House Committee on Science, Space and Technology
INVESTIGATIONS AND OVERSIGHT Subcommittee (116TH CONGRESS)
The Need for Resilience: Preparing America's Transportation Infrastructure for
Climate Change
Oral Testimony - Greg Winfree, TTI Agency Director
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Good morning. Chairwoman Sherrill, Ranking Member Norman, and Members of the Subcommittee, thank you for inviting me to testify regarding transportation infrastructure resilience and transportation research. My name is Greg Winfree, and I am the Agency Director of the Texas A&M Transportation Institute—or TTI. Prior to joining TTI in 2016, I served as the Assistant Secretary of the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology.

Established in 1950 and a member of the Texas A&M University System, TTI is a state agency and the largest and most comprehensive university-affiliated transportation research center in the United States. TTI has conducted work in all 50 states and 51 countries. The Texas A&M University System is one of the largest systems of higher education in the nation, with a budget of $4.7 billion dollars. Through a statewide network of 11 universities and seven state agencies, the System educates more than 153,000 students each year. Our System Chancellor, John Sharp, was appointed by Texas Governor Greg Abbott to lead the Rebuild Texas Commission formed to help rebuild our state's infrastructure damaged by Hurricane Harvey in 2017.

Between 1980 and 2017, the U.S. was hit by 227 weather-related disasters that caused more than $1 billion dollars in losses; 98 of those happened in Texas. More than one third—or 91—of those disasters struck between 2010 and 2017, with nearly half striking Texas directly. Hurricane Harvey was the costliest in history, leaving behind $190 billion dollars in damage.

Robust research efforts must be put into place to change the traditional ways in which we design, build and maintain our infrastructure. I'd like to share a few examples of TTI research outcomes that plan for and mitigate these devastating occurrences. Additional

projects like these are critical to transforming our infrastructure to deal with this new paradigm of extreme weather:

- In 2005, Hurricanes Katrina and Rita identified the critical need for safely evacuating large numbers of coastal residents. Through TTI's University Transportation Centers (UTC) funding, researchers developed a Bluetooth travel-time monitoring system that was implemented in 2010 to track real-time traffic flow on evacuation routes. Today, the system is installed on over 1,000 centerline miles of Texas highways.
- In 2017, TTI led a National Symposium on the Barriers and Opportunities for Infrastructure Renewal. Members of the Presidential Administration and other high-level state and federal officials, as well as private-sector stakeholders, were in attendance, including Congressman Bill Shuster, then Chairman of the U.S. House Transportation and Infrastructure Committee. One of the critical needs identified was transportation infrastructure resilience.
- In 2018, TTI developed a first-of-its-kind flood warning system that warns motorists in real time about locations where roadway flooding is likely to occur in the Houston area, using data from 170 existing county-maintained flood sensors. Residents can view the warnings through the TranStar traffic management system website or mobile app.

As a country, we have historically responded to weather disasters in a reactive way, turning to established rehabilitation and repair practices to return service to pre-disaster levels. As demands on our infrastructure systems grow, and the population and funding to meet those demands lags behind, that strategy is no longer sustainable. Instead, we must focus more on preparation and planning. This new mindset requires a different approach to making our existing and new infrastructure more resilient.

While USDOT research has made strides in this effort, particularly at FHWA, sufficient program-based resources and capabilities focused on transportation resilience are not currently in place. More innovative, research-based and data-driven solutions are

required to make significant progress in learning how to build and maintain our infrastructure to last longer and withstand extreme weather events. Sample research needs include:

- Multidisciplinary research initiatives that involve not only the traditional approach of engineers and transportation planners, but climatologists, hydrologists, and a host of other disciplines that don't normally work together.
- Examination of multiple data sets – including data collected on roadway flooding, GPS and LiDAR, roadway elevation, climate, FEMA and storm surge – just to name a few. These varying and often complex sets of data need to be put into a more useful and consistent format, such as a data clearinghouse.
- More robust software models are needed to evaluate the impacts on infrastructure service life given an extreme weather event.
- The variety of resiliency studies and best practices developed by individual DOTs and the FHWA in areas such as vulnerability assessment, asset management, and risk management should be shared and duplicated throughout the country.
- Performance measures for resiliency must be developed, and their correlation with other DOT priorities (such as safety and infrastructure condition) must be better understood so that scarce resources can be allocated most effectively.

The UTC Program is currently actively involved in transportation resilience research. Of the 35 UTCs awarded in the most recent competition (authorized by the FAST Act), seven list resilience as being a major focus of their programs in research, education, and technology transfer. As previously discussed, TTI's UTCs have made significant contributions to the state of practice in this area. This valuable program is contributing to the body of knowledge in transportation resilience, and this should continue as long as the topic falls within USDOT and congressional priorities.

Any severe weather event poses risks to our transportation system, but also to our economy and our very existence. We can't prevent major weather disasters, but by investing resources into research that focuses on resiliency long before disaster strikes, we will be far better able to weather whatever comes our way.

Thank you for your time and attention. I would be happy to answer any questions you may have.