

TTI, CARTEEH  
Supporting Transportation  
Electrification Efforts

Before Warning Bells  
Ring — Hazmat, Train  
Derailment Emergency  
Planning for Schools

Crowdsourced Data  
Enhance Border Trip  
Insights in CIITR Report

TEXAS TRANSPORTATION

**Researcher**

VOL. 58 | NO. 1 | 2022

**PROTECTING  
THE MONARCH**

**SUPER  
HIGHWAY**



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TEXAS TRANSPORTATION

VOL. 58 | NO. 1 | 2022

# Researcher

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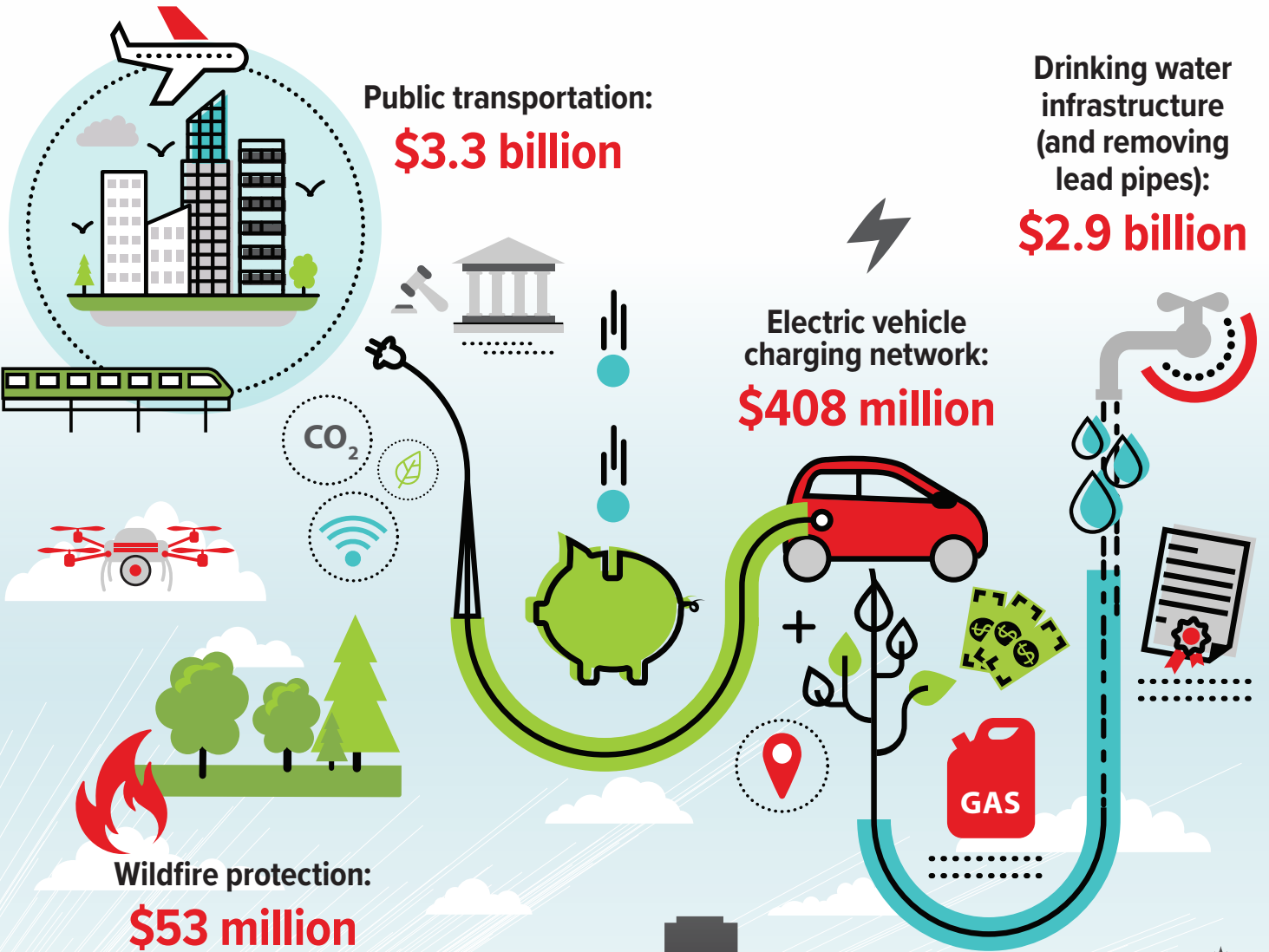
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# The Infrastructure Investment and Jobs Act Impact

## ON THE TEXAS ENVIRONMENT



Wildfire protection:  
**\$53 million**

Federal highway programs:  
**\$26.9 billion**

Tribune Article: <https://www.texastribune.org/2021/11/09/biden-infrastructure-bill-texas/>

White House: <https://www.whitehouse.gov/wp-content/uploads/2021/08/TEXAS-Infrastructure-Investment-and-Jobs-Act-State-Fact-Sheet.pdf>

# Joint Effort by TTI, Texas A&M AgriLife Helps to Protect Endangered Species From Road Projects

**Unintended encounters with cars and trucks are nearly always bad news for animals.** But not only do creatures face dangers on existing roads, they're often imperiled from the moment that road construction begins.

Animals of all types and sizes need to move about their habitats to forage, breed and simply exist, and that movement can sometimes involve crossing over or through a road project at any stage of completion. And if those critters hold protected status under the federal Endangered Species Act, their presence can automatically cause construction delays and increased project costs.

Operating agencies and contractors use exclusion fences to prevent those intrusions. Testing the efficacy of three toad exclusion fence (TEF) alternatives is the focus of a joint research effort involving Texas A&M AgriLife and the Texas A&M Transportation Institute (TTI). Two of the fences are from private-sector manufacturers, and the third was designed by the Texas Department of Transportation, which is funding the research. The two protected species in question are:

- the Houston toad, classified as endangered under law and the first amphibian to be listed as federally endangered on the Endangered Species Act; and
- the nonvenomous Louisiana pine snake, classified as threatened and one of the rarest snakes in North America.

The effort brings together two agencies with distinct and long-established capabilities. "AgriLife personnel are the experts on animals, so they take care of actually handling these species, and TTI researchers have the real estate and



*To be effective, toad exclusion fences need to prevent climbing and have jumpouts (pictured above) to allow toads to escape construction zones.*

background in building test sites," says Jett McFalls, TTI assistant research scientist and lead for TTI's role in the project. "We both bring our best expertise to the project." McFalls emphasizes that the endangered snake and toad

**Animals of all types and sizes need to move about their habitats to forage, breed and simply exist, and that movement can sometimes involve crossing over or through a road project at any stage of completion. And if those critters hold protected status under the federal Endangered Species Act, their presence can automatically cause construction delays and increased project costs.**

*Right: Houston toad. Editorial credit: Chase Fountain, Texas Parks and Wildlife Magazine.*





Test Pen Area at TTI's Sediment and Erosion Control Laboratory.

aren't actually used in the research. Instead, researchers use the common Gulf Coast toad and corn snakes as substitutes because they are of similar size and characteristics.

Habitats for the protected species are concentrated in several southeast Texas counties. The most serious threat facing the two is habitat loss, resulting in part from clear cutting of forest lands to accommodate agricultural use and urban expansion. The associated use of pesticides and herbicides exacerbates the problem. Completed high-traffic roads can create barriers for movement between foraging, hibernating and breeding locations, and motor vehicle encounters exacerbate the mortality rate of both species.

The AgriLife/TTI effort involves a two-phase evaluation process. In phase one, researchers used the three TEF varieties to build 18 pens at TTI's Sediment and Erosion Control Laboratory on the RELLIS campus. The snakes and toads are placed in the pens, and their activity is monitored overnight with video cameras to document their movement (successful and unsuccessful attempts to escape the pen). To work properly, the TEF must not only prevent intrusion by snakes and toads but also allow them to escape if they were already present when the fences were installed. This controlled testing was done over the summer months in 2021 and resumes this spring.

In phase two, McFalls and his colleagues installed about 1.5 miles of the three different TEFs at roadway right-of-way locations where AgriLife staff determined that the protected species are known to live. The team will monitor the sites, comparing snake and toad mortality rates with rates recorded prior to the TEF installations.

"We've been evaluating the performance of all sorts of roadside products over the past 30 years, but this is the first time we've built simulated habitats for endangered species," McFalls says. "This evaluation falls right in line with our mission."

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**"We've been evaluating the performance of all sorts of roadside products over the past 30 years, but this is the first time we've built simulated habitats for endangered species. This evaluation falls right in line with our mission."**

*Jett McFalls*  
TTI Assistant Research Scientist

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Research findings should enable agencies to keep their construction projects on track and within budget, while at the same time meeting the requirements federal legislation passed almost half a century ago to address the interests of threatened wildlife. The act, passed in 1973, is the primary law in the United States for protecting imperiled species. Its purpose is twofold: to prevent extinction and to help species recover to a point where protections are no longer needed.

Kristina Chyn, a postdoctoral research associate who leads the AgriLife team on this effort, emphasizes the need for broader study. "There are many gaps in our understanding of how roads affect wildlife," she says. "Even roadkill, the most obvious impact of roads on wildlife, is not given much attention. As roadkill observations are a relatively cheap and easy way to collect wildlife-road impact data, robust roadkill observation networks throughout Texas, supported by community scientists and volunteers, would be a low-hanging fruit to immensely help road-wildlife research." ■



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More information about the Urban Air Mobility Advisory Committee is available at <https://www.txdot.gov/inside-txdot/division/planning/urban-air-mobility-advisory-committee.html>.

*An artist's conception of an urban air mobility environment, where air vehicles with a variety of missions and with or without pilots are able to interact safely and efficiently. Editorial credits: NASA/Lillian Gipson.*

# The Future Is Now:

## The Evolution of Aviation in Urban Environments

### URBAN AIR MOBILITY ADVISORY COMMITTEE FORMED TO IDENTIFY POLICY

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**Unmanned aerial vehicles (UAVs), or drones** as they are commonly referred to, can carry out many impressive tasks, such as capturing stunning visual images, delivering packages, or carrying out complex military operations. While the use of UAVs is not new, their widespread use and seemingly unlimited potential in urban and rural areas have necessitated the formation of an Urban Air Mobility (UAM) Advisory Committee in Texas.

In spring 2021, the Texas Legislature passed Senate Bill 763 in the 87th regular session, requiring the Texas Transportation Commission to establish the UAM Advisory Committee. The Federal Aviation Administration defines UAM as “a safe and efficient aviation transportation system that will use highly automated aircraft to operate and transport passengers or cargo at lower altitudes within urban and suburban areas.”

“This is an industry that takes advantage of a lot of new technologies in the automated and connected space,” says Texas A&M Transportation Institute (TTI) Senior Research Scientist Jeff Borowiec. “Because of that, there is a need to collaborate across government levels and with the private sector to ensure we develop a system that works for all groups. There are a lot of issues involved when we deploy this kind of technology in urban areas, such as where are they going to land, what is the noise level, are we creating a visual nuisance, and what are the land use implications?”

The Texas Department of Transportation’s (TxDOT’s) Strategy and Innovation Division and Aviation Division began working with TTI in fall 2021 to assist the department in supporting the work of the UAM Advisory Committee upon its establishment.

“TTI is assisting TxDOT by developing a literature review and background research for the committee as well as a review of activity in other states,” says Borowiec. “TTI will also provide supporting materials and assistance to the committee and TxDOT during any public meetings where input on urban air mobility will be received. In this report, a framework for the final report and an outline of the main issues and challenges related to urban air mobility are presented for the committee’s review and discussion.”

Beyond the urban environment, the committee is addressing issues in rural areas as UAM has given way to advanced air mobility (AAM). The purpose of this evolution toward AAM is to be more inclusive of the types of services these new technologies can provide, the business use cases they can offer and the potential markets they can serve beyond Texas’s urban areas. ■

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**“This is an industry that takes advantage of a lot of new technologies in the automated and connected space. Because of that, there is a need to collaborate across government levels and with the private sector to ensure we develop a system that works for all groups.”**

*Jeff Borowiec  
TTI Senior Research Scientist*

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# TTI, CARTEEH Supporting Transportation Electrification Efforts

An electric vehicle (Chevrolet Bolt) is tested on the chassis dynamometer inside TTI's environmental test chamber. The testing includes a solar array built around the vehicle to simulate the vehicle driving on a hot summer day.

## The rapid appeal and growth of electric vehicles

(EVs) over the last few decades are part of a fundamental shift in the constantly evolving transportation system. Stakeholders with interests in transportation, energy and emissions are finding they need to come together to plan for the future of the nation's transportation system, including considering the idea of electricity one day powering the way most travelers, and thus consumers, move from point A to point B.

The Texas A&M Transportation Institute (TTI) and the Center for Advancing Research in Transportation Energy, Emissions, and Health (CARTEEH) are establishing the Clean Transportation Collaborative (CTC) to help facilitate and guide thought leadership in the transition to a low-emissions transportation system. To sufficiently plan for this renewed focus on clean transportation — including vehicle electrification — researchers have identified a need to work together to transition toward new interactions connecting transportation energy systems.

“What it means to create a low-emissions transportation system — especially in the sense of electrification — has drastically changed over the last decade,” says TTI Associate Research Scientist Alice Grossman. Grossman is one of the CARTEEH researchers leading CTC along with TTI Associate Research Engineer Tara Ramani and TTI Assistant Agency Director Joe Zietsman.

“Until recently, clean transportation primarily meant focusing on cleaning up existing internal combustion engines to reduce what they emit into the air,” Grossman adds. “Today, transportation electrification means that clean transportation is an interdisciplinary topic that has implications on the infrastructure, power grid and environment.”

**“What it means to create a low-emissions transportation system — especially in the sense of electrification — has drastically changed over the last decade.”**

*Alice Grossman  
TTI Associate Research Scientist*



Xu

**CARTEEH recently saw EV-related research spin off into the launch of a start-up company co-founded by former CARTEEH Assistant Director for Technology Ann Xu. Xu established the company ElectroTempo Inc., which uses a software algorithm to predict light-duty EV charging demand. The technology tests EV charging strategies using a variety of market, price, technological and seasonal factors. It also tracks EV charging demand estimates at street block and regional levels.**





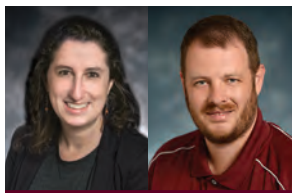
*The facility is large enough to hold a heavy-duty 18-wheeler and includes offices and a research and testing preparation area.*

Together, industry experts and public servants involved in CTC will work to reach the common goals of:

- stakeholder collaboration between the transportation and energy sectors;
- use of scientific and objective data to inform policy makers and other interested stakeholders of the emission impacts of existing and emerging vehicle technologies;
- education of policy makers on the singular and multiple emission reduction benefits of various vehicle technologies;
- maximization of emission reduction in the transportation sector in a cost-effective manner;
- national leadership in early completion of state-of-the-art emission, economic and technology assessments regarding each vehicle technology; and
- collaborative development of effective approaches to maximize emission reductions in the transportation sector and thereby advance equity and health outcomes.

Housed within CARTEEH, CTC supplements several ongoing and recently completed research projects in the area of transportation electrification, according to Tara Ramani.

“While CTC’s mission goes beyond electrification, it will bridge a number of EV-focused initiatives and projects that CARTEEH has sponsored,” notes Ramani. “CARTEEH has sponsored a project led by researchers in TTI’s Infrastructure Analysis Program to understand the economic impact of EVs. CARTEEH researchers worked with the Port of Houston and examined its fleet and cargo-handling equipment to study the feasibility of electrification opportunities. We also continue to support the Texas Department of Transportation on emerging electrification and air quality issues as part of our air quality work in the state.” ■



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## The Environmental and Emissions Research Facility

In January 2010, TTI opened the Environmental and Emissions Research Facility in Bryan, Texas. The \$2.5 million facility is one of the largest environmental chambers in the country and has enabled TTI researchers to test vehicles, idle reduction technologies for the trucking industry, shipping containers used by pharmaceutical and other companies, and other products for their performance and durability under severe temperature, humidity and other simulated weather conditions.

To account for the needs of future electrification research, TTI has teamed up with the Texas A&M Engineering Experiment Station to announce an expansion of TTI’s environmental chamber facility, which includes building a climate-controlled EV and grid testing facility. The expansion will lower the existing temperature range; install a new dynamometer to accommodate heavy-duty vehicles inside the environmental chamber; and install a grid, microgrid and photovoltaic lab.

“The expansion enables our researchers to study and understand EVs at an even higher level than before,” says TTI Research Specialist Jeremy Johnson. “Among other opportunities, the expansion will allow us to study electric vehicle performance under varying conditions; how electric vehicles interact with the energy storage systems, solar panel and other power sources; and how the ever-increasing use of electric vehicles will impact the grid.” ■

# Environmental RESEARCH AT TTI

*Brown pelicans can be found on the Texas coast throughout the year.*



*The number of monarch butterflies has declined 80 percent over the last two decades.*



**T**he behavior of the brown pelican, the fascinating migration of monarch butterflies, and rangeland management are not usually associated with transportation research. But all that is changing. Over the last few years, researchers with the Texas A&M Transportation Institute (TTI) have developed a portfolio of environmental projects never considered part of transportation research.

TTI already has a rich history of environmental activities. For example, the Institute helps Texans breathe easier with its air quality research. And for 32 years, TTI's Sediment and Erosion Control Laboratory has evaluated roadside products that help preserve waterways and groundwater.

Now, transportation research opportunities that have an environmental connection are becoming more common.

"The research landscape is certainly changing," says Jolanda Prozzi, TTI's Multimodal Planning and Environment division head. "We are conduct-

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**"The research landscape is certainly changing. We are conducting more and increasingly diverse environmentally focused projects."**

*Jolanda Prozzi  
TTI Multimodal Planning and  
Environment Division Head*

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ing more and increasingly diverse environmentally focused projects."

For example, TTI recently collaborated with Texas A&M AgriLife on

Texas Department of Transportation (TxDOT)-funded monarch butterfly and Houston toad projects. "We are currently hosting experiments that look into the efficacy of fences to keep the endangered Houston toad away from work zones," TTI Research Scientist Jett McFalls says. (See related article in this issue.) "It's an extension of our expertise in silt and sediment fences but also presents exciting new opportunities to reduce the environmental footprint of transportation."

The recent interest in monarchs is due to an impending decision by the U.S. Fish and Wildlife Service to list them

as endangered, which would have important consequences for right-of-way management and roadway construction. There's been an 80 percent decline in the number of these fascinating insects over the last two decades. If they are listed as an endangered species, transportation agencies across the country may need to adjust the management of their rights of way.

"TxDOT sponsored a project to estimate monarch roadkill within its migration corridors and identify ways of mitigating mortality," says Prozzi. "The hope is that the research will help conserve monarchs such that they will not need to be listed or, worst case, will provide effective mitigation solutions should they become listed."

TTI became involved in the project because of its work on right-of-way vegetation management (including work on Texas's renowned wildflower program) and the management of rights of way for pollinator and monarch habitat.

TTI Assistant Research Scientist Andrew Birt is also deeply involved in TTI's environmentally focused research. He just completed a multiyear TxDOT project that involved brown pelicans in South Texas, where the birds are being hit and killed by motorists during blistering cold fronts along the coast.

"Wildlife-oriented transportation problems such as those involving the monarch, brown pelican and Houston toad tend to be very diverse and can't be solved until we understand the ecology and behavior of the focal species," Birt points out. "But established transportation knowledge is also essential for solving these problems — and this makes TTI an ideal venue for this type of research."

Societal concerns about the environment have highlighted the need for more research on the impact of transportation. Transportation can also have a positive impact on



*TTI's Sediment and Erosion Control Laboratory provides the transportation industry with a research and performance evaluation program for roadside environmental management.*

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**"Wildlife-oriented transportation problems such as those involving these animals tend to be very diverse and can't be solved until we understand the ecology and behavior of the focal species... But established transportation knowledge is also essential for solving these problems — and this makes TTI an ideal venue for this type of research."**

*Andrew Birt  
TTI Assistant Research Scientist*

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the environment. Birt is currently participating in a U.S. Department of Agriculture-funded project to improve rangeland management. Rangelands are typically managed for cattle production, but they also provide essential ecosystem services such as water, wildlife, recreation and wildfire prevention. "Historically, transportation has benefited agricultural systems by allowing goods and services to be moved to and from markets, and by helping sustain rural communities. But trends in transportation and shifting attitudes toward the environment suggest that we revisit how transportation can help improve the efficiency and sustainability

of agricultural systems such as rangelands."

"The new Infrastructure Investment and Jobs Act specifically highlights wildlife crossings, rural communities, water conservation, wildfire, ecosystem restoration and resilience — all issues that we have already begun to research," Prozzi adds.

"In line with this changing research landscape, we are developing new expertise within the division, as well as collaborating with other groups in TTI and environmental researchers in The Texas A&M University System." ■



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# TTI Experts Receive Recognitions at 2022 TRB Annual Meeting



Mary Cearley, director of administration, and Bill Frawley, program manager of TTI's Urban Analysis Program and research scientist, greet visitors to TTI's TRB exhibit booth.

Approximately 60 Texas A&M Transportation Institute (TTI) researchers and staff participated in the Transportation Research Board (TRB) 101st Annual Meeting in Washington, D.C., Jan. 9–13. Held in person for the first time since 2020, about 6,000 participants attended more than 400 workshops, lectern sessions, and poster sessions, as well as nearly 400 committee meetings, during the week.

TTI's annual TRB reception, co-sponsored by the Texas A&M University Zachry Department of Civil and Environmental Engineering, was well attended, and traffic was steady at TTI's exhibit in the Walter E. Washington Convention Center.

Amy Epps Martin, TTI senior research engineer; Edith Arámbula Mercado, TTI Recyclable Materials program manager and research engineer; and Fawaz M. Kaseer, pavement design engineer at the Michigan Department of Transportation, authored the paper *Relationship between Rheological Indices and Cracking Performance of Virgin Recycled and Rejuvenated Asphalt Binders and Mixtures*. The paper won the TRB K. B. Woods Paper Award, which is “given annually for the outstanding paper published in the field of design and construction of transportation facilities,” according to TRB.

Epps Martin shares, “At the 30th TRB Annual Meeting I’ve attended, it’s a great honor for our research to be recognized and selected from some 500 papers initially submitted to the Transportation Infrastructure Group — a group that, in turn, represents 56 technical committees.”

Juan Carlos Villa, TTI Mexico City Office division head and research scientist, chairs the TRB International Trade and Transportation (AT020) Standing Committee. At the 2022 TRB Annual Meeting, the AT020 committee received the 2022 Blue Ribbon Committee Award in Diversity: Increasing the Diversity of Committee Membership. Part of TRB’s Technical Activities Council (TAC), the committee evaluates “best practices



The TRB Urban Freight Transportation (AT025) Standing Committee, chaired by Bill Eisele, accepted the 2022 Blue Ribbon Committee Award in Renewal (certificate shown).

**“I’m humbled our committee efforts to attract and engage the next generation of TRB leaders have been recognized. During these uncertain times, urban freight transportation is more critical than ever, and I’m pleased our committee has provided a supportive learning environment and mentoring and networking opportunities for leadership roles in this important field.”**

Bill Eisele  
TTI Senior Research Engineer

**“At the 30th TRB Annual Meeting I’ve attended, it’s a great honor for our research to be recognized and selected from some 500 papers initially submitted to the Transportation Infrastructure Group — a group that, in turn, represents 56 technical committees.”**

*Amy Epps Martin  
TTI Senior Research Engineer*

in attracting and retaining members and friends from historically underrepresented groups,” according to TRB.

“I’m honored that the committee received this award for its diversity efforts,” Villa says. “Since I became chair of the International Trade and Transportation Committee, I’ve been working toward creating a more diverse membership. And that has only been possible by teamwork with a great group of diverse members and friends of the AT020 committee.”

TTI Mobility Division Head and Senior Research Engineer Bill Eisele is the chair of the TRB Urban Freight Transportation (AT025) Standing Committee within TRB’s TAC. The AT025 committee accepted the 2022 Blue Ribbon Committee Award in Renewal: Attracting and Preparing the Next Generation of Professionals and Scholars in TRB. The committee’s objective is to help up-and-coming leaders gain experience “by providing active involvement in critical committee activities,” according to TRB.

“I’m humbled our committee efforts to attract and engage the next generation of TRB leaders have been recognized,” reflects Eisele. “During these uncertain times, urban freight transportation is more critical than ever, and I’m pleased our committee has provided a supportive learning environment and mentoring and networking opportunities for leadership roles in this important field.” ■



*Amy Epps Martin and her co-authors received the TRB K. B. Woods Paper Award. Left to right: Neil Pedersen, TRB executive director; Edith Arámbula Mercado; Amy Epps Martin; Fawaz M. Kaseer; and Avery Grimes, chair of the TRB Technical Activities Council.*

**“I’m honored that the committee received this award for its diversity efforts. Since I became chair of the International Trade and Transportation Committee, I’ve been working toward creating a more diverse membership. And that has only been possible by teamwork with a great group of diverse members and friends of the AT020 committee.”**

*Juan Carlos Villa  
TTI Mexico City Office Division Head  
and TTI Research Scientist*



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Neil Pedersen, TRB executive director, speaks with Katie Turnbull, TTI executive associate director, in the *Thinking Transportation* episode “How Universities and the Transportation Research Board Find Solutions Together Through Science and Innovation.” Pedersen, Turnbull and host Bernie Fette discuss how TRB and universities work together to brainstorm, develop and test solutions.

 **Stream Now**





# Before Warning Bells Ring —

## Hazmat, Train Derailment Emergency Planning for Schools

Hazmat transportation corridors such as railroads, highways and pipelines can be a significant hazard source for communities and schools that are nearby.

**“Our research found that many school districts lack resources for hazmat and train derailment emergency planning. The guide provides tools and best practices that school districts can use to improve their readiness across the full spectrum of hazmat incidents.”**

*Brad Trefz  
TTI Associate Transportation Researcher*

**Hazardous materials** (hazmat) travel daily by road, rail, pipeline, waterway and air through the Lone Star State. Most transport vehicles safely arrive with their cargo. It’s when things go wrong — such as a hazmat incident or train derailment near a school — that a well-informed, thorough safety plan can save student, teacher and staff lives.

Texas Education Code Section 37.108 mandates that school districts with facilities within 1,000 yards of rail tracks have a train derailment policy in their emergency plans. Texas A&M Transportation Institute (TTI) researchers recently developed the *Hazardous Materials and Train Derailment Emergency Planning Guide for School Districts and Community Colleges*. It was funded by the Hazardous Materials Emergency Preparedness Grant under the U.S. Department of Transportation’s Pipeline and Hazardous Materials Safety Administration and administered by the Texas Division of Emergency Management. The guide supplements emergency planning standards and protocols published by the Texas State School Safety Center.

The purpose of the guide is to provide resources and tools that school district administrators, emergency managers and safety officers can use to be proactive about planning for hazmat and train derailment emergencies. The TTI research team interviewed district administrators and safety personnel from across Texas and reviewed literature, guidance and data on lessons learned in disaster management.

“Our research found that many school districts lack resources for hazmat and train derailment emergency planning,” says Brad Trefz, lead author and TTI associate transportation researcher. “The guide provides tools and best practices that school districts can use to improve their readiness across the full spectrum of hazmat incidents.”

**“We start with what school districts already know and do, and build from there. For example, many school districts already practice evacuating for fire or active shooter emergencies, but evacuating for a major external hazmat emergency can be very different, and schools need to plan and practice for that as well.”**

*Dr. David Bierling  
TTI Research Scientist*

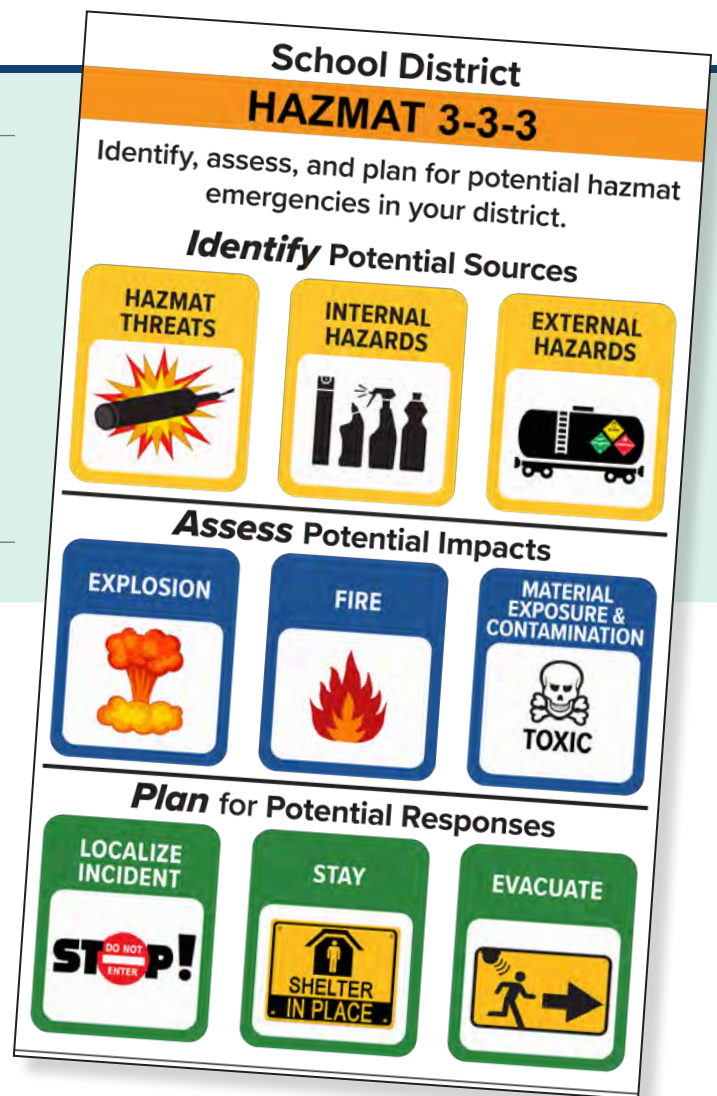
*The hazmat 3-3-3 model provides a simple reference to help users think about and plan for potential hazmat threats and hazards, hazmat incident impacts, and potential responses to the emergency.*

Andrew Christjoy, doctoral student in Texas A&M University’s Department of Communication and former TTI research associate, explains, “The interviews helped us create a unified, comprehensive guide with information that can be immediately applied by emergency managers in any Texas school district.”

The team organized the guide into the following documents:

- *Summary for Planning Leaders*, with an introduction to the guide and why planning for safety in these situations is important;
- Volume 1, which outlines an emergency management and planning framework;
- Volume 2, with recommendations to make hazmat incident prevention, protection, response, recovery and mitigation part of school emergency plans;
- Volume 3, which walks school districts through steps for hazmat threat and hazard risk assessments; and
- Volume 4, which offers emergency plan templates that align with plans used by emergency responders in most Texas communities.

Based on insights from the interviews and literature review, the team developed several new ideas and tools that districts can use to enhance their emergency plans. “We start with what school districts already know and do, and build from there,” says Dr. David Bierling, project director, TTI research scientist and director for transportation research at Texas A&M’s Hazard Reduction and Recovery Center. “For example, many school districts already practice evacuating for fire or active shooter emergencies, but evacuating for a major external hazmat emergency can be very different, and schools need to plan and practice for that as well.”



The guide also presents a new hazmat 3-3-3 planning model to help identify internal threats, internal hazards or external hazards that could lead to an explosion, fire or toxic release. Appropriate responses involve localizing and isolating an incident, sheltering in place, or evacuating to a safe area. When things go wrong and warnings bells ring, being prepared can protect people on a school’s campus.

“TTI’s efforts to assist K–12 school systems in this area represent a significant leap forward in terms of collaboration by multiple agencies to offer technical emergency planning resources that will save lives,” notes Jon Bodie, emergency management director for the Frisco Independent School District and a certified Texas emergency manager. “I’m sincerely grateful for the opportunity to have participated in this important TTI readiness initiative, and I’m looking forward to integrating TTI’s content into our district and campus emergency plans and related training regimens.” ■



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# CROWDSOURCED DATA

## Enhance Border Trip Insights in CIITR Report



“These emerging data sources can be especially helpful for understanding and regulating cross-border travel, given today’s limited resources and lack of reliable data to address the unique needs of regions where different languages, cultures and economies intersect. Our research explores the potential of using crowdsourced data to better understand cross-border trips and travel patterns, as well as assist officials in developing robust, data-driven policies that benefit every transportation system user.”

Ipek N. Sener  
TTI Research Scientist



Crowdsourced data, such as smartphone data from passenger and commercial vehicles, can provide much-needed insights into cross-border trips and travel patterns.

**Getting accurate, continuous travel information** can be difficult for binational metropolitan regions like El Paso, Texas, and Ciudad Juárez, Mexico. As a result, international cross-border trips often go underrepresented in travel demand and behavior analysis studies. This can be caused by a number of factors, including time and budget limits and boundary issues associated with international jurisdictions. Transportation agencies are interested in technologies such as smartphones as an additional data source for gleaning travel information.

*Exploration of Cross-Border Trip Characteristics Using Crowdsourced Data*, published by the Texas A&M Transportation Institute’s (TTI’s) Center for International Intelligent Transportation Research (CIITR), looks at the value crowdsourced data can add to the travel information equation. The report’s authors are Rafael Aldrete, CIITR director and TTI senior research scientist; Okan Gurbuz, TTI assistant research scientist; David Salgado, TTI assistant research scientist; Ipek N. Sener, principal investigator of the study and TTI research scientist; and Erik Vargas, TTI graduate student worker.

“We’re living in exciting times of technological and data analytics advancements,” notes Sener. “These emerging data sources can be especially helpful

for understanding and regulating cross-border travel, given today’s limited resources and lack of reliable data to address the unique needs of regions where different languages, cultures and economies intersect. Our research explores the potential of using crowdsourced data to better understand cross-border trips and travel patterns, as well as assist officials in developing robust, data-driven policies that benefit every transportation system user.”

Specifically, the research team evaluated how crowdsourced data can be used for acquiring cross-border trip characteristics. January–April 2020 data came from five land ports of entry (POEs) in the El Paso–Juárez region across the Bridge of the Americas, Paso del Norte, Stanton, Santa Teresa and Ysleta–Zara-

goza bridges. The team found the Ysleta–Zaragoza POE had the highest cross-border trip volume, while Santa Teresa had the lowest. Crowdsourced data offered useful insights for cross-border travel and provided unique, new opportunities, especially when combined with other data sources, to assist with transportation planning.

“Numerous crowdsourced data vendors are emerging every year,” Aldrete says. “Researchers and transportation agencies need to understand the opportunities and limitations of data offered by these vendors before investing significant resources in purchasing them or, more importantly, relying on them. In the long run, however, a more accurate and complete understanding of cross-border trips — from point of origin to destination and all points in between — can prove highly beneficial for transportation planners who daily face the need to do more with fewer resources.” ■



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## TTI, Texas A&M International University Formalize Partnership

TTI Agency Director Greg Winfree and Texas A&M International University (TAMIU) President Pablo Arenaz recently signed a five-year memorandum of agreement (MOA) to facilitate cooperation between their respective institutions, particularly involving border logistical data.

“The agreement comes after the local trade community in Laredo tasked [TAMIU’s Texas Center for Border Economic and Enterprise Development (TCBEED)] with providing timely access to current data and analysis to aid in their logistics planning,” says Daniel Covarrubias, TCBEED director. “TTI’s expertise in gathering data and project development paired with TCBEED’s data analysis and visualizations will help produce timely and accurate data representations for local stakeholders in the private and public sectors.”



Left to right: Daniel Covarrubias, Pablo Arenaz, Juan Villa, and María Eugenia Calderón-Porter.

The agreement outlines multiple activities, including collaborative exchange for research and data analysis; joint educational programs and community-related projects; and joint sponsorship of conferences, symposia, etc., for information exchange. After signing the MOA, Covarrubias and TTI Research Scientist and Regional Manager for Latin America Juan Villa met with the local trade community to announce the partnership.

“By having a local partner at the border, [TTI] can be closer to key stakeholders from both the public and private sectors,” says Villa. “Their input is critical to our research, providing useful insights that ultimately facilitate international trade.” Villa notes that border research is even more important as supply chain shortages continue to be a problem: “TTI and TAMIU are already working on the development of a cross-border information dashboard that will provide useful information to cross-border transportation stakeholders.” ■

## TTI Authors TCRP Guidance for Transit Agencies Using Social Media

To help codify best practices for transit agencies using social media, TTI researchers authored *TCRP [Transit Cooperative Research Program] Synthesis 156: Uses of Social Media in Public Transportation: A Synthesis of Transit Practice* for the Transportation Research Board (TRB).

“This report will be useful to transit professionals on marketing, social media and communication teams,” notes Mariela Garcia-Colberg, TRB staff member on the project and Cooperative Research Program senior program manager. “Excellent work by the TTI team.” ■

## Winfree Appointed to National GPS Advisory Board



Winfree

TTI Agency Director Greg Winfree was recently appointed by the administrator of the National Aeronautics

and Space Administration (NASA) to serve a two-year term on the National Space-Based Positioning, Navigation and Timing (PNT) Advisory Board.

Comprised of 29 members representing U.S. industry, academia and international organizations, the board meets semi-annually to provide advice on U.S. space-based PNT policy, planning, program management and funding profiles to a national executive committee that coordinates GPS-related matters across multiple federal agencies. The multi-use services provided by GPS are integral to U.S. national security, economic growth, transportation safety and homeland security.

“After providing more than a decade of leadership in this arena, I am thrilled to be appointed to this board,” Winfree says. “GPS capabilities are interwoven into all aspects of our economy and will enable transportation innovations such as self-driving vehicles. The responsibility to establish recommendations to sustain, modernize and protect this critical national asset is a matter of paramount importance.” ■



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Turner

## Turner Named 2020–2021 Regents Fellow

The Texas A&M University System Board of Regents named TTI Senior Research Engineer Shawn Turner a 2020–2021 recipient of the Regents Fellow Service Award for his nationally recognized expertise in mobility analysis, multimodal travel data collection and analysis, and performance measures and monitoring.

The Regents Fellow Service Awards program began in 1998 “to recognize employees who have made extraordinary contributions to their university, or agency, as well as to the people of Texas.”

Turner joined TTI in 1991 and has served as principal investigator on numerous research projects, including helping develop how Big Data is used to improve our transportation system’s efficiency, safety and reliability.

“I’m humbled and honored to receive this prestigious Regents Fellow Award,” says Turner. “My TTI and Texas A&M colleagues (researchers and support staff) have mentored, encouraged and helped me along the way... I can honestly say I would not be where I am today without them.”

TTI Agency Director Greg Winfree notes, “Throughout his career, Shawn has advanced the role of walking and bicycling as eco-friendly transportation modes. In particular, he has sought to improve the safety of walking and bicycling on streets and highways. His contributions have, quite literally, saved lives.” ■



Hueste

## Hueste Receives Prestigious Joe W. Kelly Award

The American Concrete Institute (ACI) recently bestowed its prestigious Joe W. Kelly Award on TTI Research Engineer Mary Beth Hueste. In addition to her role as head of TTI’s Major Structures Division, Hueste is a professor and associate department head for undergraduate programs in Texas A&M University’s Zachry Department of Civil and Environmental Engineering.

Established in 1974, the award recognizes professionals who contribute to the concrete industry through innovation and education as Joe W. Kelly, past ACI president, did before them. ACI recognized Hueste’s contributions to the concrete industry through her research — which includes developing earthquake-resistant reinforced concrete structures, conducting performance-based seismic testing, and designing prestressed concrete bridge structures — as well as her work educating the next generation of engineers and her professional volunteerism to help advance her discipline.

“To be recognized with the Joe W. Kelly Award means a lot to me. ACI has supported my professional development for over 20 years and has allowed me to develop a wonderful professional network of colleagues from around the world,” Hueste says. “I am truly honored to be recognized by ACI with this award.” ■

## TTI Encourages Young Women to Explore Transportation Careers

TTI conducted career exploration sessions Nov. 11 for 28 students in the San Antonio Independent School District’s Young Women’s Leadership Academy. Volunteers from Pape-Dawson Engineers and consultants from the Women’s Transportation Seminar (WTS) International Transportation YOU Program organized the sessions.



The Young Women’s Leadership Academy group is introduced to TTI’s Driving Simulator.

WTS International is a professional, global society committed to connecting, supporting and advancing women in transportation. The Transportation YOU Program provides mentoring opportunities for girls ages 13–18, introducing them to various transportation careers and offering a forum for asking questions and getting advice. Local WTS chapters volunteer with Transportation YOU to inspire girls to consider transportation careers and pursue related coursework.

“Encouraging young women to consider careers in transportation is one of the goals of the workforce development mission of the U.S. Department of Transportation’s University Transportation Centers [UTC] program,” says Sue Chrysler, TTI senior research scientist and director of the Institute’s Safety through Disruption UTC. “This group was particularly motivated, interested and a joy to work with.” ■

## Transition Takes Time

### *Internal Combustion Engines Aren't Dinosaurs Just Yet*

In this issue of the *Texas Transportation Researcher*, we've featured TTI experts conducting cutting-edge research designed to preserve and protect our environment. That includes helping pave the way for alternative-fueled vehicles, like electric cars. Electrified and fuel-celled propulsion are gaining significant momentum, but internal combustion engines (ICEs) aren't an extinct species yet.

It's easy to get excited about cleaner energy sources. Climate change accelerated by carbon-heavy emissions, including from ICE vehicles, is an existential threat. Reducing that carbon load is a top priority, so it's easy to get excited about alternative-fueled vehicles. Major automobile manufacturers like Ford, GM, Volvo and Mercedes have committed to producing scores of electrified models by 2030. But right now, NPR reports, approximately 97 percent of vehicles are gas and diesel fueled. And, according to Statista.com, U.S. gas stations recorded more than \$100 billion in sales in 2020. That ship can't turn quickly, no matter how enthusiastic we are about saving the planet.

Political pressures, public affordability, fleet turnover rates, infrastructure needs — these are just some of the challenges to shifting to cleaner propulsion vehicles. They'll titrate into the marketplace as price points, technology, public acceptance and policy incentives combine to catalyze change. In the meantime, we must be

vigilant in pursuing carbon-reduction strategies that yield cleaner emissions produced by ICE vehicles.

The trucking industry provides a window into the complexities of transitioning the fleet. Freight carriers operate on thin profit margins. A recent Bloomberg Law article suggests that by 2030 — due to the weight of the massive batteries powering them — long-haul electric trucks could be 5,000+ pounds heavier than ICE trucks. That means about 6 percent of the 80,000-pound weight limit imposed on trucks by law would be used by batteries. That's 6 percent less cargo revenue the industry will need to make up somewhere else in its business model to maintain viability. Trucking sub cultures like long-distance hauls versus last-mile deliveries (think: those blue Amazon vans in your neighborhood) further complicate the industry's evolutionary landscape.

We saw a similar reality check in recent years regarding connected

**Political pressures, public affordability, fleet turnover rates, infrastructure needs — these are just some of the challenges to shifting to cleaner propulsion vehicles.**

and automated vehicles. Not long ago, headlines had us riding in self-driving cars as a matter of course by 2025. It turned out to be much more complicated than we thought to make such a fundamental shift from person-controlled to computer-controlled driving.

Let's apply that lesson here. While we must continue to facilitate the shift to cleaner propulsion vehicles, let's be realistic about how long that will take. In the meantime, what can we do to reduce the environmental impact of the internal combustion engine? For the foreseeable future, we'll continue to rely on our ICE vehicles while the transition to electric vehicles is underway. ■

**It's easy to get excited about cleaner energy sources. Climate change accelerated by carbon-heavy emissions, including from ICE vehicles, is an existential threat. Reducing that carbon load is a top priority, so it's easy to get excited about alternative-fueled vehicles.**





**THINKing TRANSPORTATION**



Download, listen, and subscribe wherever you get your podcasts. Every other week, we interview a TTI expert or special guest on a wide range of transportation topics and discuss how those topics impact the average person.

<https://tti.tamu.edu/thinking-transportation/>


The banner features a dark blue background with a large white thought bubble containing the title 'THINKing TRANSPORTATION'. The word 'THINK' is in white, 'ing' is in gold script, and 'TRANSPORTATION' is in white. Surrounding the thought bubble are yellow line-art icons of a car, an airplane, a van, and a truck. The text on the right is in white, and the URL is on a yellow bar at the bottom.

**Upsides and Downsides:** *Transportation and public health share a complicated union.*

How we develop our transportation systems has direct and lasting impacts on personal well-being. Associate Research Scientist Ben Ettelman explains how newly identified pathways can help agencies ensure that the goals for efficient mobility and robust public health are inextricably linked.




The 'Stream Now' button is a black rectangle with a white smartphone icon and the text 'Stream Now'. Below it is a square QR code. The background image shows the rear of a white car with exhaust smoke coming from the tailpipe.



**First, Do No Harm:** *When endangered species habitats lie in a roadway's path.*

Unintended encounters with cars and trucks are bad news for animals. Not only do creatures face dangers on existing roads, they're often imperiled from the moment road construction begins. Assistant Research Scientist Jett McFalls talks about why protecting endangered snakes and toads is good for the creatures, and good for keeping road projects on schedule and on budget too.



The 'Stream Now' button is a black rectangle with a white smartphone icon and the text 'Stream Now'. Below it is a square QR code. The background image shows a brown and black patterned snake on a paved road.