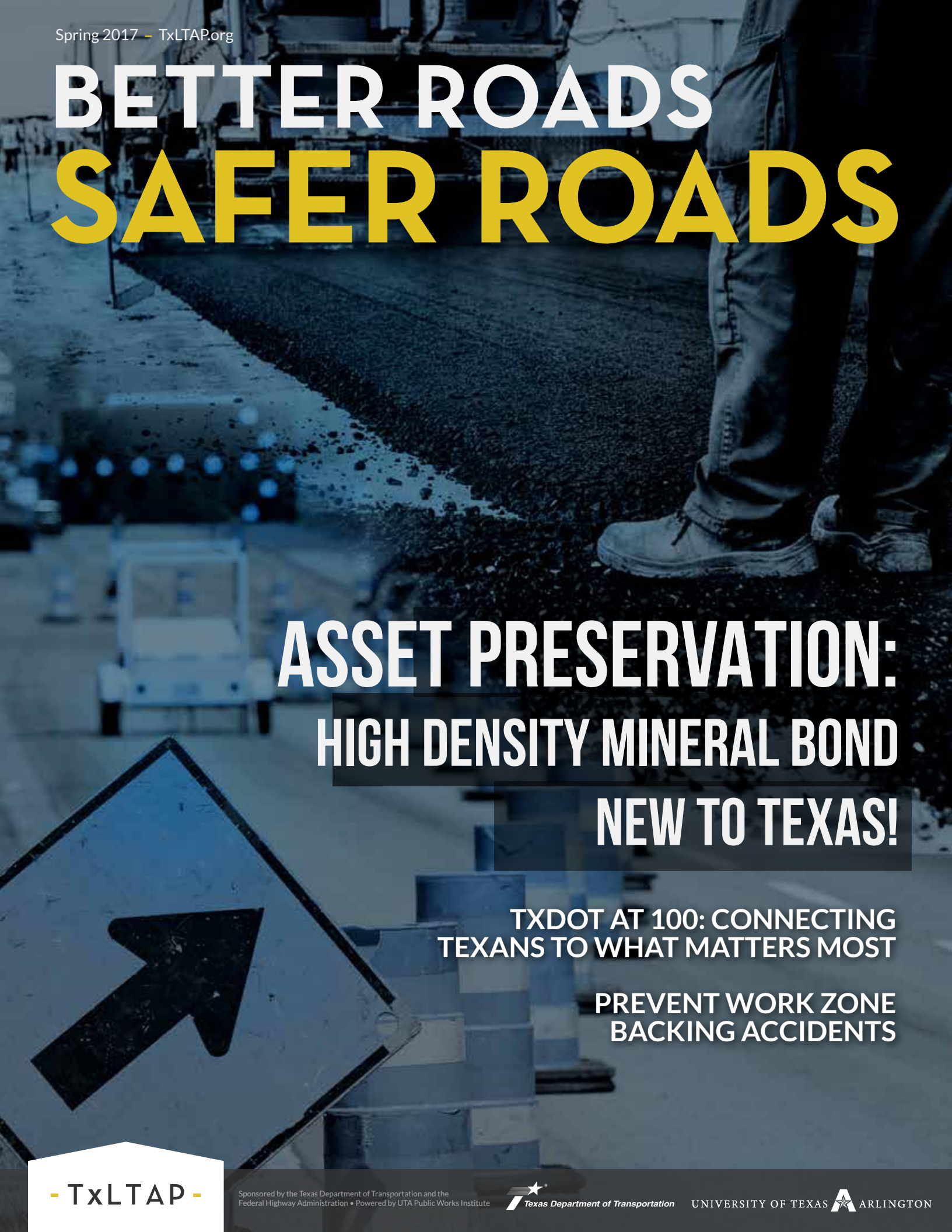
Spring 2017 – TxLTAP.org

BETTER ROADS SAFER ROADS



ASSET PRESERVATION: HIGH DENSITY MINERAL BOND NEW TO TEXAS!

TXDOT AT 100: CONNECTING TEXANS TO WHAT MATTERS MOST

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BETTER ROADS
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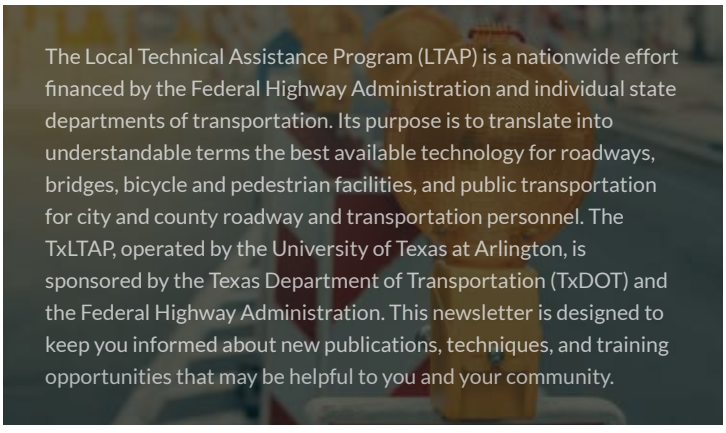

The Local Technical Assistance Program (LTAP) is a nationwide effort financed by the Federal Highway Administration and individual state departments of transportation. Its purpose is to translate into understandable terms the best available technology for roadways, bridges, bicycle and pedestrian facilities, 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.

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Premium polymer emulsion sealer installed May 2009.

Picture taken FOUR YEARS after sealer was installed.

HA5 installed May 2009.

Picture taken FOUR YEARS after HA5 was installed.

Side-by-side performance comparison

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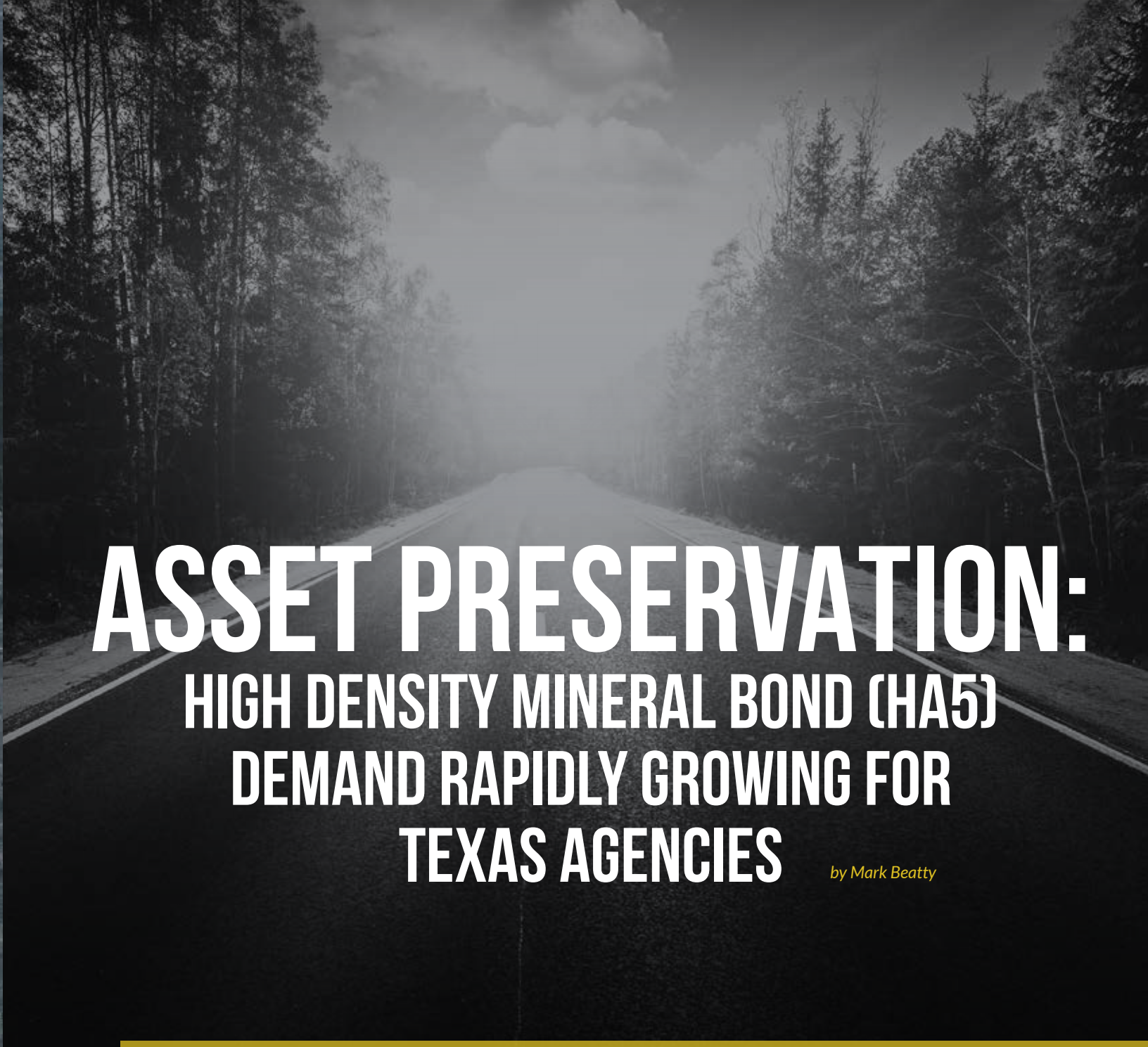


ASSET PRESERVATION:
HIGH DENSITY MINERAL BOND (HA5) DEMAND RAPIDLY GROWING FOR TEXAS AGENCIES

by Mark Beatty

With over 135 agencies nationally already using HA5, and that number is expected to grow by 25-30% this year, there are a couple of questions consistently asked by administrators hearing about HA5 for the first time: "What is a High Density Mineral Bond?" and "Why are agencies racing to use it at such an accelerating pace?"

The preservation treatment known primarily for its use in the West can now be found as you cross the plains of Kansas all the way to the Florida coast. The treatment is classified as a High Density Mineral Bond, but it is probably more widely known as HA5. Up until a couple of years ago, most hadn't heard of High Density Mineral Bond applications, but today it is on the ground in 24 states.

People like black roads. I like black roads. But turning a road black does not necessarily equate to effectively extending the useful life of asphalt pavement.

Performance Evaluation.

A noteworthy installation has been the subject of an engineering firm's examination comparing HA5's performance in a side-by-side comparison with another treatment. On one section, a commercially available polymer-enhanced asphalt emulsion was installed within a week of an adjoining HA5 installation. Both treatments were installed six years ago.

The original paving of both sections was done as one project nine years before the side-by-side maintenance treatments were installed. There is no difference whatsoever in the pavement mix design. In fact, in the side-by-side comparison, there is no seam in the asphalt, just a distinguishing difference in the preservation treatments used. Each of the treated sections had multiple crack samples taken.

The HA5 treated section had sample areas examined that calculated to an average .007 of the surface experiencing cracking and the polymer enhanced asphalt emulsion sampled road surface was found to have .06 of the area with cracking. That's an astounding 857% more cracking in the non-HA5 treated pavement compared to the road having had HA5 installed.

DOT's Benefit.

In 2014 the Alabama DOT did their first project. After ALDOT assessed the project, they published a specification furthering its use in 2014. In addition to roadways, ALDOT found a specific benefit already initiated by another DOT where HA5 was installed to extend the life of asphalt shoulders, and in particular, the DOTs investment in rumble strips. Due to the installation of HA5, the shoulder and rumble strip investment is effectively preserved for seven to nine years which has been a significant advancement for a thinner surface treatment.

City & Counties Benefit.

One city that has been installing HA5 consistently is Farmington, UT, an upscale, primarily bedroom community with a population of about 25,000 just north of Salt Lake City where HA5 has been the center of their preservation program for the last seven years. "It saves our city money as we extend pavement life, and residents like the look" states Ray White who oversees the city's pavement preservation program. "We have had a proactive pavement management program in place the last nine years or so.

For the last seven years, we have been utilizing the HA5 High Density Mineral Bond. Originally we began our program using slurry, chip seal, and overlays. After a couple years we moved away from using slurry and chip seal in any neighborhoods. Residents just didn't like those treatments and the city particularly did not have much success with slurry lasting.

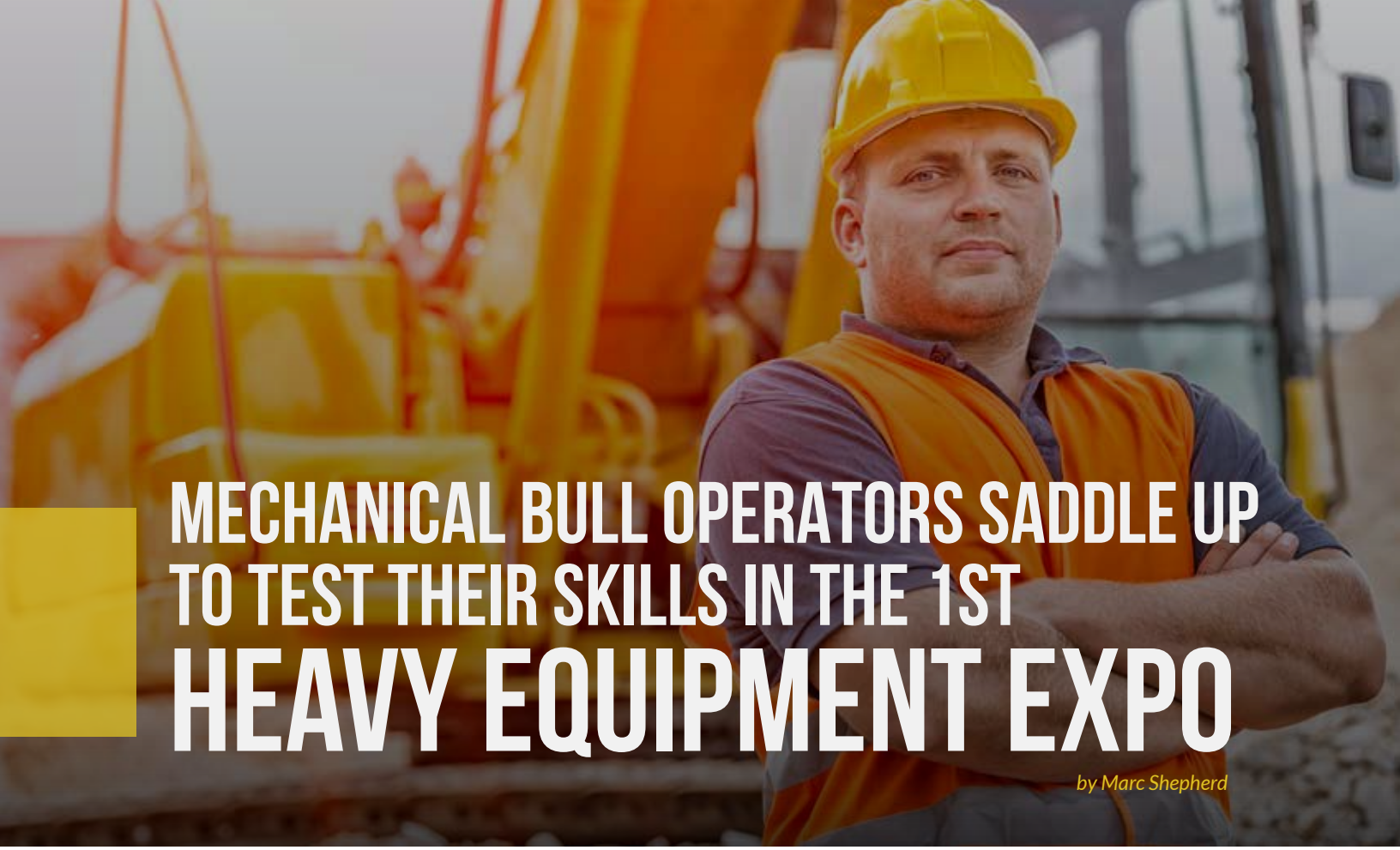
"The first year we used HA5 we were able to quickly determine that it was a solution that our residents liked because of the aesthetics and public works liked because of the product's enduring performance leading to longer lasting streets. With those two entities in the city on board, our elected officials embraced the strategy. The reduction in the city's overall costs of pavement ownership is evident as our road network is maintaining an elevated condition with our strategy."

IPS.

Mark Beatty serves as Sr. Vice President for Integrated Pavement Solutions (IPS) as well as Holbrook Asphalt Company. Mr. Beatty consults with numerous agencies regarding pavement preservation strategies and is a regular presenter at APWA and other industry events. You can reach Mark by emailing mark@preserveapshalt.com or 435-862-8064.

Polymer enhanced emulsion seal coat installed May 2009. Picture taken May 2013

HA5 High Density Mineral Bond installed May 2009. Picture taken May 2013



MECHANICAL BULL OPERATORS SADDLE UP TO TEST THEIR SKILLS IN THE 1ST HEAVY EQUIPMENT EXPO

by Marc Shepherd

It's a rodeo like no other. You won't find any bareback riding, team roping, or even "bulldogging." In this arena, riders cinch up to ride steel, rubber, and hundreds of "horses" to test their skills on the big rigs. Think of it as TxLTAP's twist on riding the mechanical bull.

Amid a sea of orange cones, barrels, and barricades, heavy equipment operators from Chambers, Liberty, Jefferson, and Harris counties maneuvered their way through TxLTAP's first Heavy Equipment Expo at Whites Park in Chambers County. The clear February day greeted 24 operators who turned the parking lot and rodeo arena into a proving ground for patience and skill.

Using maintainers, front end loaders, dump trucks, and backhoes, operators steered through a series of exercises designed to test their abilities. Each exercise simulated a skill needed to build and maintain roadways. Sponsored by Chambers County, Mustang Cat, and TxLTAP, the event kicked off the first of many such expos TxLTAP plans across Texas. The free events allow heavy equipment operators an opportunity to test their skills with a bit of friendly competition. But the expo is more than bragging rights. It's a chance to learn and practice new skills while stressing safety and excellence.

"WE DESIGNED THIS WITH THE OPERATOR IN MIND. IT'S NOT ANY EASY COURSE, BUT IT'S A LOT OF FUN. EVEN THE BEST OPERATORS SAY IT PUT THEIR SKILLS TO THE TEST,"

Said Kimberly Johnson, TxLTAP's Program Manager.

Even the best of the best can find the event challenging. The expo centers around seven exercises: vehicle inspection, backing stop, traffic stop, motor-grader, backhoe, loader serpentine, and Gradall. Operators can score up to 50 points for each exercise for a total of 350 points. Judges stationed along the route deduct points for a variety of reasons including hitting a traffic cone or barrel. Avoiding cones and barrels can be challenging. But the biggest test is precision and attention to detail.

In the vehicle inspection portion of the expo, operators, armed with a vehicle inspection checklist, have just five minutes to find ten planted "defects" on a dump truck. Points are deducted for any missed defects or for improperly filling out the inspection sheet. Knowing what to look for and where to look helps stress the importance of paying attention to detail and to making sure equipment is in safe operating condition.

Operators then get behind the wheel of a dump truck and are required to back up as close as possible to a type III barricade. Points are awarded based on how close the operator gets to the barricade without touching it. A fraction of an inch can mean the difference between 40 or 50 points. Touching the barricade results in no points.

The traffic stop exercise simulates stopping in traffic. Operators are required to stop their dump truck within 20 feet to 22.5 feet behind a stopped vehicle. Again, inches matter. Miscalculating the distance can cost points.

Continue on the next page.

Operators then move to a different type of challenge involving heavy road building equipment. In the motor-grader exercise, drivers use the blade to knock off 10 tennis balls placed on top of traffic cones. No cones can be touched or knocked over, and the operator must keep the motor-grader within the tight cone pattern. The test is about precision and the operator's ability to skillfully use the blade.

The test of precision continues with the backhoe and Gradall exercises. Those willing to brave these two challenges often find they are not as easy as they look. Using the backhoe, operators use the bucket's teeth to pick up and transfer large metal rings from one cone to another. Points are giving for successfully moving the rings, while points are lost for dropping the ring or striking a cone. The Gradall exercise is similar. Instead of cones, however, the operator uses the bucket and boom to pick up a large ball placed on a traffic cone and drop it into a trash can.

The front end loader serpentine exercise is the final test. It challenges the operator's ability to move forward and in reverse through a twisting path of construction barrels. Striking a barrel or going around the barrels the wrong way costs points.

While keeping score is all in fun, the takeaway lesson is operating equipment safely and efficiently. Jefferson County Precinct 2 Commissioner Brent Weaver says the expo has helped his employees sharpen their skills.

"THIS IS ONE OF THE FIRST TIMES WE HAVE HAD OUR STAFF INVOLVED IN THIS TYPE OF TRAINING AND SETTING. IT WAS A GREAT OPPORTUNITY AND THEY LEARNED FROM THE METHODS AND APPLICATION," SAID WEAVER. "IT ALLOWS THE OPERATOR OR SUPERVISOR TO SET STANDARDS FOR FUTURE TRAINING."

Safety, including the 3-points of contact are stressed throughout the event as well as wearing the proper personal safety equipment and using seatbelts. According the Kim Johnson, encouraging operators to be safe and skilled is the greatest goal.

"THE EXPO IS ALL ABOUT HELPING OPERATORS BECOME THE BEST THEY CAN BE THROUGH TEAMWORK AND ENCOURAGEMENT," SAID JOHNSON. "WE WANT IT TO BE FUN, CHALLENGING, AND AIMED AT OPERATING SAFELY."

The expo has already attracted the attention of other cities and counties, and TxLTAP is already working to schedule those events. For more information on how to saddle up and hold a Heavy Equipment Expo in your area, contact TxLTAP at 817-272-5279.

TXDOT AT 100

CONNECTING TEXANS TO WHAT MATTERS MOST

On April 4, the Texas Department of Transportation celebrated 100 years. Born as the Texas Highway Department in a corner of the Texas Capitol in 1917, the earliest incarnation of TxDOT still shares one challenge with the agency we know today – there's a lot of ground to cover in Texas.

Texas' transportation system not only gets us back and forth to daily destinations and appointments, but also brings us home each day and allows us to visit loved ones across the state and beyond. That's why TxDOT's centennial theme is "Connecting Texans to what matters most."

From the earliest days of connecting farms to market, to the modern realities of multi-lane metropolitan highways, TxDOT now manages 80,000 miles of roadway. As the state's economy and population continue to grow, TxDOT remains committed to meeting Texas' ongoing and ever-changing transportation needs.

TxDOT is proud of its 100 years of service to the people of Texas, and the department is particularly proud of the collaborative tradition that has helped guide our service, projects and ongoing plans for the future.

History has shown that by working closely with community leaders and residents, TxDOT has developed one of the safest and most reliable transportation systems in the world.

The Dallas and Fort Worth Districts, covering 16 counties in the North Texas region, are successfully completing legacy projects like the DFW Connector, Horseshoe, LBJ Express and North Tarrant Express.

TxDOT will continue working with its transportation partners and the North Central Texas Council of Governments to deliver projects for the next 100 years.

FOR A LOOK AT HOW TXDOT HAS EVOLVED TO MEET THE NEEDS OF TEXANS, WATCH THE CENTENNIAL VIDEO AT HTTPS://YOUTU.BE/KTA3DE7P-Y4.

ROAD TOURS: KNOW YOUR ROADS FOR GOOD MAINTENANCE

by Duane A. Blanck, P.E

Spring and summer months are excellent times to conduct a road tour to observe and record the overall conditions of your roads and to identify needed maintenance to ensure the public health, safety, and welfare regarding the use of public roads.

Be reminded that a "road" is more than the travel way or driving surface even though the term "road" often refers to the improved portion of the overall right-of-way that is used for travel. There are several elements of a road including:

- Right-of-way – the overall width of the road
- Travel-way – the driving surface
- Shoulders – support the driving surface, often integral with the driving surface of a gravel surfaced road
- In-slopes – support the driving surface and are part of the ditch
- Ditch – supports the road bed, conveys water, provides snow storage
- Back slopes – are part of the ditch
- Appurtenances – such items as culverts, road signs, public utilities, mailboxes, E911 address signs, etc., that exist in the right-of-way

All elements of a road need to be observed or inspected on a regular basis and should become part of a spring road tour. It is important to note what has changed since the last road tour or inspection. The appearance of the driving surface becomes obvious while driving a road, but look for unusual conditions and degradation in general along with suspicious wear and tear—all of which may suggest a need for maintenance.

Have winter conditions caused issues or problems that need to be addressed? Are there concerns about the relative condition of the overall right-of-way and ditch area such as tree windfalls, debris or discarded garbage, or even hay bales that were not picked up in the fall? These concerns may pose a liability risk in the event of an crash involving an errant vehicle or they may restrict lawful uses of the right-of-way as well as impact water quality. Have late fall or early spring rainfalls caused excess material to wash into ditches resulting in sediment buildup, thereby causing potential drainage issues? Is ditch cleaning necessary as a result?

Observing the condition of the various appurtenances that may exist within the right-of-way is an important aspect of a road tour. It is easy to concentrate on the driving surface and the immediate adjacent area while often unintentionally ignoring culverts, signs, public utilities, etc. It is important to know that culverts are in good functioning condition; note any damage such as crushed ends, particularly at driveways and other entrances caused by vehicle runoffs or private snowplowing. And, make note of culvert end conditions regarding scour and erosion—is end treatment appropriate such as rip-rap or aprons?

Traffic signs have been installed for good reasons and contribute to the overall safety of a road. They need to be maintained in a proper manner. Leaning or twisted sign installations resulting from snowplowing and excessive winds may no longer be visible, rendering them ineffective in providing road users with the information intended. The failure to properly maintain traffic signs once installed can become a serious liability risk.

Public utilities that exist above ground should be so noted in terms of any conditions that may contribute to a public nuisance or particularly to a hazard or safety concern. Such conditions might be exposed cables due to erosion, open or uncovered electrical or other cable junction boxes, sagging overhead wires, sagging support/anchorage devices, or leaning poles—if it looks unusual, report it to the appropriate utility company.

Similarly, if mailbox supports have become unsightly or damaged over winter due to no negligence of the [agency], there should be an effort to encourage owners to repair or install acceptable mail box supports, especially if existing ones represent a safety concern or roadside hazard.

What do we do with the information collected once a road tour is conducted? It is reasonable to make a record of the tour: date, time, who participated in the "drive-about," roads inspected, and what was observed. The information acquired can be useful in planning maintenance activities for the summer along with other road activities.

Subsequently, whatever may be planned should recognize the urgency to address immediate liability risks and safety issues that can be resolved with routine maintenance activities performed by your maintenance [employee] or regular contractor. Major and more costly maintenance activities can be planned consistent with overall goals and funding availability. Having a record of inspecting your roads and having a plan of action can be very helpful in explaining matters to your constituents as well as defending against a potential legal claim.

A follow-up tour in the fall allows for the "inspection" of maintenance work accomplished during the summer and to note work needed prior to winter and/or desired in the future. It is good to know your roads!

Article excerpt from the Minnesota LTAP March 2017 newsletter

E-CONSTRUCTION AND CONSTRUCTION PARTNERING - A SMARTER AND FASTER VISION FOR THE FUTURE

Every Day Counts (EDC) is the FHWA's initiative to advance a culture of innovation in the transportation community in partnership with public and private stakeholders. Every two years, FHWA works with state departments of transportation, local governments, tribes, private industry, and other stakeholders to identify a new set of innovative technologies and practices that merit widespread deployment through EDC. EDC-4 (2017–2018) builds on the progress of earlier rounds.

Through round four of Every Day Counts (EDC-4), the Federal Highway Administration (FHWA) is promoting e-Construction to help deliver transportation improvements smarter and faster. e-Construction is the creation, review, approval, distribution, and storage of highway construction documents in a paperless environment. These paperless processes include electronic submission of all documentation by all stakeholders, electronic document routing and approval (e-signature and work flows), and real-time management of all documents in a secure digital environment accessible to all stakeholders through mobile devices and web based platforms.

The documented seven-year e-Construction return on investment for construction management, project collaboration, mobile devices, and electronic bidding tools ranges from 200 to more than 700 percent. e-Construction time savings have averaged 1.78 hours per day, per inspector, and inspectors have collected up to 2.75 times more data. In addition, cost savings have been reported at about $40,000 per construction project, per year. All of this adds up to improved efficiencies in the highway construction program.

Construction partnering is a project management practice where transportation agencies, contractors, and other stakeholders create a team relationship of mutual trust and improved communications. Partnering builds relationships and connections among stakeholders to improve outcomes and successful completion of quality projects that are built on time and within budget, focused on safety, and profitable for contractors.

INCREASES TRANSPARENCY

e-Construction supports secure, expedited, and transparent document transmission, distribution, and storage. Partnering builds a relationship of mutual trust and an enhanced understanding of stakeholder roles and responsibilities, while resolving issues and minimizing disputes.

SAVES TIME

Partnering strengthens collaborations that can reduce project schedules by eliminating misunderstandings. e-Construction decreases the delays inherent in paper-based project administration through secure and expedited collaborative communication.

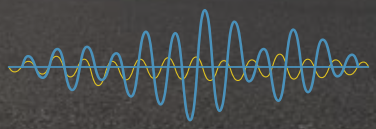
SAVES MONEY

e-Construction saves paper, printing, and document storage and transmission costs. Partnering reduces project costs by minimizing change orders and claims through improved relationships, trust, and communication.

EDC-3 promoted e-Construction as an effective way to transfer and use electronic documents in construction, and it has been successfully demonstrated using various tools and technologies in states nationwide. EDC-4 will continue to provide the core knowledge, support, and impetus for stakeholders to venture into and mainstream e-Construction while highlighting the tools needed for successful implementation. Twenty-seven (27) transportation agencies that have established partnering programs and are currently partnering in highway construction projections.

For more information on e-Construction, contact Kathryn Weisner at (202) 823-2267 or Kathryn.Weisner@dot.gov.
For information on Construction Partnering, contact Chris Schneider at (202) 493-0551 or Christopher.Schneider@dot.gov.

REDUCING ROAD NOISE THROUGH MIX SELECTION



by Chris Campbell

Road noise is a genuine concern today. Limited urban space results in developments being built closer to high-volume roadways, and the effects can be heard both day and night.

The type of road noise varies greatly depending on the speed and volume of the traffic, as well as the size of the vehicles. It can be broken down into a few main components: operation of the vehicle (engine noise), the interaction with the roadway surface, the type of tire and the location of the road.

Here we will be focusing on the techniques for reducing asphalt pavement noise as it relates to the interaction between vehicle tire and asphalt surface.

One of the quietest surfaces to drive on is a newly placed hot mix asphalt roadway. As the asphalt surface begins to wear, road noise will gradually start to increase. This noise is influenced by the properties of the road surface. An effective way to reduce road noise is to choose an appropriate asphalt-based mix design or treatment that incorporates both durability and noise dampening characteristics.

These mixes can be grouped into three categories: open-graded mixes, dense-graded mixes that have been optimized and have modifiers and fine-graded surfaces that include microsurfacing and ultra-thin bonded asphalt.

Open-graded asphalt mixtures

These mixes are designed to be water-permeable – they help to remove standing water from the road surface by allowing it to flow through the mix to the outer edges of the roadway. An added benefit of this porous design is good sound absorption. This is due to the compressed air from the tire being able to escape down through the mixture.

Open-graded asphalt mixes can incorporate polymer modified binder and/or fibers to add durability for long-term performance and prevent drain-down of the binder during construction. Some European countries have found that a highly porous (18-22 percent air void) double layer open-graded asphalt mix is best. The bottom layer contains larger aggregate while the top layer is a finer mix. This finer mix has less macrotexture, reducing contact forces which in turn would reduce noise. Noise reduction with these mixes has been measured at the 3-7 dB range.

These mixes work well for reducing noise when they are new, but over time the pores can start to clog, leading to a possible reduction in the noise dampening effect. The finer aggregate can wear quickly if not maintained and the reduction in noise can disappear. The best application for this type of mix is higher volume suburban roads with road speeds above 45 miles per hour. The higher speeds seem to keep the pores flushed. Due to the porous nature of these mixes, they are not as suitable for areas with freezing climates.

Dense-graded asphalt mixtures

Reducing the aggregate size in the wearing surface will generally result in a quieter surface. These mixes could also incorporate crumb rubber and/or a polymer binder. This type of mixture gets its sound dampening qualities by having a reduced contact area (due to the smaller aggregate grading) as well as an increase in flexibility (due to the crumb rubber) allowing for air to escape at a lower pressure.

Instead of a 12.5-mm nominal maximum aggregate size (NMAS), these mixes often are produced to have an NMAS of 10-mm or lower. It has been noted that these types of mixes can reduce road noise by as much as 8 dB. The advantage of this type of mix compared to other noise-reducing mixes is its additional resistance to reflective cracking and rutting. The downside is the cost of the additional additives.

Fine-graded surface mixtures

Examples of these types of mixtures or surface treatments are microsurfacing and ultra-thin bonded asphalt surfaces. They can act as road preservation techniques and help reduce noise. These thin-surfaced, gap-graded mixes have less macrotexture which reduces contact areas between the tire and the road creating less noise. Reductions can be seen in the range of 2-5 dB.

Rather than the costly full-depth repaving of a road, these products can be applied over a well prepared existing surface as a much cheaper option. These mixes or treatments work best on medium- to high-volume roads in most climates. These surfaces can wear down (within 2 to 5 years) causing greater road noise near the end of their service life.

The types of mixes and treatments discussed above may help in the reduction of road noise if used and maintained properly. The biggest challenge will be in reducing possible added costs to encourage their use in a greater variety of areas.

Reprinted with permission from Asphalt Magazine, March 2017.

PREVENT WORK ZONE BACKING ACCIDENTS

Have you ever found yourself a bit nervous as you've driven through a roadway construction zone due to the limited driving space, construction barriers, and large machinery? Now imagine how you would feel if you were the person not sitting in the safe confinement of your vehicle, but you're actually a part of the work crew. Now image all of the other activities that you, the crew member, must focus on and beyond…the constant passage of vehicles driving through the work zone, the blowing car horns, the screeching tires, the equipment and heavy machinery being operated in the work zone, to name a few. While many of these factors are beyond the control of the work crew, there is something that employers and work crews can control that just may prevent needless injuries or death to the work crew.

According to the National Institute for Occupational Safety and Health (NIOSH), workers on roadway construction work zones are exposed to possible injury and death from moving construction vehicles and equipment. NIOSH and the Fatality Assessment and Control Evaluation (FACE) Program have identified control measures that employers, contractors, and workers should take to protect against injury while working around backing construction vehicles and equipment.

EMPLOYERS AND CONTRACTORS

Standard Operating Procedures

- Develop, implement, and enforce standard operating procedures that address worker safety and minimize work to be performed near vehicles and equipment.
- Use equipment designed to minimize blind areas and equipment with proximity warning systems.
- Establish safe work practices for night work and backing equipment, requiring high visibility apparel.
- Design work sites to minimize backing vehicles and equipment.
- Provide adequate oversight and supervision by a competent person.
- Ensure that drivers only back under the direction of a spotter.
- Ensure daily communication between the prime and sub-contractors to discuss any changes or revisions in construction traffic flow.
- Channel construction vehicles and equipment away from workers using visual safety devices (retro reflective barrels, delineators, portable barricades, cones).
- Install signs to guide workers on foot with respect to traffic areas, vehicle flow, and worker-free zones.

Continue on the next page.

Equipment Operation and Servicing

Ensure that construction vehicles and equipment operating on-site are maintained in safe operating condition at all times by developing and implementing the following:

- A scheduled maintenance program for all roadway construction vehicles and equipment.
- Safety features (reverse alarm, video cameras) installed in accordance with manufacturer's specifications, that operate as intended, and function properly.
- Inspection of all vehicles, equipment, and safety devices (brakes, lights, horns, and reverse alarms) at the beginning of each work shift. Defective vehicles, equipment, and safety devices should be immediately reported and removed from service until repairs are made.
- Installation of collision avoidance or proximity warning systems (radar and sonar devices, or tag-based systems that use personal electronic tags to detect a marker field generated by a transmitter on the vehicle) or monitoring technologies (video cameras and additional mirrors) on construction vehicles and equipment to increase the likelihood that equipment operators will detect workers on foot around their equipment.

Vehicle and Equipment Operators

- Inspect your vehicle, equipment, and safety devices (reverse alarm, mirrors, and windows) at the beginning of each shift and report any deficiencies to your supervisor or employer; remove any defective equipment from service until repairs are made.
- Ensure mirrors and windows are functioning, in good condition, clean and properly adjusted.
- Be aware of equipment and vehicle blind areas and watch for workers.
- Use and maintain contact (visually, verbally, or by hand signals) with a spotter when backing any vehicle or equipment. If contact with the spotter is lost, STOP immediately.

Communication

- Develop, implement, and test the method(s) of communication that will be used during operations. At the start of each shift, review communications signals (verbal, hand signals, flags) between spotters, machine operators, truck drivers, and workers on foot. Prohibit the use of personal cellular phones and head phones or similar items that could pose a distraction [VDOLI 2009]. Provide two-way radios to personnel who coordinate vehicular and equipment activity within the worksite.

Training

Develop, implement, and enforce a comprehensive safety and training program in the workers' primary language and at the appropriate literacy level. Training should include the following information.

- Targeted training on the operator's visual limits of the specific equipment being used on the site, and provided to both equipment operators, and workers required to work on foot near the equipment blind areas.
- Standard operating procedures that minimize exposure of workers on foot to moving construction vehicles and equipment.
- Daily pre-work safety meetings to discuss the work to be performed, safety hazards, safe work procedures, and the method of communicating changes in the work plan.

WORKERS ON FOOT

- Always wear high visibility apparel that is appropriate for your job task and work environment.
- Be aware of equipment and vehicle blind areas and avoid being near these areas.
- Confirm communications signals with an operator and do not approach until the operator gives acknowledgment.
- Be aware of equipment travel paths and avoid standing or walking in these areas.
- LISTEN for reverse signal alarms in the area.
- Do not rely solely on one safety practice, always be aware of your surroundings and ensure that workers are aware of you.

Visit the TxLTAP Library for a complete copy of the NIOSH report Preventing Worker Injuries and Deaths from Backing Construction Vehicles and Equipment at Roadway Construction Work sites.

PROJECT TESTS TECHNOLOGY TO MEASURE PAVEMENT MARKING SAFETY

Safe driving in adverse conditions—whether rain, fog, or darkness—requires visible road markings. Retroreflective pavement markings that bounce light from vehicle headlights back to drivers' eyes improve safety and prevent roadway departure crashes, but they must be maintained to ensure they remain visible over time.

Some highway agencies rely on fixed repainting schedules, while others measure retroreflectivity with hand held or mobile measurement systems to determine when pavement markings need to be repainted. A grant from the Federal Highway Administration Technology Partnerships program enabled Leetron Vision LLC of Concord, NH, to refine its prototype Mobile Retroreflectivity Unit (MRU) to improve its ability to handle various road and environmental conditions and collaborate with the Florida Department of Transportation to conduct field tests.

The MRU uses real-time laser tracking technology to measure pavement marking reflectivity at highway speeds. A new FHWA report, Advanced Methods for Mobile Retroreflectivity Measurement on Pavement Marking, explains the technology, outlines steps taken to refine the Leetron unit, and discusses results of tests using the system to collect pavement marking data.

The Technology Partnerships program, part of the Highway for LIFE program to accelerate innovation use in transportation, provided grants to private industry to further develop proven, late-stage prototypes and evaluate them in real-world settings.

Refining the Prototype

The Leetron system uses a method of tracking measurements in real time that mitigates the effects of vehicle motion and variance in the road profile, one of the most challenging aspects of mobile retroreflectivity measurement. Using variable geometry technology, the system aims a laser at the center of the pavement marking and uses a feedback loop to readjust the aim point as the vehicle equipped with the unit travels at highway speeds.

"In the process of finalizing the product from a prototype, a number of refinement cycles were incorporated in the testing to ensure that the unit remained capable of handling conditions in real-world settings," system developer Terry Lee said in the report. "Extensive road testing and refinements helped develop a robust, commercial-ready system."

The system offers a faster measurement method than traditional systems by allowing simultaneous measurement of markings in two lanes. It also has an automatic calibration capability that minimizes downtime and maximizes data collection.

Independent Evaluation

An independent evaluation conducted by the Texas A&M Transportation Institute confirmed that the Leetron system can collect accurate retroreflectivity data on a range of paving marking types under a variety of challenging conditions. The evaluation included controlled testing in a laboratory and on an airfield runway along with field testing on open roads.

"The results of the comprehensive testing demonstrate Leetron Vision's MRU using variable geometry technology is capable of accurately measuring pavement marking retroreflectivty under a broad range of real-world conditions," the report said.

Article excerpts reprinted from the Federal Highway Administration's March/April 2017 issue of Innovator.

15 TEXAS EMPLOYERS HONORED FOR CONTRIBUTIONS TO TRAFFIC SAFETY

Fifteen Texas employers who have demonstrated a proven commitment to traffic safety have been recognized by the National Safety Council through the Our Driving Concern Texas Employer Traffic Safety Awards program. Awards are presented annually in partnership with the Texas Department of Transportation. Award recipients range from businesses with as few as 13 employees to as many as 20,000, and from nonprofits to municipal organizations. It is the first time winners have been selected in three different categories, and the number of recipients is record-breaking – a nod to the level of commitment employers in Texas have made to protecting employees on the road.

"As traffic fatalities continue rising nationwide, it is more important than ever to look out for one another," said Deborah A.P. Hersman, president and CEO of the National Safety Council. "These employers are taking the lead, and we are proud to recognize their efforts."

NSC and Our Driving Concern recognize the following employers:

EXEMPLARY AWARD RECIPIENT

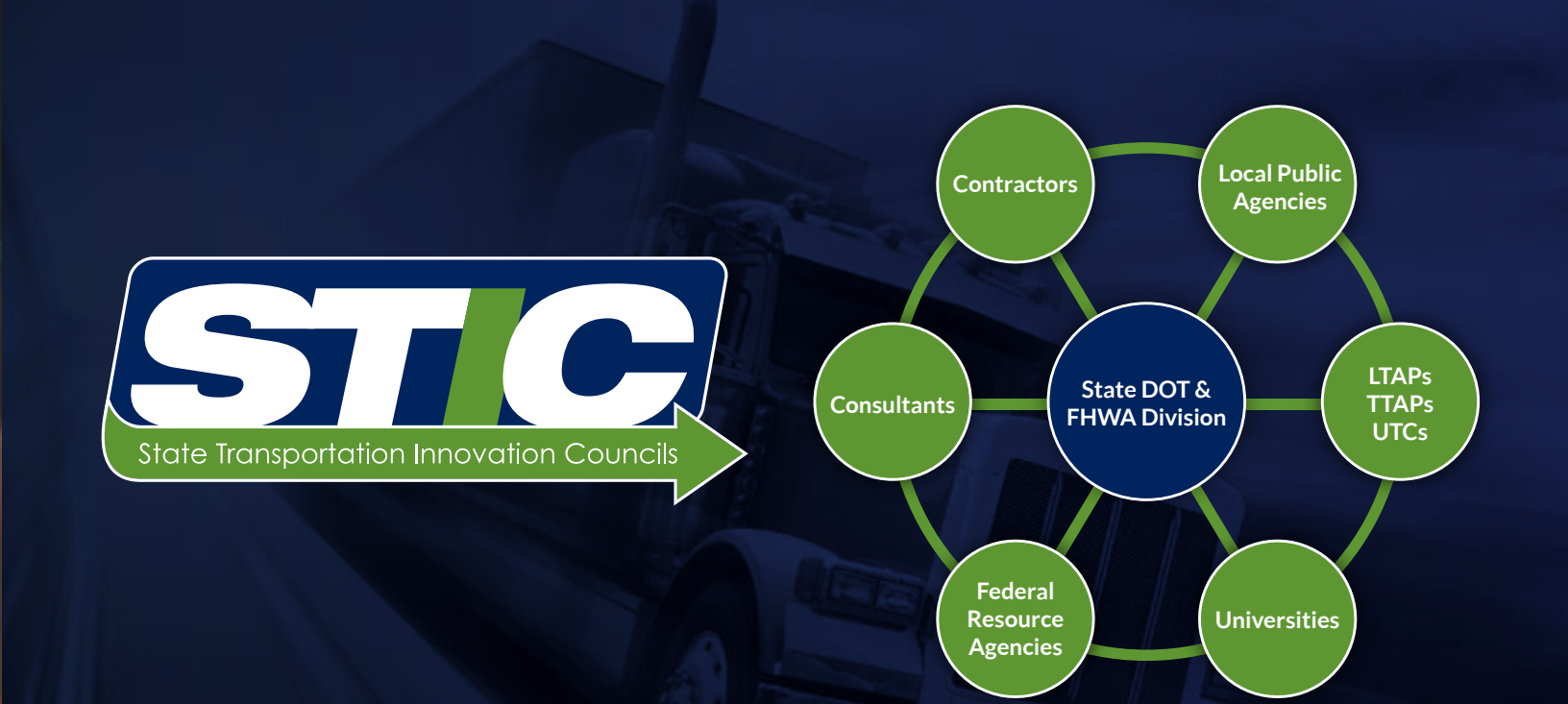
1. **Buffalo Gap Instrumentation & Electrical Co. Inc.**
2. **City of Arlington**
3. **Dallas ISD**
4. **MedStar Mobile Healthcare**

AWARD RECIPIENT

5. **City of Irving**
6. **City of San Antonio, Office of Risk Management**
7. **City of Waco**
8. **LeMeilleur's RV Truck & Equipment Repair Co., Inc.]**
9. **Port of Corpus Christi**

HONORABLE MENTION AWARD RECIPIENT

10. **AFC Transportation**
11. **Brown Integrity, LLC.**
12. **CECO Pipeline Services & CECO Compressor**
13. **Erath County Offices of TxDOT**
14. **Service First Distribution/Mid-South Baking**
15. **Titan Directional Drilling**



TAPPING INNOVATION COUNCILS TO LEAD CHANGE

HOW CAN STATE TRANSPORTATION INNOVATION COUNCILS (STICS) LEAD THE WAY IN AN ERA OF RAPID CHANGE?

Transportation professionals explored elements of effective STICs at a workshop at the Transportation Research Board 96th Annual Meeting in January in Washington, DC. The workshop was sponsored by the Committee on Technology Transfer (ABG30) and the Committee on Conduct of Research (ABG10).

"If you resist change, you lag behind. If you accept it, you survive. If you actually lead it, that's when you thrive," Thomas Harman, director of the Federal Highway Administration's Center for Accelerating Innovation (CAI), told workshop participants. "That's what we're looking to do with the STIC network. We want to thrive in this changing environment."

STICs—which bring together stakeholders to identify and deploy innovations—operate in all 50 States, Washington, DC, Puerto Rico, the U.S. Virgin Islands, and Federal Lands Highway. FHWA encouraged formation of the STIC network to create a strong culture of innovation in the transportation community and get innovations into practice quickly.

"We've established a STIC network. Now we need to nurture it and leverage it to its max," said Harman.

The workshop focused on elements STICs need to develop an innovation culture in their States: origins of innovations, outreach and communication, telling a compelling story, and change management. After hearing presentations, participants broke into groups to discuss goals, challenges, and solutions to reinforce these elements in a STIC. CAI is compiling the groups' recommendations and STIC best practices into a tool STICs can use to strengthen their efforts to lead change.

Origins of Innovations

"Innovation is really about people," David Esse, Wisconsin Department of Transportation (WisDOT) innovation officer, said in a presentation on how the Wisconsin STIC identifies innovations to advance. "The important thing is figuring out who can contribute, who wants to contribute, and who should contribute."

In addition to working with external stakeholders through the Wisconsin STIC to consider innovations from the Every Day Counts (EDC) initiative and other sources, WisDOT formed

Continue on the next page.

an internal Innovation Review Committee to evaluate ideas. Committee members represent a range of agency functions, including traffic operations, project development, and information technology.

Esse then assembled local innovation teams in WisDOT regions to draw frontline staff into the innovation process.

"Now our STIC has an external component, but we also have this critical internal and local component," said Esse. "People are really investing their time. They want to make a difference."

Telling a Compelling Story

Jan Huzvar, Pennsylvania Department of Transportation (PennDOT) deputy communications director, discussed the importance of telling a compelling story about a STIC and the quantifiable benefits of the innovations it champions.

This involves using outreach and communication strategies to build partnerships and share successes.

"You want to make your STIC relatable to your elected officials and the traveling public," she said. "Use the communication tools you have right now. You don't have to go out of your comfort zone."

Among the communication tools PennDOT uses to provide updates on STIC innovation efforts are its Web page, Innovation in Motion newsletter, and social media.

Other useful STIC education tactics include infographics, videos, news releases, and events.

"Have a communications person whose job it is to talk about your success because success breeds success," Huzvar said.

Change Management

Ben Huot, Utah Department of Transportation preconstruction engineer, outlined change management principles agencies and STICs can adopt to focus their efforts to create a culture of innovation, such as fostering leadership trust throughout an organization and following through on innovation initiatives to maintain momentum.

"An important first step is understanding what your existing culture is," he said. "Look for ways to work to the strengths of the existing culture."

Huot also reviewed techniques STICs can use to implement change, including identifying the right champions to lead innovation efforts, sharing information through effective messages, using a risk-based approach to analyzing innovation, and developing good relationships with industry partners.

Emerging STIC

When the Texas Department of Transportation (TxDOT) formed its STIC in 2016, "we looked at our peers and took what we thought was the best from all of those programs," said Sonya Badgley, TxDOT research project manager.

The STIC's primary purpose is to provide a forum for transportation leaders to review and collaborate on innovation efforts that align with Texas transportation goals. Sources the STIC uses to generate ideas include council members, TxDOT's research program, the Texas Technology Task Force, and EDC. Among the strategies the STIC uses to encourage stakeholder involvement in this large State is offering member organizations the option to attend meetings by webcast or send alternate representatives.

"We have an unprecedented $38 billion over the next 10 years that will be transferred through TxDOT," Badgley said. "We're looking forward to engaging with our local stakeholders through the STIC to make sure we're making wise decisions with our public funding."

Article excerpts reprinted from the Federal Highway Administration's March/April 2017 issue of Innovator.

WANT MORE INFO?

HOW TO LEAD INNOVATION - 10 KEYS TO INNOVATION DEPLOYMENT

Users-like customers-are always right, so listen to them and understand their needs.
Communicate why it's essential to adopt an innovation.
Expect resistance to change and show how an innovation can produce significant improvement.
Foster innovation champions and encourage communication among peers.
Keep innovation messages simple and clear.
Establish, build, and leverage an innovation network.
Develop innovation resources that address individual learning needs and reinforce "how."
Tell a compelling story that quantifies success.
Manage change.
Celebrate and learn from mistakes.

VISIT HTTP://TXSTIC.ORG

FOR MORE INFORMATION ON THE TEXAS STATE TRANSPORTATION INNOVATION COUNCIL

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