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AI in the Sky: Satellites, Imaging, New Technology Applications in Transportation

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VOL. 58 | NO. 3 | 2022

TEXAS TRANSPORTATION Researcher

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Researcher
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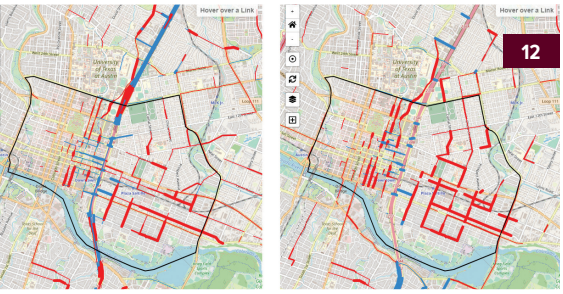
ON THE COVER: TTI's research staff in the El Paso urban office use drones to capture a bird's-eye view of border crossing traffic.



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TTI.RESR2300/8672.1222.4000

A PUBLICATION OF
Texas A&M Transportation Institute

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Texas Transportation Researcher (ISSN 00404748) is a quarterly publication of TTI Communications, Texas A&M Transportation Institute, 3135 TAMU, College Station, Texas 77843-3135. Periodicals postage paid at College Station.

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EXPANDING
TTI's Research Reach

Texas A&M Transportation Institute's (TTI's) urban research and implementation offices foster local agency cooperation and help assure implementable research results. Beyond its headquarters in Bryan/College Station, TTI supports eight urban offices across Texas; one urban office in Washington, D.C.; and two international offices in Doha, Qatar, and Mexico City, Mexico.

Headquarters
Bryan/College Station

Urban Offices

- Arlington
- Austin
- Dallas
- El Paso
- Houston
- Laredo
- San Antonio
- Waco
- Washington, D.C.

International

- Mexico City, Mexico
- Doha, Qatar

Clear the Way!

Emergency Vehicles En Route

During an emergency, seconds matter. However, navigating through busy urban arterials may sometimes be a tricky task for emergency response vehicles, particularly through busy intersections. In 2021, of the 633,499 roadway crashes in Texas, nearly 37 percent occurred at intersections, emphasizing the importance of improving safety in these scenarios.

An ongoing research project conducted by the Texas A&M Transportation Institute (TTI) and sponsored by the Texas Department of Transportation (TxDOT) has yielded promising results in an alternative means of notifying drivers of an oncoming emergency vehicle. TTI formed a multi-program research team collaborating on this project, with the TxDOT Houston District taking the lead.

"In the existing preemption systems, an emergency vehicle turns on its emergency sirens and strobe lights to alert nearby vehicles of its arrival," says TTI Assistant Research Engineer Tracy Zhou. "However, there is no alternative way of warning nearby vehicles when the drivers cannot be alerted properly by the sirens and lights. The goal of this project is to provide TxDOT with prototype systems for using connected vehicle [CV] technologies to improve traffic signal preemption and provide first responders and civilian drivers with signal, roadway and traffic information."

The CV technologies being studied include dedicated short-range communication (DSRC), cellular vehicle-to-everything (C-V2X) communication and Bluetooth® low-energy (BLE) communication.

The research team has been testing the hardware and software settings of the CV prototypes to broadcast various messages in a controlled environment and at selected field sites (e.g., single intersections, diamond intersections and ramp meters) in the TxDOT Houston District. Researchers will then identify the potential benefits of the connected emergency vehicle preemption system by simulation analysis and/or field data collection in before-and-after studies on selected corridors in Houston.

The key products of the project include DSRC/C-V2X and BLE prototype systems that operate on TxDOT infrastructure and guidelines for implementing the systems.

In the not-so-distant future, our vehicles may be able to provide us with even more critical roadway information such as when an emergency vehicle is approaching a congested intersection. Such traveler information is key to making split-second decisions that could save a life.

"By leveraging the CV emergency preemption technologies, the results of this project can help enhance the emergency response service system and improve the safety and mobility of our roadway system."

Tracy Zhou
TTI Assistant Research Engineer

"The Houston metropolitan area has witnessed a continuing increase in its population over the past decade. It is vital to ensure the safety and timeliness of first responders' travel for emergency services when major events (like Hurricane Harvey) happen," says Zhou. "By leveraging the CV emergency preemption technologies, the results of this project can help enhance the emergency response service system and improve the safety and mobility of our roadway system." ■

For more information, contact **Tracy Zhou** at h-zhou@tti.tamu.edu.

JUST HOW EFFECTIVE ARE Peak-Hour Lanes?

"The early results of our analysis have shown that these PHLs have impacted traffic in a positive way. We're seeing improved traffic volumes, increased speed and better traffic flow in the corridor during the PHLs' assigned operating hours."

Stephen Ranft
TTI Research Specialist

The Dallas–Fort Worth–Arlington metropolitan area is one of the most populous metropolitan areas in the United States. With a population of over 7.5 million people — and growing — the area has rapidly become a desirable place for families and businesses to locate to over the last decade. Alongside the population and economic growth, traffic congestion has quickly become a problem that many commuters must deal with on a daily basis.

In December 2020, the Texas Department of Transportation (TxDOT) Fort Worth District opened peak-hour lanes (PHLs) to help relieve traffic congestion on an approximately 2.5-mile section of the four-lane, divided, access-controlled SH 121 from Bedford to Euless. Researchers at the Texas A&M Transportation Institute's (TTI's) Arlington urban office are currently working on providing the TxDOT Fort Worth District with a before-and-after assessment of the operational performance of the PHLs.

"What we're trying to do for TxDOT is provide a comprehensive analysis of before-and-after implementation data to understand the impacts these PHLs have had on congestion over time," says TTI Research Specialist Stephen Ranft, lead researcher on the project. "Our assessment includes a comprehensive analysis of before-and-after implementation data related to traffic volume, travel speeds, queue-jumping volumes, and origin and destination data within the SH 121 corridor."

Example of a dynamic message sign indicating the lane is open to road users during the PHL's operating hours.

To create these PHLs, TxDOT and its regional partners converted the inside shoulder to a third travel lane — on both sides of SH 121 — for motorists to use during the peak operating hours of Monday through Friday, 5:00 a.m. to 8:00 p.m. Operational information regarding lane accessibility is relayed to drivers via dynamic message signs, new pavement markings and static signs. When not open for use, the inside shoulder remains available for emergencies and disabled vehicles.

"The early results of our analysis have shown that these PHLs have impacted traffic in a positive way," says Ranft. "We're seeing improved traffic volumes, increased speed and better traffic flow in the corridor during the PHLs' assigned operating hours."

Once Ranft and his team are done with their comprehensive assessment, TTI will continue working with the TxDOT Fort Worth District to assess before-and-after crash data to determine whether there are any safety concerns related to the implementation of the PHLs. ■

For more information, contact **Stephen Ranft** at s-ranft@tti.tamu.edu.

TTI Provides Technical Assistance Study on Railway Grade Crossings in Mexico

"Collisions between highway vehicles and trains have always been a main source of injuries and fatalities in the railroad industry. We're hopeful that this study will help Mexican officials identify unsafe railway grade crossings and prioritize the crossings that need to be addressed, while also accounting for adequate financial planning."

Juan Villa
TTI Research Scientist and Program Manager of TTI's International Trade and Border Transportation Program

Mexico's national railway network consists of 16,700 miles of railway lines. Following a restructuring and privatization completed in 1998, the system is operated under long-term concessions to the federal government. The restructuring has resulted in the steady growth of freight rail traffic and increased efficiency. The road and rail systems intersect at more than 7,000 level crossings, with only a handful of these crossings having functional modern crossing safety technology. In 2017 alone, there were 718 level crossing accidents involving trains and automobiles or pedestrians. Rail and road traffic in Mexico is projected to continue to grow, increasing the risk of these types of accidents. Mexico's Secretariat of Communications and Transportation has identified accidents at railroad level crossings as a critical public safety issue that must be addressed.

Beware of the Train sign.

Road workers by the Zapopan Air Force Base install a railway crossing intersection sign.

The Texas A&M Transportation Institute (TTI) served as the primary contractor for a recently completed technical assistance (TA) study for the Mexican Railroad Association (AMF), funded by the U.S. Trade and Development Agency. Researchers from TTI's Mexico City urban office worked with Mexican and U.S. rail transport experts to analyze the safety situation at railway grade crossings (e.g., intersections where a railway line crosses a road or path at grade) in Mexico. Researchers then developed a financial plan that would allow the modernization and installation of technological devices for the railway network in the coming years.

"Safety and security are paramount for any railway system," says Juan Villa, TTI research scientist and program manager of TTI's International Trade and Border Transportation Program. "Although we've only recently completed the TA, this study will hopefully be a great contribution to support the development of safety at railway grade crossings in Mexico."

The study included the identification and review of existing studies, as well as the evaluation and comparison of the different standards, laws, manuals and guidelines on railway grade crossings in Mexico and the United States. The evaluation was critical in providing researchers with enough information to assess the railway signage needs in Mexico and develop an investment plan to increase safety at railway grade crossings.

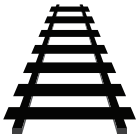
The scope of the TA study also included a cost-benefits analysis, a review of crash statistics and reports related to safety at crossings, and an analysis of the documents related to the processes, guidelines and criteria to be considered in the development of the investment plan.

"Collisions between highway vehicles and trains have always been a main source of injuries and fatalities in the railroad industry," notes Villa. "We're hopeful that this study will help Mexican officials identify unsafe railway grade crossings and prioritize the crossings that need to be addressed, while also accounting for adequate financial planning."

Altogether, the TA study presents railway practitioners in Mexico with:

- detailed field studies and technical evaluations of 63 railroad crossings identified by AMF, with detailed engineering drawings for the solution at these crossings;
- cost estimates for the 63 crossings and evaluation of more than 7,500 level crossings of the Mexican Railway System to estimate intervention costs; and
- an analysis of potential funding sources to provide recommendations for the implementation of the solutions and investment for grade-crossing improvements over the next seven years. ■

For more information, contact **Juan Villa** at j-villa@tti.tamu.edu.



Mexico's national railway network consists of **16,700 miles of railway lines.**

The road and rail systems intersect at more than 7,000 level crossings, with ***only a handful of these crossings having functional modern crossing safety technology.***

In 2017 alone, there were 718 level crossing accidents involving trains and automobiles or pedestrians.

Do Not Enter!

YOU'RE DRIVING THE WRONG WAY

"The high-risk locations were determined using crash data from various sources including TransGuide logs and SAPD 911 call data. This resulted in us selecting the US 281 corridor as a WWD testbed by installing LED border-illuminated WWD red signs and WWD radar detection on all exit ramps."

Steven Venglar
TTI Research Engineer

Few scenarios are more terrifying for a motorist than encountering someone driving the wrong way on a freeway. When a crash occurs because of wrong-way driving (WWD), the results are often catastrophic.

Such was the case on March 15, 2011, when San Antonio Police Department (SAPD) Officer Stephanie Brown was killed by an intoxicated WWD driver while responding to a 911 call. The tragedy prompted local agencies to band together to create a task force to initiate and lead WWD countermeasure efforts in the region.

"Officer Brown's death really brought the issue of WWD to the forefront," says Texas A&M Transportation Institute (TTI) Research Engineer Steven Venglar. "San Antonio knew that it had a drinking and WWD problem, but this was certainly the point that facilitated everything coming together. What it did was essentially bring the agencies together in a task force, which was managed by the Texas Department of Transportation [TxDOT]."

The project showed that flashing LED Wrong Way signs reduced the number of wrong-way driving incidents.

"They [TTI] have helped us analyze the data and provided proof that what we are doing is working. Their two-year study of the US 281 corridor proved that the flashing LED Wrong Way signs we installed reduced the reports of WWD activity by 30 percent — a huge first success for our WWD program."

John Gianotti
TxDOT's Manager of the San Antonio TransGuide Traffic Management Center

The task force included TxDOT, SAPD, the Bexar County Sheriff's Office, the City of San Antonio Public Works, the Federal Highway Administration and TTI. The goal of the task force was to:

- investigate prior WWD-related research,
- identify high-risk locations,
- investigate WWD countermeasures for a San Antonio testbed, and
- improve agency actions to speed response to WWD events.

"The high-risk locations were determined using crash data from various sources including TransGuide logs and SAPD 911 call data," says Venglar. "This resulted in us selecting the US 281 corridor as a WWD testbed by installing LED border-illuminated WWD red signs and WWD radar detection on all exit ramps."

The improved agency response for WWD incidents for TxDOT included the development of TransGuide operator WWD logs, consistent dynamic message sign alerts, and WWD countermeasures for most future freeway construction projects.

Additional actions resulting from task force recommendations included:

- added red reflective tape on Wrong Way and Do Not Enter signs (for WWD drivers),
- increased the size of One Way signs,
- investigated but did not implement lowered Wrong Way and Do Not Enter signs, and
- performed a field study of all exit ramps in the San Antonio area.

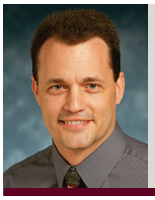
"Past TTI research revealed a very strong link to impaired drivers," says Venglar. "WWD crashes also occur mainly at nighttime and are severe. This project recommended pavement arrows at all exit ramps and suggested considering lowering Wrong Way and Do Not Enter signs; these were things that were checked during field reviews by TTI and TxDOT staff."

As a countermeasure, red reflective tape can be seen running down the entire length of the Wrong Way sign.

The work on the San Antonio task force led to multiple projects sponsored by TxDOT with the goal of examining WWD crash analysis and countermeasures. A recent TxDOT WWD project performed closed-course testing with alcohol-impaired drivers. This research showed that impaired drivers tended to look down and not search the forward driving scene as much, and that they also took longer to "find" roadway signage. Another project is currently examining technologies used to detect WWDs on freeway exit ramps.

Similar WWD efforts have led to countermeasure deployments in major urban areas throughout the state, including Fort Worth, Houston, El Paso and Dallas.

"TTI has been with TxDOT from day one of our WWD program," says John Gianotti, TxDOT's manager of the TransGuide traffic management center in San Antonio. "They have helped us analyze the data and provided proof that what we are doing is working. Their two-year study of the US 281 corridor proved that the flashing LED Wrong Way signs we installed reduced the reports of WWD activity by 30 percent — a huge first success for our WWD program. TTI continues to evaluate all aspects of our WWD program including its current research project that is evaluating WWD detection systems from numerous manufacturers for TxDOT to develop a WWD detection spec that can be used throughout the state. TTI has been one of our most valuable partners for the past 11 years and is a big reason for the success of the WWD program." ■



For more information, contact **Steven Venglar** at s-venglar@tti.tamu.edu.

AI IN THE SKY

SATELLITES, IMAGING, NEW TECHNOLOGY APPLICATIONS IN TRANSPORTATION

If you watch police procedurals on television, you've probably seen an episode where traffic cameras play a pivotal role in solving the crime. Usually, an analyst zooms in to identify the perpetrator's license plate, providing the clue needed to close the case.

Using the big-picture power of video imaging can be just as helpful in transportation management. And enhanced by artificial intelligence (AI), today's imaging technologies can help transportation planners do in a fraction of the time what it took them days or even weeks to accomplish in the past. Researchers in the Texas A&M Transportation Institute's (TTI's) El Paso Office have applied advanced video technology to improve transportation at the U.S.-Mexico border for years. For more than 15 years, TTI engineers and analysts have worked with regional stakeholders — including the Texas Department of Transportation (TxDOT) and national and international sponsors — to make cross-border trade and travel safer, more efficient and more secure. In 2006, the Texas Legislature funded TTI's Center for International Intelligent Transportation Research (CIITR) for just that purpose.

"Leveraging advanced technologies to improve transportation management has always been a primary focus for TTI research at the border."

Rafael Aldrete
TTI Senior Research Scientist and CIITR Director

"Leveraging advanced technologies to improve transportation management has always been a primary focus for TTI research at the border," explains CIITR Director Rafael Aldrete. "Now, we're learning to extend those traditional applications, like evaluating transportation's role as a vector in spreading COVID-19 across the border in 2020." To date, TTI has applied advanced technologies, like high-resolution satellite imaging and drone technology, to enhance border traffic operations. For example, these technologies can help U.S. Customs and Border Protection maintain security while planning for situations when unexpected traffic disruptions at the border cause long lines of trucks.

Using AI is integral to successfully leveraging these technologies since it can analyze thousands of images, enhance their resolution, and extrapolate assumptions about traffic patterns much faster than human beings. TTI helped regional stakeholders apply AI recently to mitigate the effects of supply-chain shortages by determining more accurate wait times at land ports of entry, where delays can negatively impact cross-border commuting and shipping costs.

"We are now in the process of determining how to apply these technologies to facilitate asset management and evacuations during extreme weather events," says TTI Associate Research Scientist Swapnil Samant. "It's not inaccurate to say that through these new applications, lives can be saved and injuries avoided." TxDOT and local partners, such as metropolitan planning organizations, must monitor, maintain and repair the state's transportation network on a limited budget with finite resources. In TxDOT's case, that means stewardship for nearly 80,000 miles of roadways statewide, including interstates — more than any other state in the nation. Keeping track of all the damaged bridge rails, pavement and other roadside assets has been a daunting task historically because of the time and effort involved in simply knowing where the problems exist.

"Satellite imaging can make that task much easier," Aldrete says, "by providing fast, accurate measurements of roadway widths. By sifting through gigabytes of satellite imagery and enhancing their resolution with AI algorithms, it's relatively easy to inventory where assets are and, as the technology matures, potentially assess their condition and identify needed repairs. That would enable an agency like TxDOT to assess and prioritize repair needs rapidly and efficiently."

"You can even use imagery taken at one location and translate it onto another location, similar to the way deepfakes work."

Swapnil Samant
TTI Associate Research Scientist

Similarly, these advanced technologies can help agencies not only develop plans that improve their responses to extreme weather events but also create a better plan in advance for dealing with them when they occur. The logistical challenges are enormous for managing mass evacuations before a hurricane hits. But if local agencies know which roads are flood risks, they can plan ahead and direct motorists to safer roadway alternatives. These alternative options can help motorists avoid traffic bottlenecks and even potentially reduce drowning deaths in low areas. Having a response plan in place based on a data-driven understanding of how the network reacts under environmental stressors can also help get first responders and necessary goods, like water and toilet paper, where they need to be faster, safer and more reliably after the event.

"You can even use imagery taken at one location and translate it onto another location, similar to the way deepfakes work," Samant explains. Deepfakes are a recent trend wherein videos are manipulated or altered from their original form. "So, you could take imagery from one coastal region and determine how the network in another area might function under similar conditions."

Thirty years ago, helping to solve crimes with high-resolution imaging was more fantasy than reality because camera resolution wasn't advanced enough — but it got better, and now that reality is here. Similarly, transportation researchers are on the verge of using satellites and AI analysis to show us the bigger picture of transportation with a whole new level of detail. ■

For more information, contact
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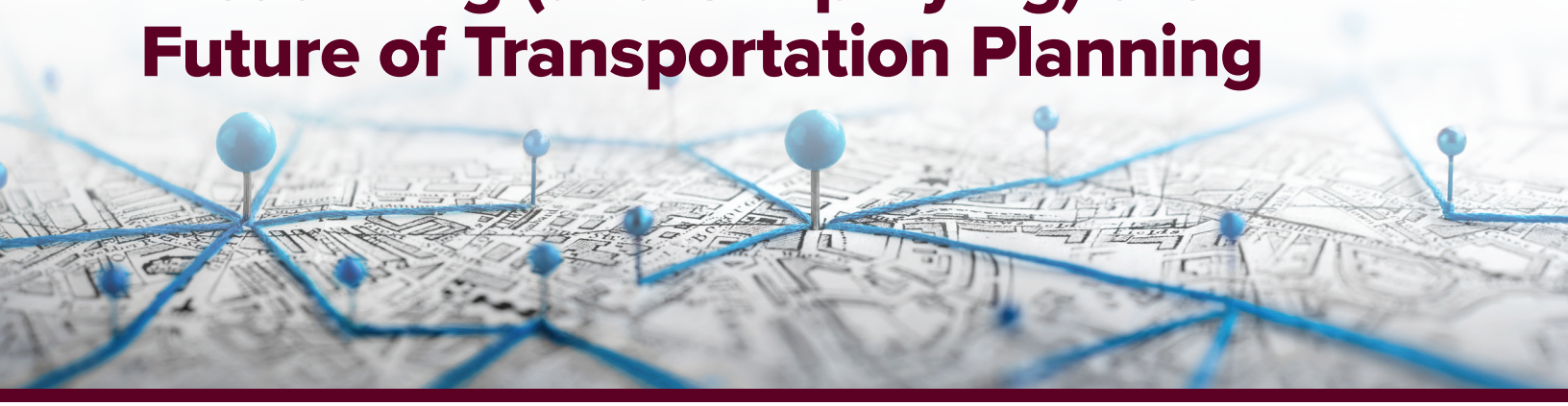
Swapnil Samant at s-samant@tti.tamu.edu.

Visualizing (and Simplifying) the Future of Transportation Planning



"Our research team has developed advanced data visualization tools, utilities, reports and dashboards to convey sophisticated transportation results to TxDOT, metropolitan planning organizations, local transportation planners and the public."

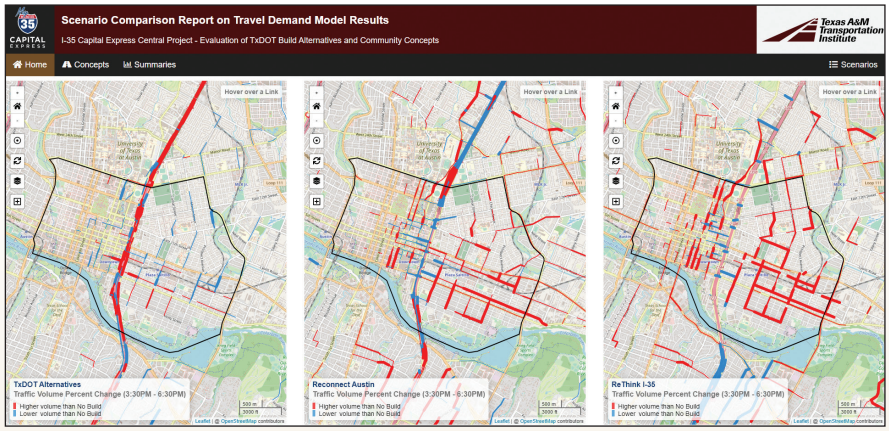
Hao Pang
TTI Assistant Research Scientist

For many years, the Texas A&M Transportation Institute (TTI) has provided travel demand model (TDM) technique support for the Texas Department of Transportation (TxDOT) as the base of the urban transportation planning process. The TDM is critical to the transportation planning process since it is used to predict future demand for transportation facilities and services. The TDM also estimates the impacts of policies and projects on travel behavior and travel demand. The TDM typically yields complicated sets of data that require professional skills and a large amount of effort to interpret and understand. Therefore, a visual way to bridge the gap between travel demand modelers and other audiences became necessary.

Researchers from TTI's Austin Office have built data visualization tools that effectively convey the sophisticated TDM results to various audiences with different levels of transportation knowledge.

"Our research team has developed advanced data visualization tools, utilities, reports and dashboards to convey sophisticated transportation results to TxDOT, metropolitan planning organizations, local transportation planners and the public," says TTI Assistant Research Scientist Hao Pang, who has led the effort. "Depending on audiences and the project's purposes, TTI researchers built several HTML-based reporting and analyzing tools using JavaScript-based application programing interfaces. We have also presented at several key transportation conferences."

One of the key elements of the project is its ability to design interfaces with the end user in mind.



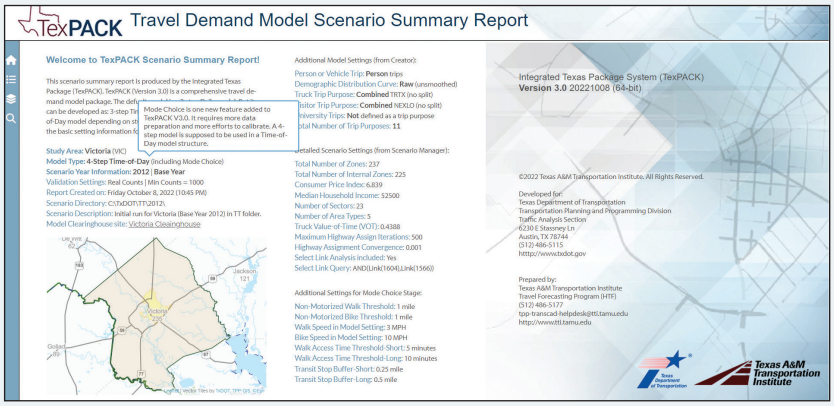
A screenshot of the CapExpress I-35 scenario comparison dashboard – traffic flow comparison.

I-35 Capital Express Central Project

This project through the heart of downtown Austin proposes to add two non-tolled managed lanes in each direction along I-35 in high-congestion areas. The research team prepared a report that was designed to show scenario comparisons during open meetings to the public.

TexPACK Integrated Travel Demand Modeling Application

This application includes a suite of TDM software incorporating trip generation and distribution techniques. The report for this project summarized the travel demand results and was used to replace an older, more difficult-to-interpret format. The audience is TxDOT and metropolitan planning organization personnel who may have a level of transportation knowledge but are not experts.



The user interface of the TexPACK Travel Demand Model Scenario Summary Report.

Demographic Check Report

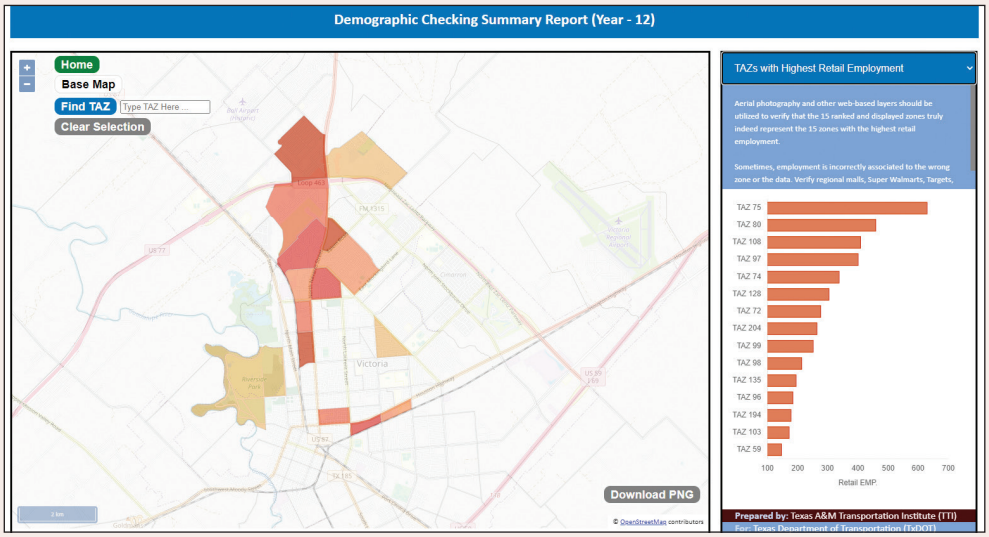
This data set is generated by a utility of the TDM and is more a tool/utility than a report that illustrates the demographics of certain segments within a region. The audience is TxDOT or TTI personnel with some level of transportation knowledge.

"Travel demand models are inherently complicated," says TxDOT Transportation Planning and Programming Division Model Program Manager Tammye Fontenot. "Through our partnership with TTI, TxDOT has developed easy-to-create and user-friendly visualization tools that greatly broaden the ability of Texas transportation stakeholders to interpret travel model results."

"The ultimate goal is to build interactive visualization tools as a 'lingua franca' or 'shared environment' in the transportation practice to support and facilitate collaboration and the decision-making process," says Pang. ■

"Travel demand models are inherently complicated. Through our partnership with TTI, TxDOT has developed easy-to-create and user-friendly visualization tools that greatly broaden the ability of Texas transportation stakeholders to interpret travel model results."

Tammye Fontenot
TxDOT Transportation Planning and Programming Division Model Program Manager



The demographic checking visualization tool for TexPACK model validation.

For more information, contact **Hao Pang** at h-pang@tti.tamu.edu.

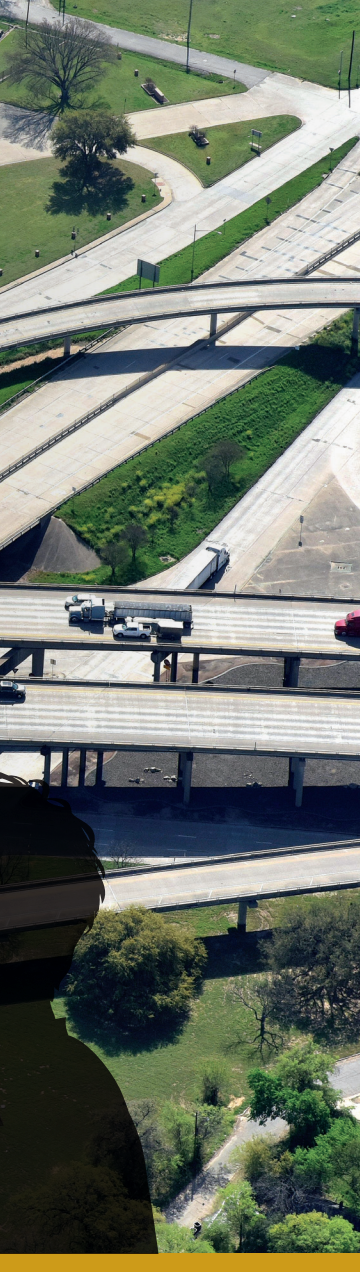
COMMUNICATION IS KEY —
TTI Mobility Coordinator Eases the Burden of Construction in Waco

Keeping close tabs on progress and traffic control changes along the I-35 corridor in the Waco District enables Habermann to ease the impact of ongoing construction on local homeowners and business owners.

Since 2012, the Texas Department of Transportation (TxDOT) has conducted the My35 Construction Project along I-35 in Central Texas. Called "Main Street Texas" for the vital role the corridor plays in international commerce, I-35 is host to hundreds of thousands of cars and trucks each day.

Comprising 17 separate construction projects, the 96-mile stretch between Hillsboro and Salado marks the section overseen by TxDOT's Waco District, and each project has had its own set of challenges. As TxDOT implemented improvements — which included reversing frontage roads, adding main lanes, and rebuilding bridges across the Brazos River — the Texas A&M Transportation Institute (TTI) has lent considerable technical and outreach support in the past decade.

In roadway construction efforts, especially ones as complex and far reaching as My35, more than motorists are impacted by construction work zones. Businesses are affected, too. This can, understandably, make for serious concerns from business owners.



It's Not Just What You Say...

"That's where the mobility coordinator comes in," explains TTI Research Engineer John Habermann, who's served in that role in the Waco District since 2013. "I'm essentially an unbiased ombudsman whose job it is to listen to stakeholders' concerns, represent the department's objectives, and offer technical recommendations."

Wearing several hats at the same time can sometimes be a challenge. TxDOT's overall goal is to improve safety and mobility along the corridor to facilitate long-term economic growth at the state and national level, as well as provide new opportunities for local growth to the communities along the corridor. And while they can appreciate that, business owners and homeowners impacted by construction have their own issues today that must be addressed. It's striking a balance that makes Habermann's job so challenging — and fulfilling, he's quick to note.

"I like to visit with people, to hear their stories and even help them out when I can," Habermann says. "By visiting with folks impacted by the My35 Project, I can help them understand what's going on, set their expectations about how long the work is to take, and maybe even defuse some tension for all involved."

Public presentations, one-on-one meetings, conference calls, and construction and traffic know-how — these are the tools of Habermann's trade. And they've led him to some experiences he might not otherwise have had.

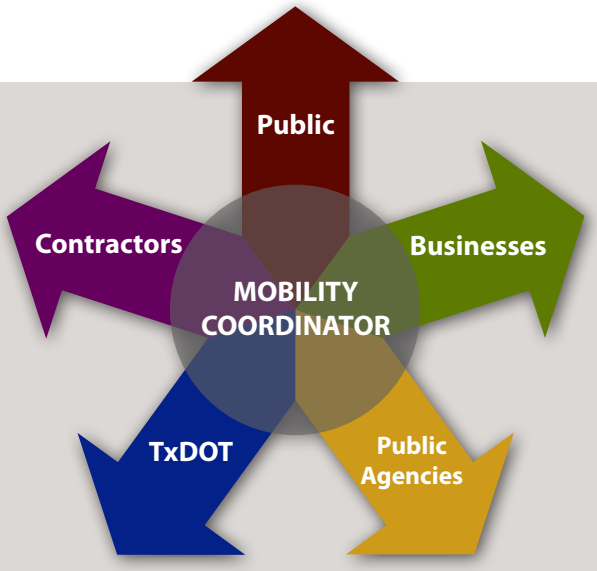
Other Roads, New Challenges

In keeping with TTI's education mission as part of The Texas A&M University System, Habermann reached out to Baylor University and has mentored some two dozen college students since 2014, giving them real-world experience in TTI's Waco Office. Students learn about potential public-sector jobs that sometimes get lost among the glitz and glamor of private-sector pitches. Baylor University regularly requests Habermann's input for its Advanced Public Relations course, where he answers student questions about career opportunities in public service.

In 2021, Habermann led an intercollegiate team to recommend ways for transportation professionals, often unknowingly on the front line of the war against human trafficking, to better recognize when they encounter victims during the course of their jobs. He's helped develop materials for this group to increase their awareness and enlist them in the fight. (See https://www.hothtc.org/.)

"All of us in the transportation field want to make a difference," Habermann says. "I can honestly say I'm making a difference through the coalition, and nothing in my career has been as fulfilling as this work is." ■

For more information, contact **John Habermann** at j-habermann@tti.tamu.edu.



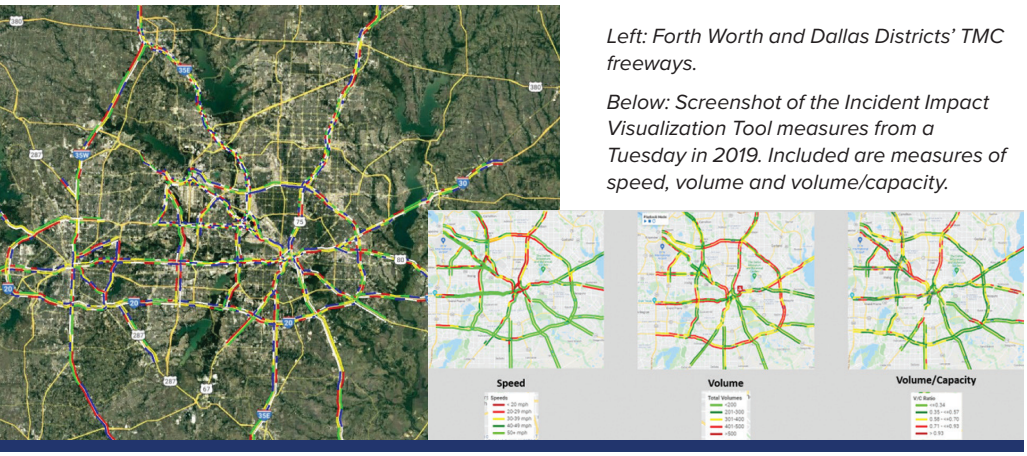
Engaging the Public

Part of a mobility coordinator's job is helping local officials in communities affected by construction respond to voters' concerns. TTI Research Engineer John Habermann regularly serves in this role for officials affected by the My35 Project.

"I translate between the 'engineering speak' that sometimes characterizes official TxDOT information and the everyday worries of real people," Habermann says. His efforts have earned him appreciation from TxDOT and the communities it serves.

"I was engaged by TxDOT over a year before construction began," says Waco Mayor Dillon Meek. "At that time, I was a city council member and chair of the metropolitan planning organization. Once elected mayor, I continued to rely on John Habermann to answer constituents' concerns about construction. His prompt replies gave me peace of mind about I-35 construction so I could focus my attention on other pressing issues in our community." ■

Visualizing Disruptions on Our Roadways



Left: Forth Worth and Dallas Districts' TMC freeways.

Below: Screenshot of the Incident Impact Visualization Tool measures from a Tuesday in 2019. Included are measures of speed, volume and volume/capacity.

Roadway congestion continues to be a frustration for drivers across the nation. Delays and slowdowns caused by crashes, extreme weather or even road debris dramatically affect the reliability of the transportation system and can add grueling hours to commuter drive times. While congestion may seem unavoidable at times, the ability to track roadway incidents and understand their impacts on congestion levels remains crucial as the transportation system continues to evolve and grow.

Researchers at the Texas A&M Transportation Institute's (TTI's) Dallas urban office have developed an Incident Impact Visualization Tool for the Texas Department of Transportation's (TxDOT's) Dallas and Fort Worth traffic management centers (TMCs). Using TxDOT's intelligent transportation system (ITS) data — among other data sources — the web-based tool is intended to help transportation managers and operators visualize and analyze incidents on the freeway network, such as crashes, lane closures, stalled vehicles and secondary incidents (i.e., an unplanned incident that occurs after the primary incident).

"The tool that we've developed for TxDOT allows both Dallas and Fort Worth TMCs to visualize incidents they have not been able to before," says Minh Le, TTI research engineer. "With over 40,000 freeway incidents reported by TxDOT annually, this tool enables transportation practitioners to go back in time and evaluate an incident based on its impact to traffic flow during a specified date and time range, or incident type."

The tool fuses ITS sensors and TMC event data with TxDOT's Crash Records Information System (CRIS) and a third-party weather data source, and displays the output in a playback mode to show operational impacts on the freeway network. Transportation managers, analysts, planners and operators can use the tool to perform post-incident analyses and conduct operational and maintenance planning by assessing roadway network impacts.

A powerful feature of the tool that can assist with these assessments is the estimated delay associated with each incident. Using the incident location and time, the total delay is based on the resulting queue (upstream link speeds relative to historical link speeds) and the duration (playback start and end times). By enabling this feature, end users can:

- conduct a comprehensive analysis of incidents and crashes,
- identify trends/patterns and plan accordingly to help address any future incidents, and
- compare TMC incidents to CRIS crashes.

As the tool continues to be used by practitioners in both the Dallas and Fort Worth TMCs, TTI researchers are regularly identifying ways to improve the tool's application. Two enhancements were recently added — the ability to search for CRIS contributing factors and multiple CRIS crashes at the same time — with additional enhancements planned for the future. ■

For more information, contact **Minh Le** at m-le@tti.tamu.edu.

TTI Researchers Participate in TRB SETT Conference

Several TTI researchers participated in the Transportation Research Board's (TRB's) Sustainability and Emerging Transportation Technology (SETT) Conference. TRB hosted the conference May 31–June 2 at the Arnold and Mabel Beckman Center in Irvine, Calif.

"TTI was well represented at the TRB SETT Conference," notes TTI Executive Associate Director Katie Turnbull. "The presentations and discussion were excellent, and it was great to interact with everyone."

Ipek Sener, TTI research scientist, and Tara Ramani, TTI associate research engineer, were both on the SETT Conference Planning Committee. Sener moderated the breakout session Micromobility for All? and presented the poster Full-Chain Health Impact Assessment of Autonomous Vehicles: A Review of Literature and a Conceptual Framework.

"It was a nice and unique conference!" Sener comments. "We had exciting discussions and presentations, and it was wonderful to finally gather for our first SETT conference and meet several colleagues and friends in person."

Turnbull moderated the breakout session Travel Behavior and Early Adoption of Automated Technology and the closing plenary session. Alice Grossman, TTI associate research scientist, moderated the panel Electrification — A Path to Decarbonization? and participated in the closing panel, presenting the energy decarbonization breakout track summary.

At the TRB SETT Conference, Katie Turnbull (far right) moderated the closing plenary session, and Alice Grossman (second from left) served as a panelist. Photo Source: Gary Jenkins, TRB.

Grossman says, "The conference did a great job of bringing researchers and practitioners together to discuss how to bring engineering, planning and social science together to inform policy and work toward energy decarbonization goals." ■

Camp BUILD Visits TTI to Explore Engineering Careers

TTI hosted two groups of campers June 23 and 30 from Texas A&M University's Zachry Department of Civil and Environmental Engineering's Camp BUILD. TTI Senior Research Engineer Melisa Finley and Associate Research Engineer Debbie Albert organized the sessions with support from Texas A&M students and volunteers.

Campers watched a live crash test at the TTI Proving Ground and toured the Institute's Environmental and Emissions Research Facility, Sediment and Erosion Control Laboratory, and Visibility Research Laboratory. Campers also attended a presentation about TTI's Teens in the Driver Seat® Program and ended the day creating their own "puff-mobiles" using Lifesaver candies, straws, paper and paper clips.

Camp BUILD is a week-long summer program designed for high school juniors and seniors. Students are given the opportunity to explore the civil and environmental engineering program at Texas A&M and experience Aggie culture.

"I always enjoy watching the excitement and passion in students' faces when they learn something new about transportation," says Albert. "I hope that by exposing students to the breadth of work we do at TTI, they feel more inclined to explore opportunities that get them involved in science, technology, engineering and math activities and transportation safety."

Jett McFalls explains the varying intensities of the rainfall simulator at TTI's Sediment and Erosion Control Laboratory.

TTI's participation in Camp BUILD is supported by the Safety through Disruption University Transportation Center, a national center funded by the U.S. Department of Transportation and the State of Texas. ■

TTI's Minjares-Kyle Promoted to Youth Transportation Safety Program Manager


Minjares-Kyle

After 35 years of service with TTI — nearly 30 of that in a management position — Russell Henk stepped down as program manager of the Youth Transportation Safety (YTS) Program effective June 30.

"Creating the Teens in the Driver Seat® Program and leading the YTS team for the past 20 years has been very rewarding," says Henk. "It has been an honor and a privilege to lead such a talented group, and I know the program is in great hands."

Henk will continue working for TTI on a part-time basis in the Center for Transportation Safety.

Stepping into her new role as program manager of the YTS Program is Lisa Minjares-Kyle. She has worked at TTI for 12 years specializing in young drivers, impaired driving, and safety education and outreach. She is a master-certified health education specialist and received both her bachelor's and master's degrees from Texas A&M University in psychology and health education. Minjares-Kyle was also part of the traffic safety administration program's second graduating class from Clemson University, where she earned her second master's degree.

"I'm very excited to lead YTS and continue to work alongside this phenomenal team," says Minjares-Kyle. "We are continuing to combat one of the leading causes of injury and death for youth — car crashes — through the peer-to-peer programs that are the foundation of YTS. It's my hope to continue expanding YTS efforts into health prevention, safe systems and traffic safety culture to better achieve our mission and effectively address the continually changing landscape young drivers are facing on our roads." ■

TTI Studies Parking Technology for I-80, I-94 Corridors

TTI researchers are teaming up with the University of Wisconsin–Madison and ParkUnload to conduct a truck parking pilot study to better understand how truck drivers use existing parking spaces and to test the benefits of using a mobile parking app. Funding for this study is provided by the Federal Motor Carrier Safety Administration (FMCSA) under a cooperative agreement through the agency's fiscal year 2020 High Priority grant program.

Select truck parking spaces along I-80 and I-94 were painted green, and signs instrumented with truck parking technology (i.e., Bluetooth® devices) were recently installed. These devices communicate with the ParkUnload app when a driver's phone is in close proximity to the parking zone. Once the app detects the marked zone, the truck driver can park and check in to the parking space on the app to let other drivers see information on remaining spaces. Marked signs also provide drivers with additional information.

"Insufficient truck parking presents a safety hazard for all highway users when drivers park in unauthorized locations, drive when fatigued, or drive past their hours of service to find safe parking," says Brian Routhier, a transportation specialist with the FMCSA Technology Division. "We're hoping this study will provide a better understanding of the truck parking needs along these corridors and whether a truck parking app is beneficial to drivers."

Drivers who travel along the I-80 and I-94 corridors can get started and participate in just three steps:

1. download the ParkUnload app;
2. park and check in to the parking space in the app; and
3. when leaving, check out in the app.

"For the pilot to work, we need drivers to download the app and check in when they park in a designated parking space," says TTI Senior Research Scientist Jolanda Prozzi, lead researcher on the study. "If we can collect actual, on-the-ground information, then we can better understand, plan for, and prioritize truck parking investments."

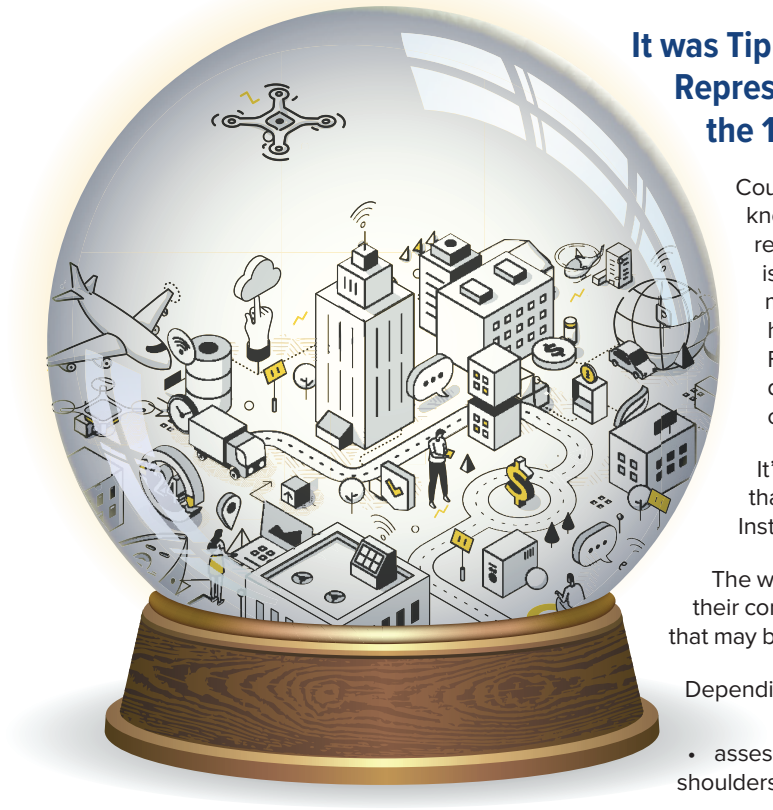
To learn more about the study, please visit parkingpilot.org. ■

For more information, contact **Bernie Fette** at b-fette@tti.tamu.edu.

THE LAST STOP

with Greg Winfree, Agency Director

Mobility, Up Close and Personal



It was Tip O'Neill, a former speaker of the U.S. House of Representatives, who was famously known to say in the 1980s, "All politics is local."

Countless candidates for office decades later routinely rely upon door knocking and town hall gatherings, attesting to both the durability and relevance of O'Neill's philosophy. His words concisely captured how it is the mundane but often indispensable elements of everyday life that matter most to people. And few things are more indispensable than how we get ourselves and the things we need from point A to point B. For the most part, we're far more concerned with the reliability of our daily commute than we are with lofty concepts of a high-speed rail line connecting Los Angeles to New York.

It's that focus on local mobility issues, often at their most granular level, that inspires and guides the efforts of the Texas A&M Transportation Institute's (TTI's) network of urban area offices.

The work in those regions is responsive to the needs of local travelers and their communities, addressing distinct challenges and refining approaches that may benefit other urban areas with comparable circumstances.

Depending on the city in question, that could mean:

- assessing the congestion-relief value of peak-hour lanes on highway shoulders;
- developing new data visualization tools to convey highly sophisticated mobility conditions and facilitate planning efforts;
- creating a web-based tool to visualize and analyze the operational impact of incidents such as crashes, lane closures and stalled vehicles;
- navigating the one-of-a-kind quandaries that are commonplace when city, state and international borders converge;
- using data from connected vehicles to improve traffic signal operation and give priority status to emergency vehicles;
- addressing higher-than-normal incidents of wrong-way driving on freeway ramps; and
- balancing the needs and priorities of community interests in the midst of the biggest highway reconstruction project in Texas history.

Like politics, all transportation is local. Few things tie communities together more practically or profoundly than their mobility systems, and no two of them are exactly alike. Those realities will always be at the foundation of the work we do through TTI's regional service centers.

You can read more about each of these ventures in this issue of our magazine. You can also learn about the people behind them who constitute our urban office staffs. One and all, they are consummate professionals, highly regarded ambassadors in their communities who hold positions of trust and confidence as they partner with operating agency staff. Although TTI operates as a hub-and-spoke organization, our local experts are nimble and responsive to exclusive local challenges.

Like politics, all transportation is local. Few things tie communities together more practically or profoundly than their mobility systems, and no two of them are exactly alike. Those realities will always be at the foundation of the work we do through TTI's regional service centers. ■

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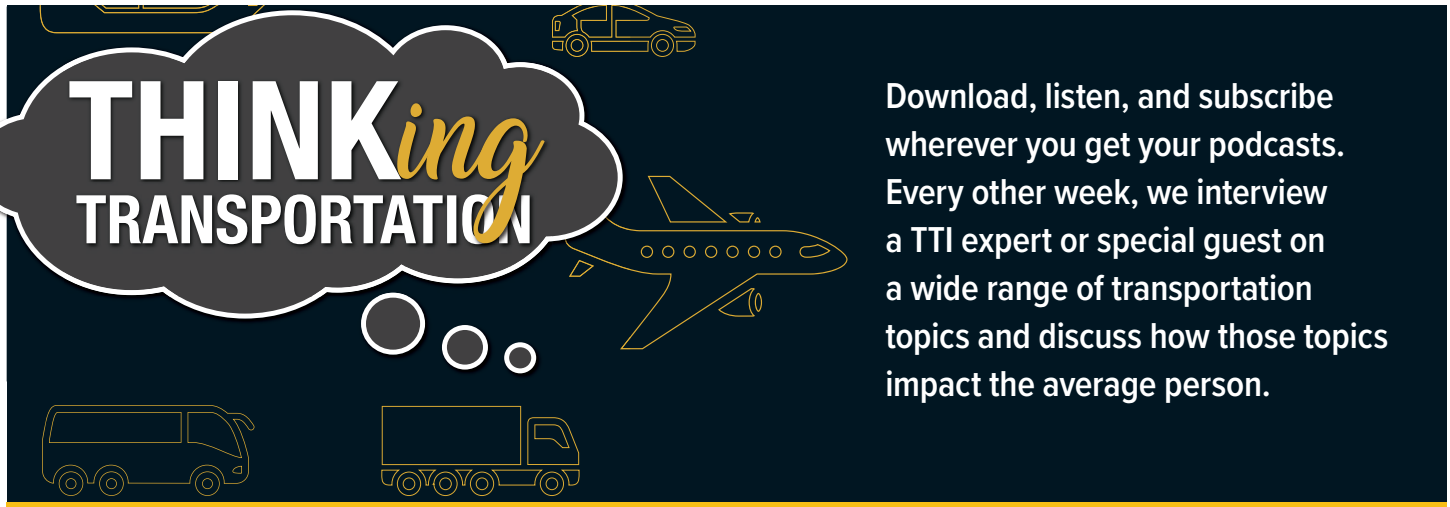

Download, listen, and subscribe wherever you get your podcasts. Every other week, we interview a TTI expert or special guest on a wide range of transportation topics and discuss how those topics impact the average person.

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

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