

Faster, Safer, Less Expensive Road
Construction Through Utility
Engineering

Slower Doesn't Always Mean
Safer — NCHRP Guide Helps
Planners Mitigate Work Zone
Crashes

Double Time — Accelerated
Construction Strategies Enable
a Quicker Pace Toward Project
Completion

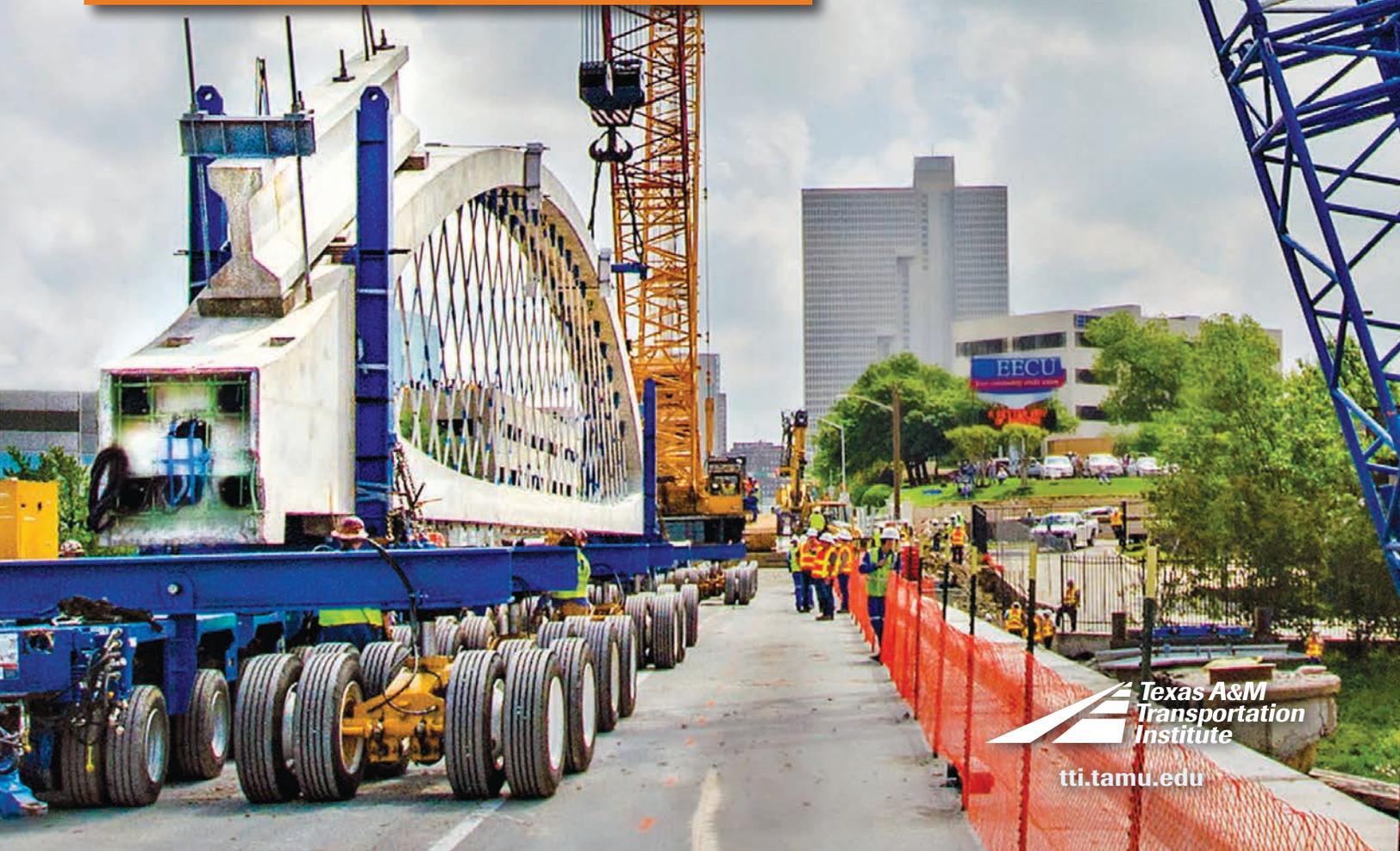
TEXAS TRANSPORTATION

VOL. 54 | NO. 3 | 2018

Researcher

TIME IS MONEY

Working Faster, Building Smarter



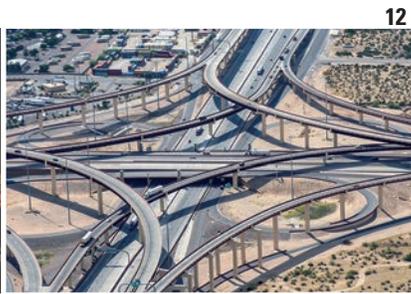
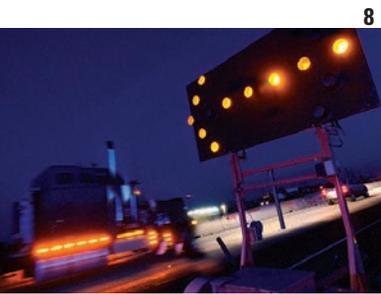
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ON THE COVER: Prefabricating concrete bridge arches, then transporting them to the construction site, can save time during construction. This accelerated bridge construction technique was embraced during construction of Fort Worth's West 7th Street Bridge. Photo courtesy TTI Research Engineer Scott Cooner.



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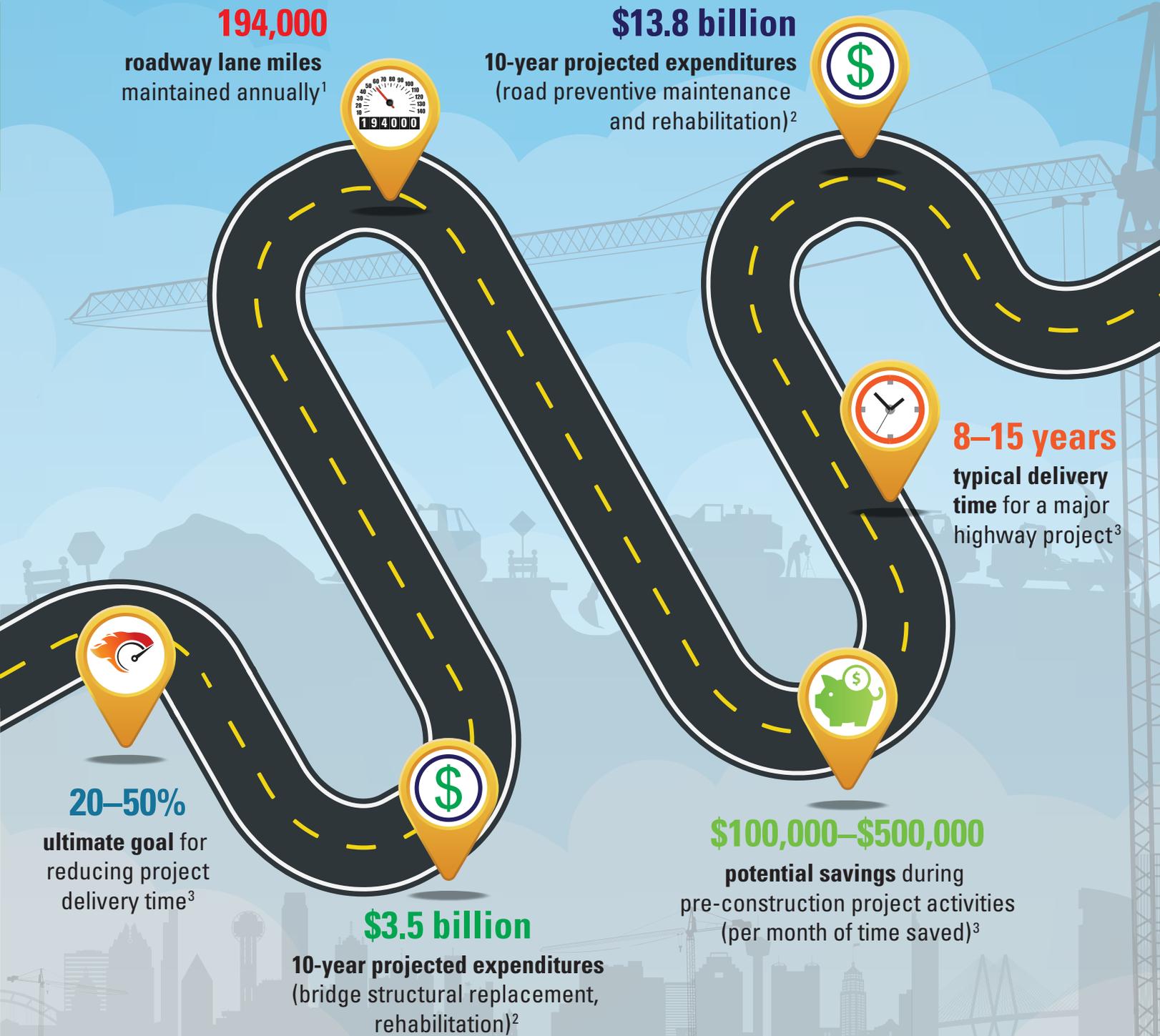
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On the Road Again in Texas

TxDOT's Projected Costs and Potential Savings with Accelerated Construction

AT A GLANCE



¹ Texas Department of Transportation (TxDOT). "Texas Transportation Asset Management Plan" (forthcoming).

² TxDOT. *Unified Transportation Program*. (2019). <http://ftp.dot.state.tx.us/pub/txdot-info/tpp/utp/2019/utp-2019.pdf>. Accessed October 4, 2018.

³ TxDOT. *Accelerated Construction Guidelines*. (2018). <http://ftp.dot.state.tx.us/pub/txdot/cst/regional-workshops/accelerated-construction-guidelines.pdf>. Accessed October 4, 2018.

what we're
THINKING

Greg Winfree
Zachary Grasley

IT'S HIGH TIME FOR A DISCUSSION ON Infrastructure

THIS YEAR, we mark 11 years since the Interstate 35 bridge in Minneapolis collapsed into the Mississippi River, killing 13 people and injuring 145 more. For anyone not living there, or otherwise not personally affected by that tragedy, the anniversary will likely pass without a single thought as to its significance.

It's difficult, after all, to get excited about the topic of infrastructure. In the realm of politics and public policy, it's the hot button issues that tend to get the most attention. Infrastructure is not one of those. Tragedies, however, have a way of obligating conversation, moving us toward actions we might not otherwise pursue absent the benefit of urgency. That was the case 11 years ago. But, not so much since then.

It's high time that we make room for infrastructure on our nation's busy policy agenda, as that vast network provides a critical foundation for virtually every other industry that supports and improves our quality of life. And for three compelling reasons, it needs both our attention and our action now.

It's high time that we make room for infrastructure on our nation's busy policy agenda, as that vast network provides a critical foundation for virtually every other industry that supports and improves our quality of life.



The Clock Is Ticking

Lots of us take infrastructure — particularly our roads and bridges — for granted. We tend to think that everything is alright, until something goes all wrong. Until, say, a disaster like the one in Minneapolis seizes our attention — or, more recently, a disaster like the one in Genoa, Italy, where a major highway bridge collapsed and killed dozens of people.

Events like those serve as reminders that roads and bridges — despite their apparent solid nature and appearance — have limits to their strength, stabil-

Roads and bridges, and how we pay for them. Not exactly the stuff of stimulating conversation, but it's a conversation we need to jump-start and sustain to inform big decisions that lead to meaningful actions. Preferably, before another tragedy compels us.

ity, and resilience. Much of what we're working with is several decades old, so we're working on borrowed time.

Infrastructure Is About More Than Roads and Bridges

The electric power grid. Airport runways. Sea ports, docks, and canals. Municipal water mains and wastewater treatment systems. Pipelines. Each of these is a form of infrastructure. Each is operating at strained capacity and in need of upgrades and/or repair. Our road and bridge network is essentially competing with all of them for overdue attention.

A draft proposal for addressing the nation's infrastructure dilemma was introduced by House Transportation and Infrastructure Committee Chairman Bill Shuster (R-Pa.) recently, focusing largely on ensuring the solvency of the Highway Trust Fund. That approach could go a long way in boosting the condition of our roads and bridges, but other infrastructure assets — all with legitimate and urgent needs — would still be waiting in line for scarce funding.

Ah, yes; the money.

This Is Going to Be Expensive; There's No Way Around That

The federal motor fuels tax is a primary source of funding for roads and bridges. The tax on gasoline is 18.4 cents per-gallon, no matter what that gallon of gas may cost. The tax amount hasn't changed since 1993, and it's not indexed to inflation. Consequently, its value has eroded so much that it pays for only about half of what it once did. And, gas consumption — and the corresponding tax generated — will decline as cars become more fuel-efficient and hybrid and electric vehicles become more common. The wear on

roads and bridges, however, will continue unabated.

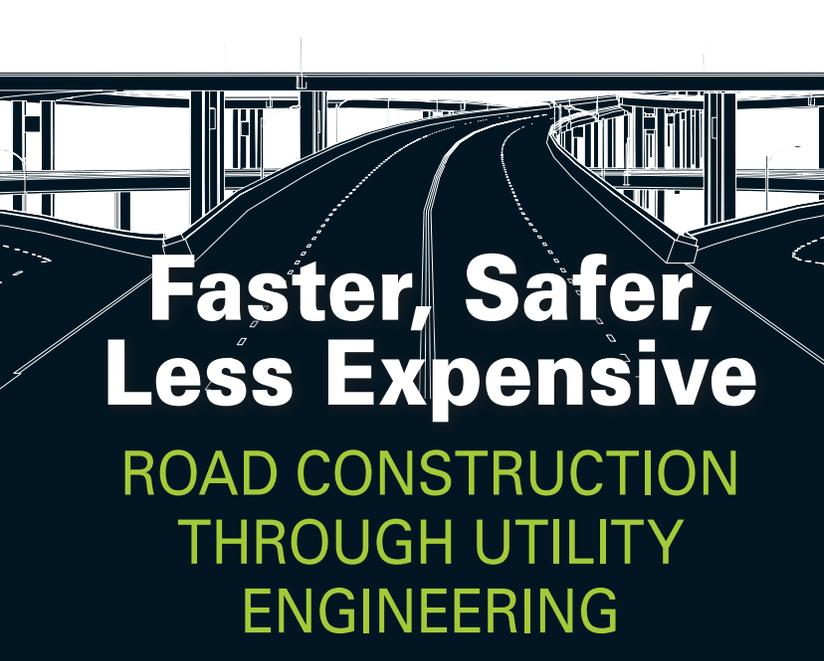
Raising the tax is an option, though certainly not a popular one. Even so, the recent proposal in Congress would do just that for 10 years before eliminating the tax in favor of a mileage-based fee. But whether funding comes in the form of taxes or user fees, one thing is certain — current funding levels and mechanisms aren't getting the job done. This is not a question of whether we will have to pay for a renewal of our road and bridge system. It's more a question of when, and how, and how much.

Granted, this subject is, to many of us, boring. Just try to imagine another topic that's at the same time interesting to almost no one while being so consequential to just about everyone. But our transportation infrastructure is central to our ability to get to where we live, learn, work, play and pray. It helps us get to the grocery store, and it helps online orders get to us. It is also in need of upgrade, repair and expansion.

Roads and bridges, and how we pay for them. Not exactly the stuff of stimulating conversation, but it's a conversation we need to jump-start and sustain to inform big decisions that lead to meaningful actions. Preferably, before another tragedy compels us. ■

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Faster, Safer, Less Expensive

ROAD CONSTRUCTION THROUGH UTILITY ENGINEERING



The practice of burying or placing utility lines without adequate documentation has caused large-scale problems across the country. It's also helped create a new program devoted entirely to the issue. The Utility Engineering Program, formed last year at the Texas A&M Transportation Institute (TTI) to capitalize on the Institute's two decades of leading-edge research and technology transfer initiatives, is designed to help state departments of transportation (DOTs), cities, counties and others overhaul and prioritize underground utility procedures and management.

"It's become obvious that, for the most part, we really don't know what utilities were placed decades ago, or exactly where they're located in the right-of-way."

*Cesar Quiroga, Manager
TTI Utility Engineering Program*

For more than a century, water and sewer lines, telecommunication lines, and even oil and gas lines have been placed along roadside rights-of-way. Utility companies would simply request a permit from the landowner (the city, county, state or federal government). Because use of the right-of-way was deemed in the public interest, the permits were almost always granted.

"But it's become obvious that, for the most part, we really don't know what utilities were placed decades ago, or exactly where they're located in the right-of-way," says Senior Research Engineer Cesar Quiroga, who manages TTI's Utility Engineering Program. "That problem is a huge operational, maintenance and safety issue, but it's also causing a lot of construction delays and additional costs when utility lines are cut or have to be relocated when they're discovered late in the project. And these impacts are happening all too frequently."

Just a few years ago, utility relocation alone for a bridge project in Georgia cost taxpayers \$5 million. One reason the price tag was so high: it was only during construction that the project engineers discovered they could have realigned the bridge slightly without relocating *any* utilities. By then,

it was too late because the utilities had already been relocated.

On a daily basis, DOTs and local municipalities are dealing with cut utility lines and costly relocations, not to mention frustrated motorists, slowed down or stopped entirely when work zones are set up for longer than might actually be necessary. The elephant in the room here is cost added to a construction project resulting from delays.

The work Quiroga and his team do can help DOTs troubleshoot costly project interruptions, like those in Georgia. Recently, using robust utility conflict management principles in performing an implementation project, Maryland identified 114 utility conflicts, avoided a \$500,000 gas line relocation charge, and saved an estimated six months of project delays.

“With TTI guiding us, we’re already reaping the benefits, saving millions of dollars for taxpayers, and we’re saving time on projects through emphasis on avoiding or minimizing the impacts on utilities.”

*Charon Williams, Director
TxDOT’s Utility Accommodations
Program*

“Because of lengthy construction delays and costs in relocating existing utilities, DOTs, highway contractors, design consultants and others involved in roadway projects have begun to embrace utility engineering,” Quiroga explains. “Those DOTs that have begun to implement utility engineering principles are already reaping the benefits.”

Quiroga and TTI are at the forefront of the utility engineering movement,

“We’ve actually been doing utility research for almost 20 years. The difference now is that it’s a formal program within the TTI organizational structure. DOTs across the country are realizing the benefits of utility engineering, and there are plans at several universities to make it part of their curricula.”

*Edgar Kraus,
TTI Research Engineer*

defined by the American Society of Civil Engineers’ Utility Engineering and Surveying Institute as “a branch of Civil Engineering that focuses on the planning, design, construction, operation, maintenance, and asset management of any and all utility systems, as well as the interaction between utility infrastructure and other civil infrastructure.”

Considering the number of research projects funded and conducted, TTI’s program has become the nation’s leading university-based utility engineering research group. Related TTI projects recently completed or under way include:

- Utility Conflict Management Training and Implementation for TxDOT Districts (TxDOT).
- Feasibility of Mapping and Marking Underground Utilities by State Highway Agencies (Federal Highway Administration).
- Identification of Utility Conflicts and Solutions (Second Strategic Highway Research Program).
- Engineering Guidelines for Installing Temporary Pipelines with the Right-of-Way (TxDOT).
- Web-Based Training on Utility Topics (National Highway Institute).

“We’ve actually been doing utility research for almost 20 years,” TTI

Research Engineer Edgar Kraus explains. “The difference now is that it’s a formal program within the TTI organizational structure. DOTs across the country are realizing the benefits of utility engineering, and there are plans at several universities to make it part of their curricula.”

The Texas Department of Transportation (TxDOT) is a leader when it comes to accounting for utilities during construction projects. Two years ago, the department began educating its employees, local governments and utility industry representatives through a course developed by TTI. And now, TxDOT is implementing those concepts by bringing designers, planners, as well as utility coordinators, engineers, and company representatives to the table before projects even begin.

“TxDOT has embraced these changes across the state,” explains Charon Williams, director of TxDOT’s Utility Accommodations Program. “With TTI guiding us, we’re already reaping the benefits, saving millions of dollars for taxpayers, and we’re saving time on projects through emphasis on avoiding or minimizing the impacts on utilities.” ■



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SLOWER DOESN'T ALWAYS MEAN SAFER

NCHRP Guide Helps Planners Mitigate Work Zone Crashes



“Reducing the duration of the project is a big safety win, actually. Each additional day a work zone exists increases the chance of a crash occurring in it.”

*Jerry Ullman, Manager
TTI Work Zone and Dynamic
Signs Program*

Roadways don't build themselves. They require careful planning, construction and regular maintenance, all of which require work zones designed to keep both workers and travelers safe.

Sometimes those measures fail. According to the Texas Department of Transportation (TxDOT), in 2017, there were 27,148 work zone crashes in Texas. Of those, 199 were fatalities, and 813 resulted in serious injuries. TxDOT and other state and national agencies responsible for building and maintaining our transportation system are consistently looking for ways to decrease those numbers.

Consider the concept of *accelerated construction* — building the system faster, smarter and with a goal to make it last longer — in the context of safety. One might think that doing things faster inherently means doing them less safely, but Texas A&M Transportation Institute (TTI) Senior Research Engineer Jerry Ullman looks at it a different way.

“Reducing the duration of the project is a big safety win, actually,” says Ullman, manager of TTI’s Work Zone and Dynamic Signs Program. “Each additional day a work zone exists increases the chance of a crash occurring in it.”

Ullman and his team recently completed National Cooperative Highway Research Program (NCHRP) Project 17-61, Analysis of Work Zone Crash Characteristics and Countermeasures. TTI performed an in-depth analysis of crash narratives to better understand why crashes occur in work zones.

“It was no surprise to anyone that rear-end collisions and sideswipes with another vehicle or barrier are the most common types of crashes due to slow-downs and the congestion that naturally occurs during construction,” Ullman says. “Driver confusion upon approaching a work zone, as well as work vehicles entering and exiting the area are also significant factors.”

The advent of intelligent transportation systems offers solutions to some of the issues uncovered by analyzing the crash narratives. For example, TTI led the deployment of an end-of-queue warning system as part of its support for TxDOT during the I-35 Reconstruction Project. Since 2011, the 96-mile widening and safety

“NCHRP’s guidebook helps planners understand the safety implications of alternative work zone designs under consideration. It also provides information on how effective the various crash mitigation strategies are at saving lives.”

*Jerry Ullman, Manager
TTI Work Zone and Dynamic Signs Program*

improvement effort between Hillsboro and Salado, Texas, has spanned a multitude of work zones that, literally, see hundreds of thousands of cars a day pass through them. Deploying the end-of-queue warning system upstream of a work zone — and warning travelers of slow-downs before they happen — has helped reduce crashes by up to 55 percent. Other options, like rumble strips, can also alert drivers to upcoming safety hazards.

“Mitigating the interactions between the traveling public and work vehicles entering and exiting the work space is also important,” Ullman explains. “Designing access points to allow work vehicle/equipment deceleration and acceleration out of the main travel lanes before entering or exiting a work area can reduce conflicts and crashes, as can the use of technology to warn approaching motorists of

slower moving construction vehicles and equipment when they are actually present.”

As part of the NCHRP project, researchers developed *Estimating the Safety Effects of Work Zone Characteristics and Countermeasures: A Guidebook*. The guidebook assists traffic planners developing phasing and staging plans for temporary traffic control through work zones to better evaluate the expected safety impacts of their plans. Those stages are crucial to successful accelerated-construction efforts, and maximizing safety when planning them is just as vital.

“NCHRP’s guidebook helps planners understand the safety implications of alternative work zone designs under consideration,” Ullman says. “It also provides information on how effective the various crash mitigation strategies are at saving lives.”

As we look for ways to improve our transportation system — to make it faster, less expensive to build and longer lasting — improving safety is always of paramount importance. That emphasis has to start with the work zones themselves, before a single square foot of asphalt is ever laid down. ■



Rear-end collisions can occur more frequently due to slow-downs and traffic congestion during roadway construction.



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DOUBLE TIME

Accelerated Construction Strategies Enable a Quicker Pace Toward Project Completion



“Reducing construction time has immediate benefits for travelers. It also supports local economies and a healthy tax base for the state.”

*Bill Compton
Director of Construction
TxDOT Waco District*

ENCOUNTERING the same construction zones day after day, month after month, it’s only natural for travelers to ask “Why does this have to take so long?” Thanks to a growing reliance on creative thinking, it no longer does.

That thinking is at the root of accelerated construction, an effort launched in Texas in 1998 and picking up steam ever since. Increasing funding for roadways has helped promote accelerated-construction techniques, which aim to trim at least 10 to 20 percent — in some cases up to half — from customary project timeframes.

In large part, those techniques are an answer to the blistering pace of growth in Texas. More people driving more cars and trucks place an ever-growing burden on our already strained transportation network. And traditional ways of doing things won’t get the job done.

Two projects — one completed and another about to transition to a new phase — provide examples of how operating agencies can transform how they deliver mobility improvements. In both cases, accelerated construction is more than just a good idea. It’s an economic imperative.

West 7th Street Bridge, Fort Worth, Texas

The West 7th Street Bridge is the primary link connecting downtown Fort Worth, the city’s museum and cultural district, and Trinity Park. In 2013, the 99-year-old bridge had major structural safety concerns and was beyond rehabilitation.

The Texas Department of Transportation (TxDOT), the City of Fort Worth, Sundt Construction, and the Texas A&M Transportation Institute (TTI) partnered to form the West 7th Street Bridge Coalition to facilitate the bridge-replacement effort.

A window of only five months was given to the contractor. “Considering innovative approaches was critical to maintaining local cultural and tourism events, which are important to the local economy,” explains TTI Research Engineer Scott Cooner.

One innovative approach involved fabricating the concrete bridge arches at a nearby site, and using the same size arches for the entire bridge. Each arch cost approximately \$1 million and weighed 290 tons. Once the first arch was created, fabrication of the remaining arches moved more quickly. The arches were transported to the rebuilding site using a mode normally reserved for maneuvering heavy equipment to oil-drilling sites. Moving the massive arches with self-propelled modular transport required needle-threading precision through a course that in some places allowed less than a foot to spare.

Early completion incentives motivated the contractor to finish construction in only four months, enabling the bridge to open a month ahead of schedule. The world’s first precast network arch bridge is both aesthetically striking and safer, with a new center barrier and wide sidewalks for pedestrians and bicyclists. It also has the flexibility to accommodate other modes, such as light rail or bus transit, in future years. The final result is a point of pride for the Fort Worth community.

“The West 7th Street Bridge is a truly elegant piece of engineering,” Fort Worth Civic Leader Ed Bass said when the bridge was completed. “I don’t think people realize the complexity of the structure and the innovation that went into designing and building it.”



Prefabricating bridge arches at one location and assembling them onsite, a technique associated with accelerated construction, helped ensure that construction of the West 7th Street Bridge finished on time. Photo by Scott Cooner.

The I-35 Reconstruction Project, Central Texas

The finish line for the biggest highway expansion in the state’s history is near, but one sizable hurdle remains: widening I-35 from three lanes to four on a six-mile stretch through the Waco city limits. In the process, ensure that no disruptions occur to the economic and tourism activity resulting from Baylor University’s expansion, Waco’s downtown revitalization, or a variety of other commerce-boosting enterprises.

If ever there was a candidate for accelerated construction, this is it. Engineers and planners will use several techniques to move the project along more quickly than normal:

- Purchasing all right-of-way before bid letting aspects of the project.
- Planning earlier clearance for utility companies to move their lines.
- Using A+B (price plus schedule) bidding, which considers contractor scheduling commitments in addition to price.
- Including phase-specific financial incentives, rather than a single end-of-project bonus.

“Giving the contractor opportunities for financial incentives at various points in the project helps to reward ingenuity along the way,” says John Habermann, TTI’s mobility coordinator for the I-35 effort. “That ingenuity keeps things progressing.”

And the progress pays off in multiple ways for multiple stakeholders, even in the state’s remote areas. Accelerated construction of an expanded rural intersection, for instance, can accommodate suddenly increased traffic associated with energy exploration, as well as support the employment boost that goes with it, in those regions.

“Reducing construction time has immediate benefits for travelers,” says Bill Compton, TxDOT’s Waco District director of construction. “It also supports local economies and a healthy tax base for the state.” ■



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QUICKER FUNDING, SHORTER PROJECT

TRZs Can Speed up Construction Projects from the Get-Go



ACCORDING

to the Texas
Department of

Transportation's (TxDOT's) *Accelerated Construction Guidelines*, a typical major highway project might take anywhere from 8 to 15 years. TxDOT says decreasing the time it takes to complete the preconstruction phase alone can save \$100,000 to \$500,000.

Phase I of the Americas Interchange, completed in 2013, was funded in part by revenue generated from a transportation reinvestment zone.

The construction phase of transportation improvements is often thought of as *the* determining factor in how long it takes to complete a project. But a key part of the process has to come first — securing funding. For example, obtaining voter approval for and issuing the bonds to fund a project can take years.

Improving access or capacity in a transportation corridor almost always results in economic development and increased land values. In 2007, Texas passed legislation authorizing the creation of transportation reinvestment zones (TRZs), an innovative value-capture finance method. TRZs allow a municipality (or other government unit) to fund an improvement project by borrowing against the incremental tax revenue *projected to accrue* from the value added to the area by the project itself. TRZs are simpler to set up than traditional tax increment financing methods, like tax increment reinvestment zones, since they only require a one-time approval by city

councils and don't need a governing board. Also, TRZs are difficult to rescind before they pay off the originally agreed upon share of project costs, making them fairly well insulated politically.

Property tax revenue collected by the municipality the year in which the TRZ is established will continue flowing to its general fund. However, future tax increments resulting from new development or increased property values beyond the base year amount are applied to paying off the improvement without increasing the property tax rate. When the TRZ expires and the improvement is paid off, the tax increment becomes again part of the city's general property tax revenue.

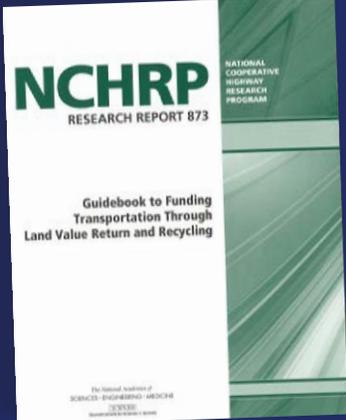
"For example, improving a road connecting a coastal port to a state highway might be needed to accommodate growing truck volumes," explains Texas A&M Transportation Institute (TTI) Senior Research Scientist Rafael Aldrete. "By estimating the expected development and value the improvement creates over, say, 30 years, the municipality can pledge the future incremental tax revenue to secure debt through the TxDOT state infrastructure bank or other related programs."

For once, the egg can come before the chicken. By avoiding the time to issue bonds or employ other, more traditional funding mechanisms, TRZs can reduce the long-term construction project timeline (and associated costs) by fast-tracking the early step of securing funding. In its guidelines, TxDOT's stated goal for reducing project costs is 20 to 50 percent. That can mean tens of millions of dollars in savings for the Texas taxpayer.

"In 2008, El Paso's Comprehensive Municipal Plan aimed to fund an ambitious \$1 billion in improvements that initially fell short of funding," Aldrete says. "With TxDOT's help and through TRZs, \$70 million in funding

Taking TTI Innovation to the National Level

In 2018, the National Cooperative Highway Research Program (NCHRP) published its *Guidebook to Funding Transportation through Land Value Return and Recycling*. TTI led a team of experts to produce the guidebook.



The guidebook's stated purpose: "to engage and motivate public policy makers to understand, consider, and, where appropriate, implement land value return methods for funding transportation investments ... [and] to assist public policy makers in adapting land value return methods to their unique circumstances." NCHRP also provides a detailed presentation on its website outlining principles, methods, and benefits of value-based financing alternatives.

"Funding to refurbish and improve our infrastructure is shrinking, and policy makers need every advantage to enhance mobility and improve access to needed services for their constituents," TTI Senior Research Scientist Johanna Zmud says. Zmud co-led TTI's team on the project. "Through this guidebook, NCHRP provides excellent direction to help municipalities find local solutions that meet their needs."

was secured to close the gap, making various projects in the plan possible."

Aldrete co-led the TTI team in 2009 that established standard procedures and guidance through a research project co-sponsored by TxDOT and the Federal Highway Administration. TTI developed tools to help agencies assess the viability of a TRZ and forecast how much an improvement might return over time in the form of tax increment revenue. TxDOT views TTI as an objective party, so the department regularly calls on Aldrete, now a nationally recognized value-capture expert, and his team. They help the department work with local governments to assess TRZ value capture opportunities along key transportation corridors.

Other states, like Virginia with its *special assessment districts*, have similar innovative finance mechanisms. In fact, national interest was so great in the practice that the National Cooperative Highway

Research Program sponsored a project to document guidelines for states interested in using value capture options to fund their projects (see sidebar).

"Transportation reinvestment zones provide opportunities to fund significant transportation projects that would otherwise remain unfunded or be delayed indefinitely," explains Walter Miller, mayor of Horizon City, Texas, a community near El Paso, when El Paso's Comprehensive Municipal Plan was funded. Miller is currently a Horizon City alderman. "These opportunities grant local entities greater autonomy to proactively develop transportation projects that encourage deliberate and strategic land use and growth." ■



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TTI'S TRAFFIC SAFETY CONFERENCE Targets Ending Roadway Fatalities

“This is Texas together on the road to zero,” said Robert Wunderlich, director of the Texas A&M Transportation Institute’s (TTI’s) Center for Transportation Safety as he opened the 2018 Traffic Safety Conference in Sugar Land, Texas. The conference, supported by the Texas Department of Transportation, was held August 8–10. TTI hosts the Traffic Safety Conference each year, bringing together safety experts and health professionals from both the public and private sectors.

Working toward zero deaths on Texas roadways is a cornerstone of the Texas Strategic Highway Safety Plan, the main topic of discussion at the conference. Attendees were able to participate in seven different emphasis-area breakout sessions moderated by speakers discussing programs and measures that have proven successful in creating safer roadways. Those emphasis areas are distracted driving, impaired driving, intersection safety, older road users, pedestrian safety, roadway and lane departures, and speeding. Similarly, discussion circles were held to identify

keys to success and how to overcome barriers related to each area.

“Why do we accept 40,000 deaths [per year in the United States]?” asked Deborah Hersman, president and CEO of the National safety Council, during her keynote speech. Hersman also chairs the national Road to Zero Coalition, which has a goal of ending roadway fatalities by 2050. “Why is that okay, and why aren’t we more outraged that we aren’t doing more?”

She told the crowd that the Lone Star State has more work-zone fatalities than



any other state, as well as skyrocketing pedestrian and bicyclist deaths. Like the rest of the nation, about a third of fatalities in Texas are linked to impaired driving, Hersman said.

“Traffic safety issues are too complicated for any one group or profession to solve on its own,” Wunderlich says. “That’s why we bring these diverse groups together. We can learn from each other, and we can work toward zero deaths with each other.” ■

CHILD PASSENGER SAFETY CONFERENCE HIGHLIGHTS

Life-Saving Efforts of Technicians



The 2018 Texas Child Passenger Safety Conference was held June 24–26 in San Marcos, Texas. About 300 child passenger safety seat technicians (CPSTs) and safety advocates heard firsthand from Michele and Brooke Ice, mother-daughter keynote luncheon speakers, who spoke on the importance of the work they do.

Michele credits CPSTs with saving her daughter’s life nearly 20 years ago. “If it weren’t for those two technicians that insisted on checking my car seat, Brooke would have died,” Michele told attendees.

Brooke was only 10 months old in 1999 when her mother agreed to have her child seat inspected. The technicians spent 45 minutes showing Michele how to properly install the seat. Two weeks later, a van ran a stop sign and crashed into the side of her car. Though Michele suffered life-threatening injuries, baby Brooke was unharmed. They credit her survival to the proper installation and use of the car seat.

“Please know that all the effort, all this training you do is making a difference in kids’ lives,” Brooke Ice said. “On behalf of all of them, I want to say thank you. You are all my heroes.”

CPSTs, representatives from child-seat manufacturers, and safety advocates from around the state and nation

attend the annual conference, made possible by a grant from the Texas Department of Transportation and organized by the Texas A&M Transportation Institute (TTI) and Texas A&M AgriLife Extension.

The wide-ranging conference provided CPSTs with the latest information on newly designed car seats, advanced installation techniques, new vehicle safety features, crash analysis results of both correct and incorrect car seat installation, and an examination of the 20-year history of the National Child Passenger Certification Program.

“Because there are so many different car seats and vehicle combinations, a lot can go wrong during installation and with the way the child is

“Because there are so many different car seats and vehicle combinations, a lot can go wrong during installation and with the way the child is restrained.”

*Katie Womack, Manager
TTI Behavioral Research Program*



restrained,” explains Katie Womack, Manager of TTI’s Behavioral Research Program. “About 80 percent of the seats inspected by CPSTs are installed incorrectly. It’s clear that some of these mistakes could result in fatalities and life-changing injuries. It’s why the work that technicians do is so important.” ■



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CHEAP, FAST, GOOD:

Cold, In-Place Recycling Can Deliver All Three



Left: Severe damage is evident in this lower-base mix layer. Above: This sample of subsurface hot-mix asphalt shows moisture damage.

The old adage, “Cheap, Fast, Good: Pick Any Two,” applies to most things. Defying this commonly held belief, rehabilitating a roadway with cold-in-place recycling (CIR) can actually be faster and cheaper than traditional methods and still yield outstanding results.

CIR is a single operation. An existing deteriorated hot-mix asphalt (HMA) layer is recycled and treated, typically with an asphalt emulsion. The layer is re-compacted to form a newly stabilized base layer. A new HMA surface layer is then placed on top. Four-to-eight inches of asphalt are usually recycled in a single pass.

Texas A&M Transportation Institute (TTI) Senior Research Engineer Tom Scullion and Research Scientist Stephen Sebesta have kept an eye on two CIR test sections that were placed by the Texas Department of Transportation’s (TxDOT’s) Amarillo District. The first CIR section was constructed in Ochiltree County in fall 2010, the second in Hemphill County in fall 2013. Recent visual evaluations show both sections are performing well.

CIR isn’t appropriate for every rehabilitation project. The base layer below the HMA layer must be structurally sound. As Scullion says, “If there are old, deteriorated

“I think of a more holistic viewpoint of planning processes, pavement designs, materials selection and traffic handling strategies that all come together as a package to accelerate the construction timeline. CIR can be part of a broader accelerated-construction package.”

*Stephen Sebesta,
TTI Research Scientist*

stripped-out asphalt layers, which may be four-to-five inches down, you end up with four-to-five inches of good asphalt material on top of a bunch of ball bearings. No matter what you do to the upper layers, the deteriorated layer will cause the top layer to fail rapidly.”

That’s where TTI’s unique forensic pavement capabilities come into play. Using ground penetrating radar, falling weight deflectometers and pavement core samples, TTI can determine if and

where deteriorated asphalt layers exist, and if the underlying base is sound.

“We gather the material, bring it into the lab and design a mix to see if we can make a good base out of it,” Scullion says, describing the TTI-developed procedures. “If you have the technology and the lab procedures to make this work, it’s a no-brainer.”

If the proposed section is a good candidate, the CIR process can accelerate the construction process. “I think of a more holistic viewpoint of planning processes, pavement designs, materials selection and traffic-handling strategies that all come together as a package to accelerate the construction timeline,” Sebesta says. “CIR can be part of a broader accelerated construction package.”

Besides saving time, CIR has a number of environmental advantages over milling the old surface and replacing it with new material. Reusing materials saves the cost of purchasing new materials, of course, but also the cost of transporting it to the site. From an environmental perspective, the energy required to produce and transport new materials is also saved. ■



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Kuhn Receives ITE's Matson Memorial Award

TTI Senior Research Engineer Beverly Kuhn is the recipient of the Theodore M. Matson Memorial Award. Kuhn received the award at the Institute of Transportation Engineers (ITE) Annual Meeting in August. The prestigious Matson Award is given annually to those considered pioneers in their engineering professions.

Kuhn has focused on transportation systems management and operations — achieving efficient transportation operations with the help of technology — for the last decade of an award-winning 30-year career. “I have always viewed transportation engineering as a form of community service, so to receive the Matson Award is an unexpected but much appreciated highlight of my career,” Kuhn says. “It means even more to see the list of past recipients — many are former professors, mentors and colleagues, for whom I have a great deal of respect.”

Kuhn has led over 50 research projects and supported numerous others for federal, state and local sponsors. She leads TTI's System Reliability Division in the areas of advanced transportation operations and connected and automated transportation. She is an active member of the Transportation Research Board, and currently serves as the chair of the Standing Committee on Freeway Operations. She is also the president of the Brazos Valley Section of the Institute of Transportation Engineers. ■



Beverly Kuhn receives the Matson Memorial Award from ITE President Michael Sanderson.



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CARTEEH's Khreis Awarded the 2018 ISEE Rebecca James Baker Award



Khreis

Assistant Research Scientist Haneen Khreis with TTI's Center for Advancing Research in Transportation Emissions, Energy, and Health (CARTEEH) has been awarded the prestigious 2018 Rebecca James Baker Award by the International Society for

Environmental Epidemiology. Khreis received this award for her work on the influence of traffic-related air pollution on childhood-onset asthma.

“Not all people are equally susceptible to the adverse effects of air pollution,” Khreis says. “Yet, few studies exist that look at how ethnicity might modify the risk of children developing asthma as a result of exposure to air pollution.”

Khreis is the first engineer-in-training to receive the award “created in memory of Dr. Rebecca

Baker, a young investigator with a commitment to environmental epidemiology as a tool for improving public health and quality of life.” Khreis's research assesses and quantifies the relationship between the onset of childhood asthma and the exposure to traffic-related air pollution. It also considers how ethnicity might impact the likelihood asthma will develop in children exposed to air pollution caused by traffic.

“Dr. Khreis's research is groundbreaking and exactly the kind of innovative approach to studying health and the environment that our center is becoming known for,” says Assistant Agency Director Joe Zietsman, who leads CARTEEH. “She's already become a thought leader in the subject matter, and the center and the industry as a whole will no doubt benefit from more of her findings in the very near future.” ■

Jon Epps Named 2019 Thomas B. Deen Distinguished Lectureship Recipient



Epps

TTI Executive Associate Director Jon A. Epps is the 2019 recipient of the Thomas B. Deen Distinguished Lectureship. Epps will deliver his lecture, “Innovative Asphalt Pavement Technology: Paving the Way for the World’s Roadways,” during the 98th

Transportation Research Board’s (TRB’s) Annual Meeting, on Monday, Jan. 14, 2019, from 6:00 p.m. to 7:30 p.m. in the Walter E. Washington Convention Center.

The Deen Distinguished Lectureship recognizes the career contributions and achievements of an individual in areas covered by TRB’s Technical Activities Division. Honorees present overviews of their technical areas, covering the evolution, status and prospects for the future.

Originally known as the Transportation Research Board Distinguished Lectureship, the award was renamed in 2002 in honor of the eighth TRB executive director, who served with distinction from 1980 to 1994. TRB also publishes each lecture in a volume of the *Transportation Research Record: Journal of the Transportation Research Board*. ■

Neology and TTI Enter Research Partnership at RELLIS Campus

TTI is partnering with Neology, a leading provider of tolling, electronic vehicle registration and public safety technologies, to establish a state-of-the-art R&D test facility at The Texas A&M University System’s RELLIS Campus.

“We look forward to collaborating with the nation’s top faculty, researchers, students and other transportation partners of TTI,” says Joe Mullis, general manager of Neology. “Our long-term relationship and investment with TTI will provide agencies and industry experts insight into the most advanced transportation solutions to meet tomorrow’s transportation-related challenges.”

The long-term master research agreement will expand and improve transportation technologies. The new RELLIS Campus, a \$300 million, 2,000-acre facility with 6 miles of high-speed proving grounds, offers an ideal location for Neology to design, develop and test new technology solutions.

“We are excited to have Neology as a flagship partner at the Texas A&M RELLIS Campus,” says Christopher Poe, TTI’s assistant director for connected and automated transportation strategy. “This industry-research partnership is exactly the type of relationship that highlights the value to both Neology and Texas A&M of having industry partners working closely with faculty, researchers and students at the leading-edge of transportation technology.” ■

Hawkins’s Dedication to Roadway Safety Recognized with ARTBA Award



Hawkins

Gene Hawkins, TTI research engineer and professor in Texas A&M University’s Zachry Department of Civil Engineering, has been honored with the John “Jake” Landen Memorial Highway Safety Award in recognition of his “significant and lasting contributions to the safety of our nation’s highways.” The Traffic

Safety Industry Division of the American Road & Transportation Builders Association (ARTBA) presents the award annually.

Hawkins’s vast 35-year career in transportation engineering has included membership in numerous professional and technical organizations. Last year he was elected

chairman of the National Committee on Uniform Traffic Control Devices. Hawkins conducts research for TTI related to improving traffic control devices, especially signs, markings and signals. He previously served TTI as a division head and program manager for the Institute’s Operation and Design Division. His interest in that part of our roadway system began as a boy growing up with a traffic engineer for a father.

“This award took me completely by surprise,” Hawkins says. “I have the utmost respect for the people who have received this award in the past. Many worked behind the scenes, but ARTBA made sure they were recognized for their work. I am very honored to be a part of that group.” ■



Accelerated Construction Is a Team Sport



In 2018, the Texas Department of Transportation (TxDOT) published *Accelerated Construction: A Path Forward*. The document lays out a vision for implementing the principles of accelerated construction statewide. TxDOT emphasizes the need to educate and train personnel, but also recognizes that accelerated construction is about a lot more than just working faster and cheaper — it's also about working smarter and safer. The department also issued its *Accelerated Construction Guidelines* that year.

I'm proud to say the Texas A&M Transportation Institute (TTI) helped the department formulate its approach to accelerated construction. TTI Executive Associate Director Jon Epps applied his decades of expertise in materials, pavements and construction to lead a series of seven workshops in 2017 that provided guidance to TxDOT personnel and private contractors about the practices, pitfalls and benefits of accelerated construction. Out of that effort came tools and recommended procedures to move the practice forward in Texas.

As you've seen in this issue of the *Texas Transportation Researcher*, any transportation construction project, particularly one fast-tracked to completion, is a complicated venture. Funding and planning, designing and securing right-of-way, environmental concerns, the impact of construction on the traveling public — the list of considerations is long. Avoiding costly delays is key to effectively managing a construction project, as well as the expenditure of taxpayer dollars. As transportation professionals, we have a fiduciary responsibility to maintain that public trust.

Accelerated construction can help us do that. In describing accelerated bridge construction (ABC), the Federal Highway Administration prioritizes mobility. For example, minimizing traffic disruption by prefabricating bridge elements easily assembled onsite is a fundamental principle of ABC. You read in this issue about the reconstruction of Fort Worth's West 7th Street Bridge. TTI's participation in the public-private partnership that formed the West 7th Street Bridge Coalition is one example of how outside-the-box thinking is getting things done for Texans.

On July 23, U.S. House Transportation and Infrastructure Committee Chairman Bill Shuster (R-Pa.) released a draft bill aimed at improving our nation's infrastructure. The "discussion draft," as Chairman Shuster calls it, is intended to kindle debate to find "real solutions that will give America the modern day infrastructure it needs." Title IV of the bill addresses accelerated project delivery. From expedited decision-making to reducing permitting to a maximum of two years, streamlining the construction process is a primary goal of the bill.

Chairman Shuster's plan is ambitious and, no doubt, will evolve through the legislative process. Its underlying purpose is to help counties facilitate the construction process locally. That's also TxDOT's goal with its new guidelines on accelerated construction. Local solutions guided by state expertise and supported by federal policy — now that's the way to build a better, safer transportation system while being good stewards of not only taxpayer dollars, but also the public trust. ■

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