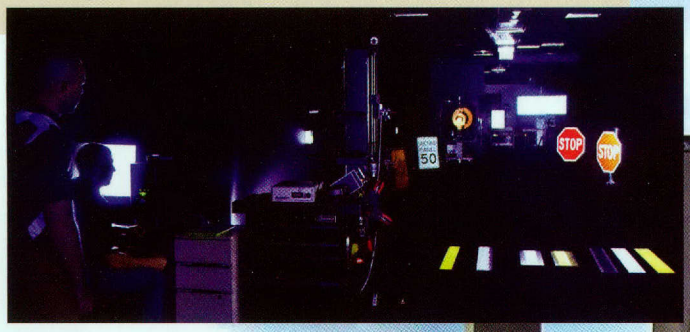
TTI's Smart Intersection tests connected vehicle applications, traffic signal control and connected infrastructure interoperability. For one research project, the intersection used advanced technologies to provide "turning bus" alerts to pedestrians and bicyclists.

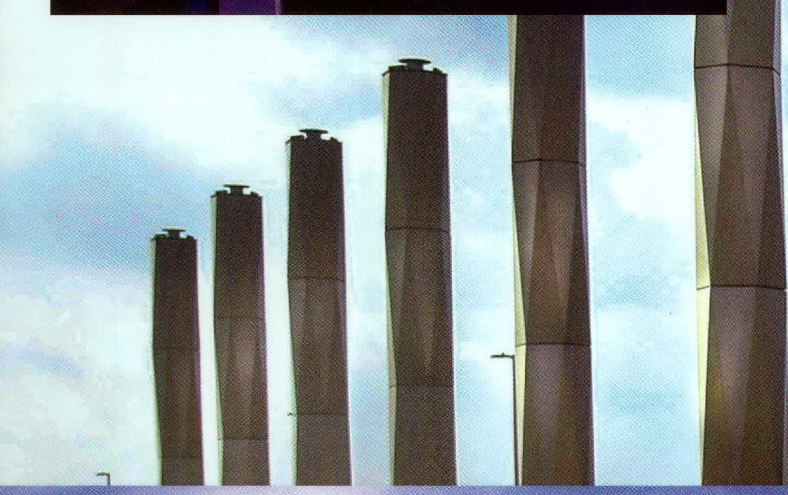
Contact: Srinivasa Sunkari, s-sunkari@tti.tamu.edu

Visibility Research Laboratory

TTI's Visibility Research Laboratory supports research evaluating transportation-related visibility products. The lab is equipped with photometric equipment to evaluate the products while traveling at night or in inclement weather.

Contact: Adam Pike, a-pike@tti.tamu.edu





Driving Simulation Laboratory

TTI's Driving Simulation Laboratory enables researchers to study driver-related transportation safety issues. The simulator illustrates how distracted drivers respond to traffic conditions, roadway signage, pedestrians, bicyclists, vehicle automation and dashboard icons.

Contact: Michael Manser, m-manser@tti.tamu.edu

CENTER FOR INFRASTRUCTURE RENEWAL (CIR)

The CIR is a 138,000-square-foot, multidisciplinary research center housing state-of-the-art facilities and laboratories aimed at making infrastructure smarter, more resilient and longer lasting. TTI and the Texas A&M Engineering Experiment Station co-manage the facility, with TTI's experts taking the research lead in a number of areas.

Contact: Zachary Grasley, zgrasley@tamu.edu

Asphalt Innovation Laboratory. Research focuses on sustainable improvements in roadway and airfield technology. The lab includes an asphalt binder and chemistry laboratory, material processing and fabrication facilities, and an asphalt mixture testing laboratory.

Contact: David Newcomb, d-newcomb@tti.tamu.edu

Concrete Innovat
Using this lab's equ
study concrete ma
develop sustainabl
materials, discover
cement, test concr
explore options for
reusing waste.

Contact: Anol Muk
a-mukhopadhyay@

Environmental and Emissions Research Facility

TTI's Environmental and Emissions Research Facility is a drive-in environmental chamber. Replicating temperatures between -5°F and over 131°F, researchers use the facility to test vehicle emissions levels and equipment tolerance to extreme temperatures.

Contact: Jeremy Johnson, j-johnson@tti.tamu.edu

Instrumented Bridge

TTI's Instrumented Bridge is an innovative bridge design that uses a spread precast concrete slab beam system tested under static and dynamic truck loads.

Contact: Mary Beth Hueste, mhueste@tamu.edu

Proving Grounds Research Facility

TTI's Proving Grounds Research Facility is a hub for roadside safety and physical security, structures, and traffic engineering. Experts conduct crash tests on safety barriers using subcompact passenger cars, pickup trucks and 80,000-pound tractor-trailer rigs.

Contact: Lance Bullard, l-bullard@tti.tamu.edu

Sediment and Erosion Control Laboratory

TTI's Sediment and Erosion Control Laboratory provides performance evaluation for roadside environmental management. This facility is conducive for research focusing on storm water quality improvement as well as vegetation establishment and management.

Contact: Jett McFalls, j-mcfalls@tti.tamu.edu

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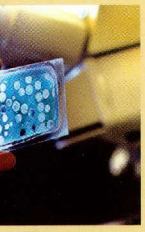

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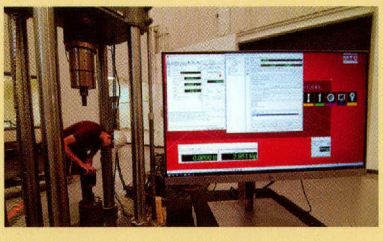
Connected Infrastructure Laboratory. Experts in this lab develop next-generation sensors and data applications for the connected and automated vehicle environment. Undergraduate and graduate students use the lab to develop expertise in connected transportation.

Contact: Srinivasa Sunkari, s-sunkari@tti.tamu.edu

Soils and Unbound Materials Innovation Laboratory. Aiming to find innovative solutions to improve pavement resiliency, researchers investigate soils, stabilization techniques and sustainable rehabilitation techniques in this facility.

Contact: Tom Scullion, t-scullion@tti.tamu.edu

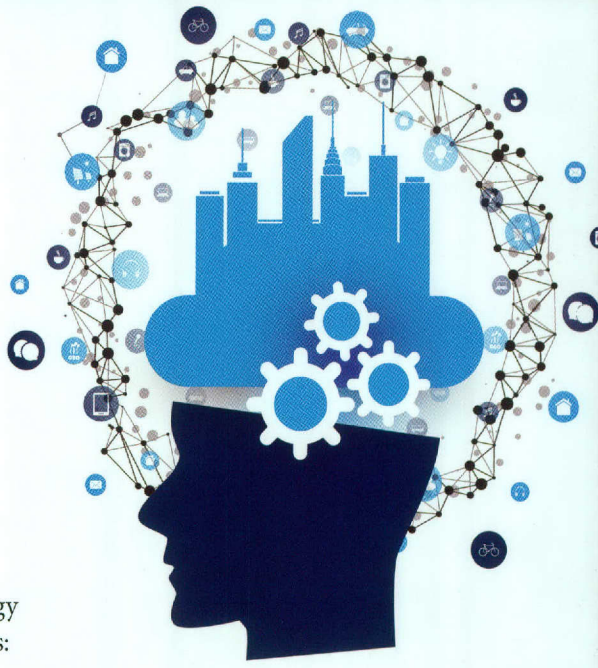


Structural and Materials Testing Laboratory. Researchers perform full-scale testing as well as component and materials testing to evaluate bridge support components, railroad rail fatigue, and scaffolding and shoring.

Contact: Peter Keating, keating@tamu.edu

Applying Advanced Tech Innovations to Transportation

AV-CV Strategy Guide Designed for Public Decision Makers



The required public transportation project delivery process can be slow, methodical and risk averse. The technology industry, by contrast, moves quickly, often takes risks, and may treat failures as learning moments. It's hard to imagine a greater potential for culture clash, but those are the players in the game of advancing automated and connected vehicle (AV-CV) technology.

Consequently, public officials can find themselves caught between a desire to encourage innovation and economic growth while also remaining good stewards of public funds and ensuring public safety. Elected leaders saddled with that balancing act can use all the help they can get. And they can find it in *Strategies to Advance Automated and Connected Vehicles*, a briefing document produced through a National Cooperative Highway Research Project study and conducted by the Texas A&M Transportation Institute (TTI).

"The AV-CV benefits to consumers are potentially immense, but what about society writ large?" asks Ginger Goodin, TTI senior research engineer and Regents Fellow and report co-author. "We are only beginning to understand the extent to which these technologies might pose risks to public safety, security, health and social equity."

Strategies outlined in the briefing document are designed to inform public policy decisions that can shape technology deployment in ways that advance societal benefits while mitigating potentially harmful unintended consequences. Each strategy addresses one of four desired outcomes:

- mitigating safety risks,
- encouraging shared automated vehicle use,
- addressing liability issues, and
- influencing market demand.

In their work, researchers applied concepts of social welfare economics — the means and methods of encouraging the well-being of both individuals and society as a whole. For example, consumers might be unwilling to pay for expensive technology if they perceive that much of the benefit would accrue to other people, and manufacturers would consequently be discouraged from building and selling AVs and CVs. To ensure societal benefits, governments might impose regulations or taxes that would compel the market to account for costs that in the past they wouldn't have considered. This approach may require unconventional thinking for public officials.

"The transportation community can choose to wait and react," says report co-author and TTI Senior Research Scientist Johanna Zmud. "Or decision makers can reframe the conventional public-policy discussion to responsibly and assertively advance AV-CV technologies in light of social interests, adopting the principles of rapid learning and shared knowledge creation."

The report is highlighted in an American Association of State Highway and Transportation Officials' YouTube video, *TTV Special Report: Automated Vehicles in American — Managing the Risks and Rewards.* ■

For more information, contact **Johanna Zmud** at (202) 679-3195 or j-zmud@tti.tamu.edu.

How Smart Is That Airport Restroom?

Internet of Things Applications Could Span Multiple Aspects of Air Travel

Airports, like any commercial enterprise, demand efficiency. So it's only natural to expect that the Internet of Things (IoT) — that gigantic network of interconnected devices collecting and sharing data to merge the physical and digital worlds — could likely prove invaluable to helping airports achieve top-notch operations. The big question is how.

To find the answer, researchers at the Texas A&M Transportation Institute (TTI) and Deloitte Consulting, LLP, recently explored how IoT could be used in the airport environment. The study was sponsored by the Airport Cooperative Research Program (ACRP) of the Transportation Research Board and involved a stakeholder survey and interviews along with case studies and a literature review.

"Many technology applications are in play in airports today, like those that allow scanning your ticket or phone at a kiosk, finding your way in the airport using an app on your phone, or looking at a screen to find your gate," explains TTI Senior Research Scientist Johanna Zmud, lead author on the study report. "But putting these technologies all together requires an infrastructure that lets these advanced services talk to each other seamlessly."

Ultimately, the benefits promised by IoT applications fall into three categories: better operational efficiency, strategic differentiation (to create a better experience for travelers as well as other stakeholders including carriers, vendors and communities), and added revenue (through either existing or new customer relationships).

IoT applications fall into three categories:


better operational efficiency


strategic differentiation

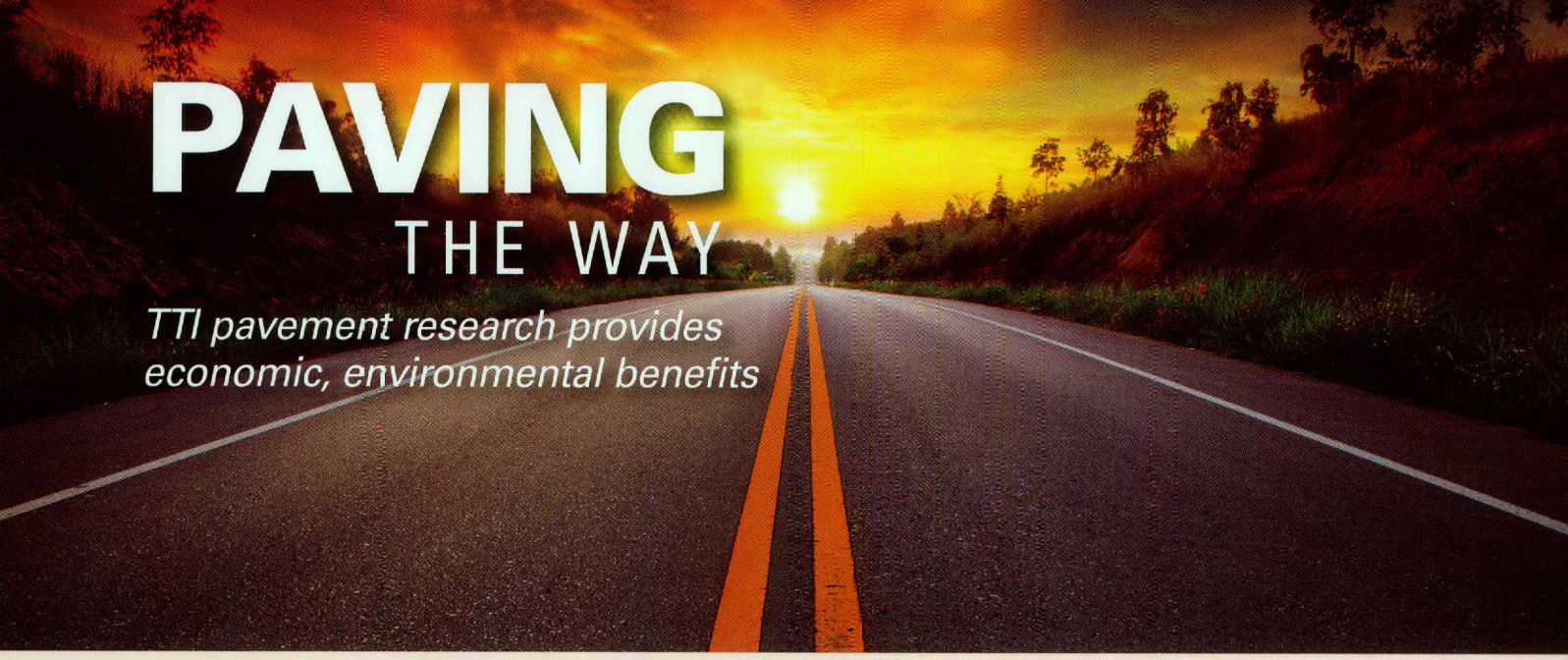

added revenue

"Many technology applications are in play in airports today, like those that allow scanning your ticket or phone at a kiosk, finding your way in the airport using an app on your phone, or looking at a screen to find your gate."

Johanna Zmud
TTI Senior Research Scientist

IoT integrations might include detailed functions like check-in, security clearance and baggage identification. Or they might involve things on the low-tech end, like equipping restrooms with sensors on faucets, toilets, and soap and paper dispensers that transmit data to alert managers about product shortages and facility breakdowns. The IoT extensions could also reach to airport tarmacs, where robots and autonomous vehicles might deliver baggage, fuel planes, clear debris, and perform other tasks.

"Airport operators and their stakeholders can use this primer to better understand the IoT environment and plan for implementing different strategies," notes Marci Greenberger, acting manager of ACRP. ■



PAVING THE WAY

TTI pavement research provides economic, environmental benefits

The Texas A&M Transportation Institute (TTI) has a varied and productive history of applied research for the National Cooperative Highway Research Program. These projects provide excellent value by solving the myriad of problems facing transportation professionals. Two recent projects in the pavement area, Short-Term Laboratory Conditioning of Asphalt Mixtures and The Effects of Recycling Agents on Asphalt Mixtures with High RAS and RAP Binder Ratios, are summarized here.

Short-Term Laboratory Conditioning of Asphalt Mixtures

As roadway aging occurs, asphalt mixtures stiffen due to oxidation and other chemical processes. This makes them inflexible under vehicle loads; cracks begin to form, causing water to seep in, creating serious damage to the roadway. The ability to simulate aging in asphalt binders and mixtures in the laboratory has been studied extensively, and procedures have been adopted for use in binder specifications and mixture design.

"When we perform mix designs on asphalt in the laboratory, we heat the aggregate and asphalt and then blend them together," explains TTI Senior Research Scientist David Newcomb. "Then we bring them up to temperature so they can be compacted, and then we test it. There's a lot of uncertainty as to whether or not this accurately mimics what's placed on the roadway."

The research question was clear: how do we get our laboratory mix designs to reflect what's actually being placed in the field? Researchers looked at two stages of aging — the initial aging during the production process and longer-term aging, which occurs as asphalt sits on the roadway.

"We examined a number of different U.S. projects as materials were produced, and we sampled the raw materials so we could test them in the laboratory at different aging phases," said Newcomb. "Then we took materials produced in the field and brought those back to test them and see how well we were matching."

"We tried various schemes of long-term aging in the laboratory and were finally able to mimic about 10 years of aging in the field. That's about as far as we could go in the laboratory."

David Newcomb
TTI Senior Research Scientist

The team discovered they could closely simulate short-term aging that occurs in a construction asphalt plant with what was done in a laboratory. They then examined longer-term aging, which for this project was about five years.

"We found that the laboratory aging did not do very well because the materials in the pavement aged more than they did in the lab," notes Newcomb. "We tried various schemes of long-term aging in the laboratory and were finally able to mimic about 10 years of aging in the field."

While researchers know there's more work to be done — particularly involving how to get materials to represent long-term aging beyond 10 years in the field — the results provide better estimates, translating long-term asphalt aging in the lab into actual practice. ■

The Effects of Recycling Agents on Asphalt Mixtures with High RAS and RAP Binder Ratios

What's not to like about the increased use of recycled materials in roadways? After all, it's economically and environmentally beneficial to use higher recycled materials content in new asphalt mixtures — but only if it's done correctly.

The recycled materials include reclaimed asphalt pavement (RAP) and, to a much lesser degree, recycled asphalt shingles (RAS). RAP is old pavement scraped up and recycled at a rate of 99 percent, making it the most reused product in the United States by far. Right now, most states only allow 20 to 25 percent of new asphalt mixtures to be RAP and 3 to 5 percent to be RAS.

"The reason states limit RAP content is that the material is brittle and aged, which can lead to cracking," says TTI Research Engineer Amy Epps Martin. "One of the mitigation strategies to maintain engineering performance is to use a softer, virgin binder to try and double the maximum RAP content to 40 to 50 percent. The goal is to realize economic and environmental benefits without sacrificing engineering performance."

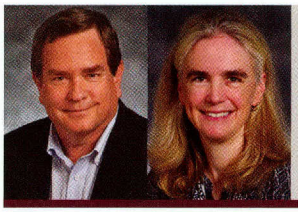
The use of a recycling agent that partially restores the binder blend is a second mitigation strategy to control cracking.

With many types of recycling agents available on the market, TTI researchers developed a set of evaluation tools for the use of recycling agents with high RAS and RAP binder ratios.

"One of the things our research project yielded was a draft American Association of State Highway and Transportation Officials standard practice that includes methods to select appropriate component materials and rejuvenator dose, as well as to evaluate binder blends and mixtures," explains Epps Martin. "Every combination of virgin asphalt binder, virgin aggregate, RAP, RAS and rejuvenator is unique and must be engineered to provide adequate performance." ■

"One of the mitigation strategies to maintain engineering performance is to use a softer, virgin binder to try and double the maximum RAP content to 40 to 50 percent. You want to realize economic and environmental benefits without sacrificing engineering performance."

Amy Epps Martin
TTI Research Scientist



For more information, contact **David Newcomb** (laboratory conditioning) at (979) 317-2328 or d-newcomb@tti.tamu.edu, or **Amy Epps Martin** (recycling agents) at (979) 317-2304 or a-eppsmartin@tamu.edu.

General Motors Funds Expansion of Landmark Teen Driving Safety Program to America's Heartland

Midwest Expansion in 2019–2020

50%
teen deaths occurring when another teen is driving

$30B annual U.S. societal costs associated with teen crashes

~2,800
# of teens per year dying in car crashes since 2012

100
# of teens injured per teen death in car crashes

General Motors (GM) has awarded a generous grant to the Texas A&M Transportation Institute's (TTI's) Teens in the Driver Seat® (TDS) Program. These funds will support ongoing outreach efforts in Texas, where TDS was born, as well as Georgia, reaching some 230 high schools and 200,000 students. TDS will also be able to expand its reach to Michigan, Ohio and Indiana.

Since 2012, some 2,800 teens have died each year in car crashes — the equivalent of a school bus loaded with teenagers crashing once weekly for an entire school year. On a per-mile-driven basis, teens are eight times more likely to die in their first six months of driving than adults, and for every American teen killed in a car crash, about 100 more are injured. In 2017, half of teen passenger deaths occurred when another teenager was driving. Besides the human tragedy of teen deaths, the U.S. societal costs of these crashes amount to $30 billion per year.

Founded in 2002, TDS leverages positive peer pressure to raise awareness of the five most dangerous teen driving habits: driving at night, speeding and street racing, driving distractions, not wearing a seat belt, and alcohol/drug use. Safety experts recruit, educate and inspire young drivers to engage their peers to promote positive behavioral change. Developed by TTI's Youth Transportation Safety Program (YTS) staff and focus-group tested with youth advisory boards, TDS provides educational materials free of charge to participating schools.

"Teen drivers today face more challenges behind the wheel than ever before," explains TDS founder and TTI Senior Research Engineer Russell Henk, manager of YTS. "Smartphones, the glamourized 'need for speed,' and peer pressure to drive while under the influence are just a handful of dangers they face."

One of the hallmarks of the program is capturing measurable outcomes to demonstrate the effectiveness of its sponsors' investments. For the GM grant, the short-term goals are to increase the awareness and knowledge of effective vehicle and road safety practices; increase teen knowledge of teen traffic safety issues, methods and resources; increase the rates of observed teen seat belt use; and decrease the rates of teens driving while using electronic devices, such as cellphones.

"Despite the challenges, teen drivers can make good decisions with the right information," Henk says. "Giving them that information and rewarding responsible behavior are what TDS is all about." ■

For more information, contact **Russell Henk** at (210) 321-1205 or r-henk@tti.tamu.edu.

Short Course attendees during the opening session in Rudder Auditorium on the Texas A&M University Campus.

TTI Hosts Annual Short Course

TTI hosted the 93rd Annual Transportation Short Course, held at the Texas A&M University Campus Oct. 14–16. A record-breaking 2,848 transportation professionals attended to learn about the latest innovations and findings from Texas Department of Transportation (TxDOT)–funded research. As happens each year, TxDOT's Extra Mile awards were presented to agency workers who helped save a life or prevent a life-threatening situation from happening.

"Together, we (TTI and TxDOT) are taking steps to be good stewards of our resources, such as by researching the latest innovations in recycled asphalt, which reduces our environmental impact and saves millions of dollars annually," said TTI Agency Director Greg Winfree. "We, the state universities, are TxDOT's state transportation solutions providers, working alongside our partners in the industry, our contractors and our suppliers."

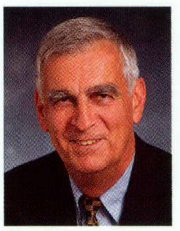
In September, TxDOT adopted a new mission statement, "connecting you with Texas," to embody all that TxDOT employees do for Texas. "TxDOT isn't our goals; it's not our programs; it's not our plans — it's our people. It's you," stated TxDOT Executive Director James Bass.

During her keynote address, former U.S. Department of Transportation Intelligent Transportation Systems Joint Program Office Director Shelley Row highlighted storytelling's value to the transportation industry. Row is now president and CEO of Shelley Row Associates LLC.

"I was eager to tell [my boss] about the program I was managing so she'd continue to fund it. ... She said, 'Yeah, but Shelley, what's the story?'" recalled Row. The key, she argues, is to understand your audience and compose a story that's visceral and vivid. "Whatever it is that you're selling, you're not the only one [who needs to understand its value]." ■

For more information about TTI News, contact **Rick Davenport** at (979) 317-2408 or r-davenport@tti.tamu.edu.

Epps Receives Multiple Honors



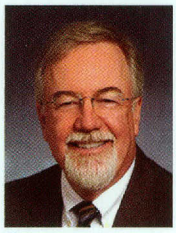
Epps

TTI Executive Associate Director Jon Epps received the Bob M. Gallaway Award from the Texas Asphalt Pavement Association (TXAPA)/Texas Department of Transportation (TxDOT) Seal Coat Committee Sept. 18, 2019. The committee also announced the creation of the Dr. Jon Epps TXAPA/TxDOT Quality Seal Coat Awards Program. TXAPA was founded with just 11 members in 1944 and has grown into one of the largest U.S. asphalt pavement associations. Its mission is "to enhance the quality, performance, and usage of asphalt pavement through technical, educational, and training services."

"It's an honor to receive this award," says Epps, who's spent 40 years in the seal coat industry. "The award has been around for years, and Gallaway was my mentor early in my career."

Today, Epps embraces Gallaway's legacy by encouraging others in the industry, and his people-first attitude inspired the TXAPA/TxDOT Seal Coat Committee to create the Dr. Jon Epps TXAPA/TxDOT Quality Seal Coat Awards Program. TXAPA has worked with Epps over the years on numerous projects. "Though he's not one to list his accomplishments, we're proud to congratulate him on the Bob M. Gallaway Award," says Harold Mullen, TXAPA executive vice president. "We believe the Dr. Jon Epps TXAPA/TxDOT Quality Seal Coat Awards Program allows us to tap into his heart for others in the industry." ■

Seymour Teaches Course in India


Seymour

TTI Executive Associate Director Ed Seymour recently traveled on an Indian Government grant to the National Institute of Technology Warangal in Telangana, India. Seymour taught a five-day course entitled Transportation in a High-Tech, Automated and Connected Vehicle World to students in the Civil Engineering Department's Transportation Division. The grant is part of India's Global Initiative of Academic Networks in Higher Education to garner and transfer the best international experience to an Indian audience. Seymour also spoke at a university conference focused on engineering for sustainable development and visited with university faculty and post-graduate students regarding career development. ■

Longest Delays on Houston, Austin Freeways in Texas

TTI researchers use traffic volume and speed data to compile the annual listing of the most crowded roadways in Texas, comparing the time it takes to travel on a congested roadway against the time needed to travel the same corridor in uncongested conditions. Fueled by the state's steady growth and healthy economy, Houston's West Loop this year repeats its 2018 rank as the most gridlocked corridor in the state. Interstate 35 in central Austin comes in a close second, with the Southwest and Eastex Freeways in Houston and the Woodall Rodgers Freeway in Dallas rounding out the top five.

Only 13 road segments are new to this year's top 100. A total of 92 are concentrated in Texas' four biggest metro areas, but roadway delay is becoming more common in urban areas of varying sizes. This year's complete list of congested road rankings includes 1,854 segments spread across 66 counties, available online at Texas' Most Congested Roadways 2019.

The Texas Department of Transportation (TxDOT) initiative Texas Clear Lanes has increased efforts to address roadway gridlock, largely through two voter-approved funding initiatives directing more resources to the State Highway Fund for non-tolled projects.

"TxDOT's mission is 'Connecting you with Texas,' and we are focused on getting people where they need to go efficiently and reliably by paying attention to where improvements are needed most," said TxDOT Deputy Executive Director Marc Williams. "Congestion relief is a priority for our top chokepoints as we balance the many demands on our roadways across the state." ■

Epps Martin Becomes ASCE Fellow


Epps Martin

TTI Research Engineer Amy Epps Martin has been elected an American Society of Civil Engineers (ASCE) Fellow, an honor awarded to ASCE members who are mentors and leaders in the civil engineering profession. Founded in 1852, ASCE is the oldest engineering society in the United States and includes over 150,000 members in 177 countries. The society's vision is for civil engineers to become global leaders who help build a better quality of life.

Epps Martin first joined ASCE as an undergraduate student at the University of California, Berkeley. Through her research at TTI, Epps Martin has developed sustainable practices for asphalt materials, performance-based specifications for asphalt pavement materials, and design and construction guidelines for specialty asphalt mixtures. In April 2019, she was elected director-at-large on the Association of Asphalt Paving Technologists board of directors.

With over 22 years at TTI and Texas A&M University, Epps Martin teaches civil engineering materials courses as a professor in Texas A&M's Zachry Department of Civil and Environmental Engineering. Besides teaching, she continues to make an impact on civil engineering students and researchers, focusing on giving back to the next generation as a mentor to graduate and post-doctoral students.

"We would like to congratulate Amy Epps Martin on being elected ASCE Fellow, a distinction awarded to fewer than 3 percent of ASCE members," says ASCE Executive Director Tom Smith. "Dr. Epps Martin achieved this distinction through a unanimous vote of the membership applications review committee." ■

with Greg Winfree, Agency Director

Learning Is Knowledge Reborn and Refined

TTI Celebrates the TRB Centennial

I've always thought of learning as an evolutionary process. It's not about achieving a certain level of education, but about sharing knowledge with others to achieve something greater than what could be accomplished alone. Fostered by teamwork, it's a cycle of professional development that's constantly evolving, always rewarding and never completed. Learning, then, is about building on knowledge in a new way.

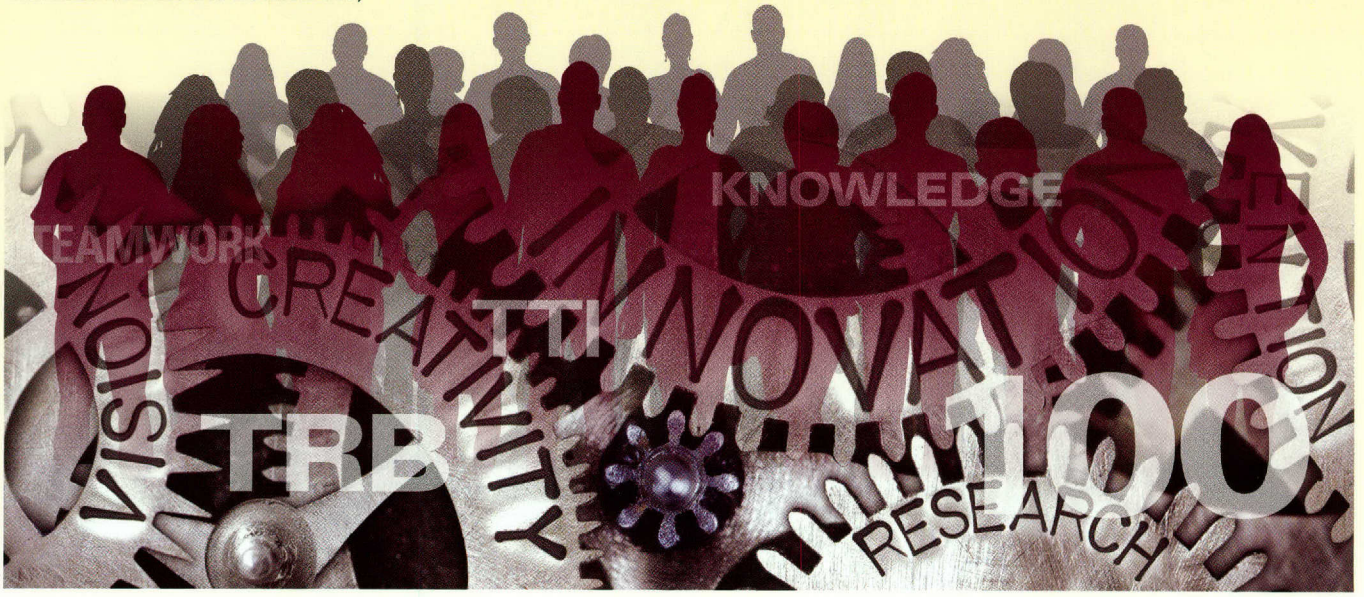
The Transportation Research Board (TRB) has set the transportation research agenda in the United States for a century, now. By drawing on the brightest minds — and providing ample opportunity for idea exchange via meetings, online resources and vast and varied cooperative research programs — TRB keeps the wheel of intellectual innovation turning. And while many results from TRB-sponsored research are aimed at finding local-level answers, they often solve worldwide problems. Longer pavement life, more efficient operational design, improved traffic safety, enhanced mobility, a healthier public — there's no area of transportation research that TRB hasn't transformed for the better. And, since transportation touches every aspect of our lives, that means the work TRB does is vitally important to every one of us, every day.

Yet TRB is made up of people, not simply research areas. It's fueled by volunteers from across the research community. And those professionals are educated at institutions of higher learning, like Texas A&M University, and — to further that education mission — trained at applied research-focused agencies, like the Texas A&M Transportation Institute (TTI). TRB, TTI and Texas A&M — together with all our sister institutions around the world — keep the wheel of discovery turning.

From primary schools to universities, educational institutions kindle the fire of curiosity in young minds. Research institutes like TTI channel that passion, transforming today's students into tomorrow's experts. That professional growth often results from experience with national research projects funded through TRB, which then encourages established and budding professionals alike to attend its annual meeting in Washington, D.C. Each year, the board invites attendees to share their research findings with colleagues through some 4,000 meetings, poster sessions and presentations. Exhibit floor interactions immerse up-and-coming professionals in thousands of years of expertise they likely wouldn't have access to back home. Social gatherings encourage them to make connections that can last a lifetime. Yesterday's graduate students are today's mentors, paying forward their opportunities to the latest generation of learned professionals.

For a century, TRB has been the clearinghouse for transportation research innovations, helping to build our global transportation network and advancing the global economy. And working with its university and research partners, TRB has fueled the engine of education by setting a national research agenda that encourages excellence by constantly refining good ideas into great solutions.

Happy 100th birthday, TRB. Here's to the next century of learning together. Now, about those flying cars.... ■



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