

BETTER ROADS SAFER ROADS

REINVENTING TRANSPORTATION CHANGE IS COMING ARE WE READY?

PREPARING YOUR WORKFORCE
FOR THE INEVITABLE TEXAS
SUMMER HEAT

STORM PROOFING PRINCIPLES
APPLICABLE FOR LOCAL ROADS

BETTER ROADS SAFER ROADS

June 2016 - TxLTAP.org

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The Local Technical Assistance Program (LTAP) is a nationwide effort financed by the Federal Highway Administration and individual state departments of transportation. Its purpose is to translate into understandable terms the best available technology for roadways, bridges, bicycle and pedestrian facilities, and public transportation for city and county roadway and transportation personnel. The TxLTAP, operated by the University of Texas at Arlington, is sponsored by the Texas Department of Transportation (TxDOT) and the Federal Highway Administration. This newsletter is designed to keep you informed about new publications, techniques, and training opportunities that may be helpful to you and your community.

LETTER FROM TxLTAP ADMINISTRATION

TxLTAP Library: It's not just books!

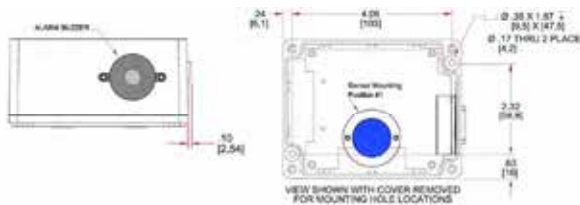
Since the beginning of this year, we've continued to make improvements to the TxLTAP website (www.txltap.org). Our goal is to become the best, most reliable Texas resource for information on local roads! Check out TxLTAP website's library page. Here you'll find electronic editions of the TxLTAP newsletter, but also access to dozens and dozens of reports, guide books, and fact sheets divided into the following categories:

- Bridges
- Drainage
- Bicycles & Pedestrians
- Maintenance & Construction
- Roadway Design
- Roadway Safety
- Signs & Pavement Markings
- TMUTCD
- Work Zone
- Worker Safety

In addition to written documents and videos, TxLTAP also hosts an Equipment Lending Library. Texas roadway agencies may borrow an item at no cost for a period of 30 days. While the TxLTAP Equipment Lending Library is currently limited to a few items, we hope to see it grow each year, and we're open to suggestions on equipment to acquire. Here are the pieces of equipment available for loan:

- **Digital Ball Bank Indicator:**

This device is used to determine the safe curve speed for a vehicle to travel on a horizontal curves in the roadway.



- **Electronic Retroreflector:** This handheld device measures the reflective quality of roadway signs to help agencies determine if signs are still in compliance with regulations.



Contact the TxLTAP office with questions about borrowing the equipment.

Thanks for "checking us out",

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REINVENTING TRANSPORTATION: CHANGE IS COMING. ARE WE READY?

The transportation revolution is on its way. In fact, it's already here. Partially automated vehicles (AVs) are on the nation's roadways right now, connected vehicles (CVs) are just around the corner, and autonomous vehicles may not be far behind.

“PARTIALLY AUTOMATED VEHICLES (AVS) ARE ON THE NATION'S ROADWAYS RIGHT NOW, CONNECTED VEHICLES (CVS) ARE JUST AROUND THE CORNER, AND AUTONOMOUS VEHICLES MAY NOT BE FAR BEHIND.”

Standards and policies are evolving as well. For example, the National Highway Traffic Safety Administration is preparing to mandate CV hardware on all new light-duty vehicles. But linking both normal vehicles and AVs into the CV system — and, in turn, to the roadway infrastructure — is a challenge that has many states scratching their figurative heads. In order for public policy to advance hand in glove with developing technologies, policy makers must first be aware of how these technologies could change the nature of the transportation system.

“We’re working to provide that understanding,” says Texas A&M Transportation Institute (TTI) Senior Research Engineer Ginger Goodin. Goodin directs TTI’s Transportation Policy Research Center (PRC), which supports the Texas Legislature by researching and reporting on transportation-related public policy issues. “We can help lawmakers understand the capabilities and limitations of technology in order to craft the best policy possible for the people of Texas.”



“Good policy creates a hospitable environment in which effective security administration can thrive”

TTI Associate Transportation Researcher Jason Wagner.

DEFINING SECURITY CONCERNS FOR CV/AVS

Securing the data enabling connected and automated vehicles to safely reach their destinations is a primary concern.

“It’s not just a question of finding the right technology to guarantee data security,” explains TTI Associate Transportation Researcher Jason Wagner. “Good policy creates a hospitable environment in which effective security administration can thrive. The policy has to support the right solution to make it work.”

The issues surrounding CV/AV data security are varied and complicated. As Wagner notes in the report *Revolutionizing Our Roadways: Cybersecurity Considerations for Connected and Automated Vehicle Policy*, there are important questions some agencies simply aren’t looking at. Security designs and policy considerations related to transportation infrastructure and non-safety applications are two such areas. Wagner, along with ITS security specialists from Booz Allen Hamilton, developed the white paper outlining detailed considerations that can help direct future research and analysis, as well as frame policy considerations, as CV/AV deployment moves forward.

Concerns regarding system design, governance and administration, standards development and data systems interoperability, how CV/AV security issues interrelate, and how the transportation system can address system security (and who’s responsible if that fails) are just some of the broad-stroke questions identified in the report.

“Good policy and administration create the context for keeping information secure,” explains Wagner, “but there’s also the related, almost inseparable issue of maintaining privacy for the individual citizen. How do we monitor, manage and ensure the system functions optimally and securely while balancing the need to protect drivers’ privacy?”

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Maintaining the privacy of personally identifiable information is currently a hot topic in policy discussions.

DETERMINING THE NEED-TO-KNOW BASIS

Maintaining the privacy of personally identifiable information (PII) is currently a hot topic in policy discussions, as evidenced by the 2015 Texas legislative session. Legislators introduced seven measures addressing the protection of PII in one form or another. Since the lifeblood of CV/AV implementation is information management, how these data are handled can influence how private they're kept.

The study *Revolutionizing Our Roadways: Data Privacy* is separate but related to the effort investigating security concerns. The PRC study's report, which Wagner coauthored with RAND researcher Karlyn Stanley, focuses specifically on defining the privacy issues surrounding CV/AV implementation.

"Personal information is a valuable but challenging tool to use," explains Wagner. "As it becomes omnipresent, its research and application value can increase, but so do the chances for its misuse. Carefully crafted public policy and vigilance in administration are needed to ensure individual privacy."

The most important PII considerations as outlined in Wagner's report are the following:

- Different areas of state and federal law define PII in different ways. There's no consistent statutory standard or treatment for personal, private or sensitive information.
- Anonymization — the process of stripping names and other identifiers from data to preserve their anonymity — was found inadequate in a recent Massachusetts Institute of Technology study; this has broad implications since many organizations rely on anonymization as a cornerstone for their data privacy protection.
- Who owns vehicle data? The general public might assume people own their personal data, but stakeholders — from private companies to public agencies — disagree. Who owns personal data can directly impact how they're protected and who can see what when.
- Those who can profit from certain data — insurance and telematics companies, for example — are rushing to do just that. Not only will those interests have concerns about how

the data are regulated legally, but business often gets ahead of policy when the bottom line is at stake.

- The amount of data AVs and CVs generate will be huge. State agencies, which will likely play a role in managing these data, are not yet prepared for the amount they'll need to manage to keep an information-driven transportation system operating smoothly and safely.

"Outlining these issues for policy makers is a perfect role for PRC," says Goodin. "Good policy founded upon solid, independent research will help smooth the anticipated transition to an automated, connected transportation system for Texans in the coming decades."

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PREPARING YOUR WORKFORCE FOR THE INEVITABLE TEXAS SUMMER HEAT

**HEAT ILLNESS CAN BE FATAL
WOULD YOU KNOW WHAT TO DO?**

As the Texas summer approaches and temperatures move closer and closer to the 100 degree mark, we'd like to share information from the Centers for Disease Control and Prevention and the National Safety Council on heat related illnesses.

Workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress. Exposure to extreme heat can result in occupational and heat-related illnesses including heat stress which can result into heat stroke (the most severe), heat exhaustion, heat cramps or heat rashes. Heat can also increase the risk of injuries in workers as it may result in sweaty palms, fogged-up safety glasses, and dizziness. Burns may also occur as a result of accidental contact with hot surfaces or steam.

Workers at risk of heat stress include outdoor workers and workers in hot environments such as firefighters, bakery workers, farmers, construction workers, miners, boiler room workers, factory workers, and others. Workers at greater risk of heat stress include those who are 65 years of age or older, are overweight, have heart disease or high blood pressure, or take medications that may be affected by extreme heat.

In 2013, 372 people died in the U.S. from exposure to excessive heat, according to Injury Facts 2016, the annual statistical report on unintentional injuries produced by the National Safety Council. Heat-related illnesses can escalate rapidly, leading to delirium, organ damage and even death.

THOSE MOST AT RISK INCLUDE:

- INFANTS AND YOUNG CHILDREN
- ELDERLY PEOPLE
- PETS
- INDIVIDUALS WITH HEART OR CIRCULATORY PROBLEMS
- PEOPLE WHO WORK OUTDOORS
- ATHLETES AND PEOPLE WHO LIKE TO EXERCISE
- INDIVIDUALS TAKING MEDICATIONS THAT ALTER SWEAT PRODUCTION
- ALCOHOLICS AND DRUG ABUSERS

HEAT STROKE

Heat stroke can occur when the ability to sweat fails and body temperature rises quickly. The brain and vital organs are effectively "cooked" as body temperature rises to a dangerous level in a matter of minutes. Heat stroke is often fatal, and those who do survive may have permanent damage to their organs.

Someone experiencing heat stroke will have extremely hot skin, and an altered mental state, ranging from slight confusion to coma. Seizures also can result. Ridding the body of excess heat is crucial for survival.

- **MOVE THE PERSON INTO A HALF-SITTING POSITION IN THE SHADE**
- **CALL FOR EMERGENCY MEDICAL HELP IMMEDIATELY**
- **IF HUMIDITY IS BELOW 75%, SPRAY THE VICTIM WITH WATER AND FAN THEM VIGOROUSLY; IF HUMIDITY IS ABOVE 75%, APPLY ICE TO NECK, ARMPITS OR GROIN**
- **DO NOT GIVE ASPIRIN OR ACETAMINOPHEN**
- **DO NOT GIVE THE VICTIM ANYTHING TO DRINK**

HEAT EXHAUSTION

When the body loses an excessive amount of salt and water, heat exhaustion can set in. People who work outdoors and athletes are particularly susceptible.

Symptoms are similar to those of the flu and can include severe thirst, fatigue, headache, nausea, vomiting and sometimes, diarrhea. Other symptoms include profuse sweating, clammy or pale skin, dizziness, rapid pulse and normal or slightly elevated body temperature.

Uncontrolled heat exhaustion can evolve into heatstroke, so make sure to treat the victim quickly.



- **MOVE THEM TO A SHADED OR AIR-CONDITIONED AREA**
- **GIVE THEM WATER OR OTHER COOL, NONALCOHOLIC BEVERAGES**
- **APPLY WET TOWELS OR HAVE THEM TAKE A COOL SHOWER**

HEAT CRAMPS

Heat cramps are muscle spasms that usually affect the legs or abdominal muscles, often after physical activity. Excessive sweating reduces salt levels in the body, which can result in heat cramps.

Workers or athletes with pain or spasms in the abdomen, arms or legs should not return to work for a few hours. Instead:

- **SIT OR LIE DOWN IN THE SHADE**
- **DRINK COOL WATER OR A SPORTS DRINK**
- **STRETCH AFFECTED MUSCLES**
- **SEEK MEDICAL ATTENTION IF YOU HAVE HEART PROBLEMS OR IF THE CRAMPS DON'T GET BETTER IN AN HOUR**

DEVELOP AN ACCLIMATIZATION PLAN

Acclimatization is the result of beneficial physiological adaptations (e.g., increased sweating efficiency and stabilization of the circulation) that occur after gradual increased exposure to a hot environment.

TIP 1

Gradually increase the time spent in hot environmental conditions over a 7-14 day period.

TIP 2

For new workers, the schedule should be no more than 20% exposure to heat on day 1 and an increase of no more than 20% exposure on each additional day.

TIP 3

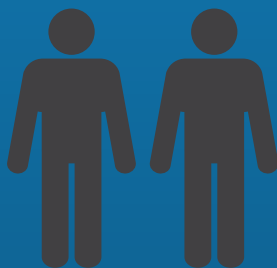
For workers who have had previous experience with the job, the acclimatization schedule should be no more than:

DAY 1	DAY 2	DAY 3	DAY 4
50% EXPOSURE	60% EXPOSURE	80% EXPOSURE	100% EXPOSURE

SET UP A BUDDY SYSTEM

CHECK YOUR WORKERS ROUTINELY TO MAKE SURE...

- they make use of water and shade.
- they don't have heat-related symptoms.



SCHEDULE AND ENCOURAGE FREQUENT REST BREAKS...

...with water breaks in shaded or air-conditioned recovery areas.



EMPHASIZE THE NEED FOR APPROPRIATE CLOTHING

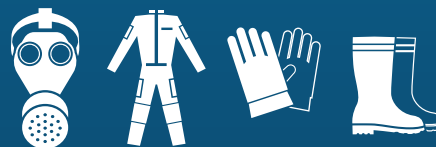
ENCOURAGE WORKERS TO WEAR CLOTHING THAT IS...

- breathable
- light-colored
- loose-fitting



COTTON CLOTHING CAN BE SOAKED IN WATER TO AID COOLING.

Be aware that protective clothing or personal protective equipment may increase the risk of heat stress.



ENCOURAGE WORKERS TO DRINK PLENTY OF FLUIDS...

...such as drinking small amounts of water before becoming thirsty.

During moderate activity in moderately hot conditions, workers should drink about...

Learn more about heat stress at:
www.cdc.gov/niosh/topics/heatstress



1 CUP EVERY 15 TO 20 MINUTES.

U.S. DEPARTMENT OF TRANSPORTATION ANNOUNCES \$8 MILLION FUNDING OPPORTUNITY FOR INNOVATIVE PUBLIC TRANSPORTATION MOBILITY

On May 3, 2016, the U.S. Department of Transportation's (DOT) Federal Transit Administration (FTA) announced an opportunity to apply for \$8 million in federal funding for projects that demonstrate innovative approaches to mobility issues in public transportation. The program, known as the Mobility on Demand (MOD) Sandbox, will support research and technology deployments that improve public transportation efficiency and effectiveness, enhancing safety and connectivity in America's transportation system.

"Innovation is driving our world forward, and we want public transportation providers to seize opportunities to embrace new ideas and solutions," said U.S. Transportation Secretary Anthony Foxx. "Technology is a powerful tool for bringing people together like never before – to connect communities in ways that build and increase opportunity."

The Mobility on Demand Sandbox Demonstration Program is part of a larger MOD research effort at FTA and DOT that seeks to support transit agencies and communities as they navigate the evolving landscape of personal mobility. Mobility on Demand projects and services help make transportation systems more integrated, automated, and accessible, while offering better connections to both existing and future infrastructure and public and private transportation options.

Projects funded through the MOD Sandbox could include smartphone apps; innovative fare payment and finance mechanisms; connected vehicles and

infrastructure; shared-use and on-demand services; and a broad range of other mobility solutions. And, as public transportation is a lifeline to jobs, education, and other opportunities for millions of Americans, it is critical that MOD projects embrace accessibility and equity for all travelers.

A detailed explanation of the program's goals and selection criteria can be found in the Notice of Funding Opportunity (NOFO) in the Federal Register and at Grants.gov.

"We are excited to see the creativity that communities nationwide will use to enhance ways to improve mobility," FTA Acting Administrator Carolyn Flowers said. "We believe the latest in research and technology can help improve access and mobility for all."

Existing FTA grantees, such as public transportation agencies, state departments of transportation, and Native tribes, are eligible to receive funds under the program, and applicants are encouraged to

partner with private and non-profit organizations to deliver their projects. Applications are due by July 5, 2016.

As outlined in DOT's Beyond Traffic framework, America's transportation systems must be redeveloped and reimagined in response to a changing world. The DOT Smart City Challenge, currently underway, represents the dynamic and innovative approaches needed to address mobility in the 21st century.

The MOD Sandbox is one of FTA's several ongoing public transportation innovation programs. Currently, interested parties also have the opportunity to apply for \$55 million in FY2016 funds via the Low and No-Emissions Vehicle Deployment Program (Low-No), for which the application period closed on May 13, 2016.

FHWA PUBLISHES POLICY REVISION TO ALLOW MORE FLEXIBILITY IN PROJECT DESIGN

The U.S. Department of Transportation's Federal Highway Administration (FHWA) published revisions to current federal policy that will help reduce cost and speed up the design of roads and streets located in smaller towns and cities.

In 1985, 13 design criteria were prioritized because of their perceived impact on operations and safety. Based on research and FHWA experience, several were removed under the new policy, leaving 10 criteria prioritized for high-speed roadways and only two criteria for lower-speed roads – such as rural roads that become main streets through smaller towns and cities. This will allow state and local engineers to develop flexible design solutions that meet local travel needs and goals.

For more information contact Nancy Singer at (202) 366-4650.





WRONG WAY DRIVER SOLUTIONS IN SAN ANTONIO

TXDOT SAN ANTONIO TRANSGUIDE WRONG WAY DRIVER PROJECT

THE SAFETY CONCERN

Severe crashes due to wrong-way driving.

THE SOLUTION

Installation of wrong-way detection and warning on at-risk roads.

THE RESULT

Dramatic decreases in wrong-way crash fatalities and serious injuries.

Congratulations to the San Antonio District of TxDOT, a 2015 National Roadway Safety Award recipient for the Texas Department of Transportation San Antonio TransGuide Wrong-Way Driver Project. The National Roadway Safety Awards is a biennial competition sponsored by the Federal Highway Administration (FHWA) and the Roadway Safety Foundation (RSF) to recognize roadway safety achievements that help reduce fatalities and serious injuries on the Nation's roadways. The competition acknowledges successful engineering solutions that agencies have integrated into their roadway safety programs. Awards were conferred in two categories: Infrastructure and Operational Improvements and Program Planning, Development, and Evaluation. Each entry was carefully evaluated for innovation, effectiveness, and efficient use of resources. A summary of the winning project is included below.

Most freeway drivers do not expect to see a vehicle traveling toward them head-on. While only a small percentage of wrong-way driver events actually result in crashes, those that do are particularly severe. According to data from the TxDOT Crash Records Information System (CRIS), 581 people were killed in head-on crashes on Texas roadways in 2014.

Such alarming statistics are the reason that the Texas Department of Transportation (TxDOT) San Antonio TransGuide office confronted the issue in 2012. TransGuide is an ITS partnership among TxDOT, the City of San Antonio, and VIA Metropolitan Transport. With the assistance of the Texas A&M Transportation Institute (TTI), the group identified a 15-mile segment of US 281 as the most problematic in terms of wrong-way operation. The countermeasures for this segment were twofold: enhanced warnings to both the errant driver and the rest of the traffic stream, and real-time alerts to law enforcement.

Illuminated "Wrong Way" signs provide the first warning to drivers errantly entering the oncoming traffic stream. But their effectiveness with intoxicated or extremely drowsy drivers is uncertain.

For this reason, radar-based sensors detect the direction, speed, and location of the errant vehicle and relay the information to TransGuide operators who coordinate with law enforcement in real time. This gives officers a chance to arrive on the scene and apprehend the driver before a crash can occur. The TransGuide operators activate changeable message signs that caution drivers in the normal traffic stream that a wrong-way driver may be in the area.

Since the introduction of this technology, the occurrence of wrong-way events on the US 281 corridor has decreased by 31 percent. These remarkable results have generated a 13.1 to 1 benefit-cost ratio, making this a promising safety enhancement for additional locations.

STORM PROOF APPLICABLE TO

Excerpted from material by Gordon Keller (USDA Forest Service geotechnical engineer, retired, and low-volume roads consultant) — — — — —

The state of Texas is no stranger to extreme weather events. Over the last several years, Texas has experienced a variety of these extreme weather events, including Hurricane Rita, Tropical Storm Bill, Winter Storm Goliath, severe thunderstorms with damaging hail, and intense rain events. Various parts of the state are still experiencing or attempting to recover from the extreme flash floods and catastrophic flooding events that recently occurred throughout the state. Among the significant impacts that such events have on the state is damage to local roads. Road closures and detours adversely affect the mobility of residents and visitors alike, and substantial resources are often needed to reconstruct the roads. Experts say the future likely holds more in the way of extreme weather events. While there are specific ways managers can minimize the impacts of storms with road assessment and prioritization of critical problem areas, many site-specific road measures can be implemented to help “stormproof” the road system.

THE STATE OF TEXAS IS NO STRANGER TO EXTREME WEATHER EVENTS.

Identify areas of historic or potential vulnerability:

Certain high-risk sites are well known, others may be more subtle. Chronically undersized culverts will have a history of plugging or failure. Geologically unstable materials or slopes, roads on steep slopes with sidecast fills, roads that cross steep channels subject to debris flows, wet slopes, areas subject to flooding, or areas

of high soil erosion near streams (inner gorges) all have increased vulnerability to storms.

Use Appropriate Minimum Design Standards:

Road standards, particularly road width, should be minimized, while still considering traffic safety and road user needs. Because SDRR treatments involve existing roads, road standards are already in place. However, SDRR treatments may be used to lower the standard as appropriate and result in less earthwork, lower cuts and fills, and less concentration of run-off, all of which reduce risk of damage or failure during storms.

Employ "Self-Maintaining" Concepts into the Selection and Implementations of Treatments:

Resources for road maintenance are often severely limited and the road systems are extensive. Implementing those treatments



ING PRINCIPLES LOCAL ROADS

that reduce the amount of road miles that need frequent and costly maintenance will allow limited resources to be applied to more of the road system where it is needed. Examples might include outsloping (on appropriate soil types), additional cross-drains, and redundant (back-up) or larger drainage structures.

Incorporate Relevant, Cost-Effective Technology:

Apply current, appropriate technology to improve identification of priorities and for planning, design, and reconstruction practices. This includes the use of GIS and GPS technology; geosynthetics for filters, separation and reinforcement; mechanically stabilized earth retaining structures; current riprap sizing criteria for bank stabilization; soil bioengineered and biotechnical slope stabilization/erosion control measures, etc.

Perform Scheduled Maintenance:

Scheduled maintenance should be performed at a regularly planned

frequency, to be prepared for storms. Ensure that culverts have their maximum capacity, ditches drain well, and channels are free of excessive debris and brush that can plug structures. Keep the roadway surface shaped to disperse water rapidly and avoid areas of water concentration. There may not be sufficient time to do the routine work as a storm is approaching.

Use Simple, Positive, Frequent Roadway Surface Drainage Measures and Use Restrictions:

Good roadway surface drainage should be provided so that water is dispersed off the road frequently and water concentration is minimized. Where soil properties are insufficient to support traffic when wet, restrict use during wet seasons to prevent rutting and gulying. Outslope roads whenever appropriate and practical and use rolling dip cross-drains for surface drainage rather than a system of ditches and culverts that require more maintenance and can easily plug during major storm events. Frequent cross-drains,

insloping and outsloping, and rolling road grades all need to be in good working order. Failed cross-drain culverts are very common after major storm events.

Properly Size, Install, and Maintain Culverts:

Improperly installed, undersized, and plugged pipes are common reasons for culvert failure during storms. Improper alignment or grade relative to channels and ditchlines, excessive woody debris in the channel, excessive channel constriction and headwater elevation, excessively wide inlet areas, and inadequate capacity all contribute to pipe plugging and subsequent failure. Concrete or masonry headwalls greatly improve the resistance of culvert to failure during overtopping. Another common cause of culvert failure is a lack of proper maintenance. Maintaining inlet configurations and removing debris that may plug the pipe are essential for proper function during storms.

Stabilize Cut and Fillslopes:

Unstable fillslopes should be removed or treated as necessary to improve stability. Cut and fillslopes should be well covered (stabilized) with vegetation, to minimize surface instability problems as well as minimize surface erosion. Uncompacted sliver fills and settling or cracking fills are a high priority for stabilization or removal. Fillslopes may also be undercut and over-steepened by a stream or channel. Failing over-steep slopes from road construction where material enters a stream can cause downstream problems, both to the watershed and by promoting plugging of structures.

Use Deep-rooted Vegetation to "Anchor" Soils:

Promote slope stability by using deep-rooted vegetation for soil bioengineering and biotechnical treatments. Combine deep-rooted plants with a mixture of shallow-rooted grasses for good ground

cover and erosion control on slopes; preferably using native species.

Design High Risk Bridges and Culverts with Armored Overflows:

High risk bridges and culvert structures can often be designed with armored overflow areas near the structure in case of overtopping, or they have a controlled "failure" point that is easy to repair and minimizes environmental damage. Alternatively, over-sizing the structure and allowing for extra freeboard on bridges will maximize capacity and minimize risk of plugging. Do not constrict the natural channel. Consider culverts with a span at least that of the bankfull channel width and bridges that span the floodplain.

Eliminate Diversion Potential:

All stream crossings, especially culvert crossings, should be designed and constructed (or upgraded) to have NO

diversion potential. Stream crossings in steep stream channels that are subject to debris flows should be designed and constructed (or upgraded) to withstand such debris flows without being washed out or resulting in subsequent streamflow diversion. Structure damage from a plugged culvert may be minimal, but road damage from a stream diverted down the road can be extensive!



This article includes descriptions of considerations and measures that local road managers should think about when trying to reduce the potential impact of storm events on their road system, i.e., storm damage risk reduction (SDRR). The list and descriptions are excerpted from material prepared by Gordon Keller (USDA Forest Service, retired, and low-volume roads consultant) for the Transportation Research Board's 11th International Conference on Low-Volume Roads held in Pittsburgh, PA in July 2015 and from the publication Storm Damage Risk Reduction Guide for Low-Volume Roads, available at: www.fs.fed.us/t-d/php/library_card.php?p_num=1277%201814 or in the TxLTAP Library.

FWHA'S SAFETY STRATEGY REGARDING ET-PLUS GUARDRAIL END TERMINALS

As a national leader in highway safety, FHWA helps ensure that America's roads remain among the safest in the world. This commitment to safety is the principle that guides all our efforts. FHWA, in concert with the American Association of State Highway and Transportation Officials (AASHTO) and the States, has acted on multiple fronts to assess the performance of roadside safety hardware and, specifically, the ET-Plus guardrail end terminal.

In particular, questions had been raised about whether the ET-Plus guardrail end terminal satisfies applicable safety criteria and performs as intended in the field. FHWA conducted a comprehensive evaluation of the safety performance of the ET-Plus to answer these questions.

FHWA reviewed previous crash tests of the ET-Plus and requested that its manufacturer (Trinity Highway Products, LLC) conduct new crash tests on the ET-Plus and concluded that it meets applicable safety criteria.

FHWA worked to thoroughly assess as much credible evidence and data as possible regarding the performance of the ET-Plus. These data included crash information collected by States and others, crash information submitted in response to FHWA's call for data in the Federal Register, and crash information in Federal safety databases.

FWHA and AASHTO formed two joint task forces to examine and address many of these issues.

- The first joint task force examined measurements of more than 1,000 ET-Plus devices installed throughout the country to reach two import conclusions:
 - First, the devices tested are representative of the devices on the road
 - Second, the measurements do not support allegations that Trinity manufactured a second version of the 4-inch ET-Plus.

- The second joint task force, comprised of Federal and State safety experts, analyzed the data collected by FHWA to determine whether there is any evidence of unique performance limitations of the ET-Plus 4-inch guardrail terminal and the degree to which any such performance limitations extend to other extruding w-beam guardrail terminals.

More broadly, FHWA is assessing the scale and scope of an in-service performance evaluation of all W-beam guardrail end terminals, which will include collection of data from future crashes with the ET-Plus and other end terminals.

After months of rigorous data-driven analysis of the ET-Plus, FHWA has concluded that the device meets the appropriate NCHRP 350 criteria and it continues to be eligible for Federal-aid reimbursement.

For more information on this topic, visit:

<http://www.fhwa.dot.gov/guardrailsafety/index.cfm>

U.S. TRANSPORTATION SECRETARY FOXX ANNOUNCES \$357 MILLION TIFIA LOAN TO BUILD NEW LANES ON HOUSTON'S SH 288

On April 29, 2016, U.S. Transportation Secretary Anthony Foxx today announced a \$357 million Transportation Infrastructure Finance and Innovation Act (TIFIA) loan from the Federal Highway Administration (FHWA) to finance the construction of four new toll lanes on State Highway (SH) 288 in Houston, Texas.

“The TIFIA loan program is designed to help communities like Houston begin projects like this – a project that they would have otherwise had to wait years to start,” said Secretary Foxx. “The new tolls lanes will provide a more reliable commute in one of America’s most congested metro areas, and improve access to jobs and community services in neighborhoods there.”

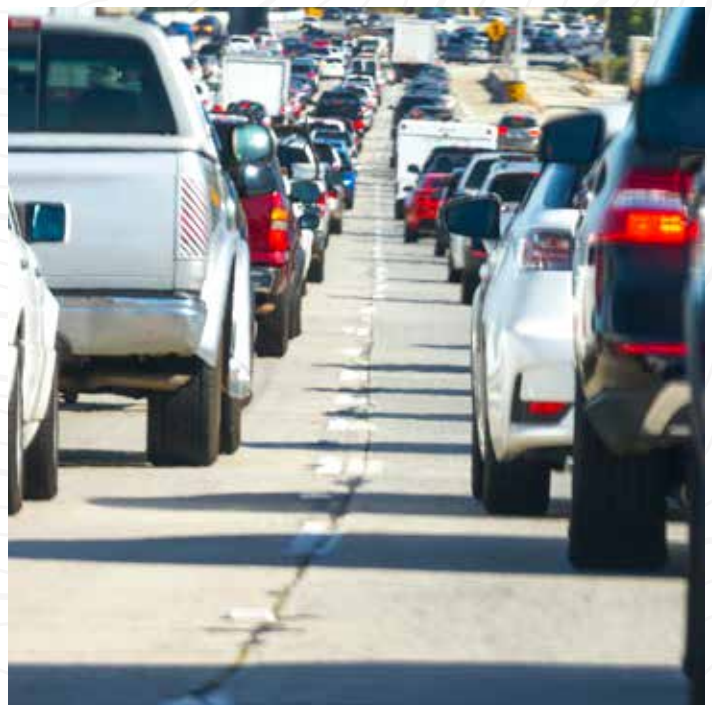
He added that Beyond Traffic, a U.S. Department of Transportation (USDOT) report issued last year, examined the challenges facing America’s transportation infrastructure over the next three decades, such as rapidly growing population and increasing traffic. Gridlock nationwide, as in Houston, is expected to increase unless changes are made soon.

The SH 288 project involves building the new tolled lanes on more than 10 miles between US 59 and the Harris County line, including direct ramps to the Texas Medical Center, a new interchange with the Sam Houston Tollway and upgrades to the Loop 610 interchanges. The \$357 million TIFIA loan will go to the Blueridge Transportation Group, the private company that will build and operate the tollway until 2068. Toll revenue will be used to repay the TIFIA loan.

“Critical infrastructure projects like this one depend on innovative new approaches, and the Lone Star State has been a leader in using such creative solutions,” said FHWA Administrator Gregory Nadeau. “The people of Houston have needed improvements to this corridor for a long time.”

SH 288 is a 60-mile highway between US 59 and the IH 45 interchange in downtown Houston, to the city of Freeport near the Gulf of Mexico and is a critical north-south transportation corridor for the Houston metro region, which extends through Harris County and Brazoria County.

The TIFIA credit program is designed to fill market gaps and leverage substantial non-federal investments. Historically, each dollar of federal funding has provided up to \$14 in TIFIA credit assistance and supported up to \$40 in transportation infrastructure investment. To date in fiscal year 2016, the U.S. Department of Transportation has financed \$1.1 billion to support transportation infrastructure across the country.



NEW RAPID-FLASHING BEACON SHOWS GREAT PROMISE IN IMPROVING PEDESTRIAN SAFETY

For many pedestrians, crossing a busy multilane roadway without the protection of a traffic signal is a nerve-wracking, sometimes dangerous proposition, even when using a marked crosswalk.

As a means of improving safety at uncontrolled pedestrian crosswalks, the Federal Highway Administration (FHWA) has sponsored research on a variety of traffic control devices intended to increase driver awareness and improve drivers' yielding to pedestrians. One of the devices, the rectangular rapid-flashing beacon (RRFB), has shown positive results — an increase in the number of drivers yielding to pedestrians.

"The RRFB is very effective," says Kay Fitzpatrick, manager for the Texas A&M Transportation Institute's (TTI's) Roadway Design Program. "A study conducted about 10 years ago found that you had to have a device that showed a red indication for drivers to yield at a high enough rate to be considered acceptable. Now with the RRFB, there is a device with a yellow indication where drivers are yielding at much higher rates. Having this device only active when a pedestrian is present is an obvious contribution to its effectiveness. We want to understand what, if any, other characteristics are contributing to the effectiveness."

"Several agencies are interested in having the RRFB added to the Manual on Uniform Traffic Control Devices [MUTCD]," Fitzpatrick explains. Before adding this device to the MUTCD,

however, refinements to its characteristics were needed. An FHWA project conducted by TTI started with a closed-course study conducted at the Texas A&M University Riverside Campus that examined driver detection of a cutout pedestrian photograph in the presence of light-emitting diodes with various brightness levels, flash patterns and locations within the sign assembly. The results from the closed-course study indicated that the flash pattern and the beacon location justified additional investigations on the open road.

The research team used a staged pedestrian approach to evaluate drivers' yielding on the open road. Under this protocol, a member of the research team acts as a pedestrian using the crosswalk to stage the conditions under which driver yielding would be observed.

The TTI team developed a temporary light bar and controller that permitted the research team to have control over the flash pattern and brightness. Three flashing light patterns were selected for use with the temporary light bars — the pattern currently being used with other installations along with two patterns developed by TTI in collaboration with FHWA and other transportation professionals.

Rapid-flashing beacons with yellow indicators are proving effective at alerting drivers to pedestrians and, thereby, improving safety at crosswalks. Having the device active only when a pedestrian is present contributes to that effectiveness.





The overall average driver yielding for each of the three flash patterns was between 78 and 80 percent for the eight sites in the study. The statistical evaluation found no difference in effectiveness between the three patterns. Because the tested flash patterns had similar driver yielding results, FHWA issued an official interpretation that favors one of the new patterns (called WW+S) because it has a greater percentage of dark time when both beacons of the RRFB are off (a benefit identified in the closed course) and because the beacons are on for less total time (resulting in energy savings).

“FHWA also wanted to investigate on the open road whether drivers would continue to yield at the same rates if the beacon placement was different,” says Fitzpatrick. “We identified 13 test sites where the communities worked with us and moved the beacons from below to above the sign. That way we had similar drivers and site characteristics when we collected data for both conditions — when the beacons were above the sign and when the beacons were below the sign.”

The findings showed only minor, if any, differences between the above and below positions (the average daytime yielding for staged pedestrians was 64 percent for above and 61 percent for below), and the statistical test showed no noteworthy difference. With the open-road study finding that driver yielding is the same whether the beacons are above or below the sign, and with the closed-course study revealing there are benefits to having it above the sign, FHWA is planning to issue an official interpretation that will allow agencies to place the beacon above the sign.

“The findings from these FHWA studies are helping to refine the device characteristics, resulting in a pedestrian treatment being considered for the next edition of the MUTCD,” says Fitzpatrick. “More importantly, the device is being used in more locations, and drivers are noticing the rapid-flashing yellow beacons and yielding to pedestrians crossing the roadway.”

For more information on this topic, contact

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HALT SYSTEM

BEXAR COUNTY INSTALLS ADDITIONAL SITES



How HALT Works

Bexar County's HALT System – High water Alert Lifesaving Technology – is a tool to warn drivers when there is too much water over the road to drive through safely. HALT uses a sensor to detect rising water. Once the water reaches a certain depth, the system will warn drivers to turn around with either flashing lights or a combination of flashing lights and gates. HALT also sends real-time information to the website maps.bexar.org/halt so drivers can see which roads are safe to travel. Bexar County worked with High Sierra Electronics, Inc. to implement the system.

Number of Locations:

- 50 completed sites, currently in operation.
 - In the process of installing 90 additional sites – 39 in Bexar County and 51 in the city of San Antonio.
 - Total sites = 140 (89 in Bexar County and 51 in the city of San Antonio).
-

Cost:

- Total Cost \$5,303,395.
-

Source of Funding:

- Bexar County Flood Control Program – part of a \$500 million, 10-year capital improvement program



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