Team Arlington
Safe Streets Arlington – Lighting the Way

Presenter: Ann Foss, Transportation Planning Manager, City of Arlington, ann.foss@arlingtontx.gov
Project Lead: City of Arlington

Project Abstract: As the City prepares our safety action plan, called Safe Streets Arlington, a key safety concern heard from stakeholders and the public, and supported by crash data analysis, focuses on visibility and lighting to improve safety on our roadways. The City proposes to use data from the Safe Streets Arlington Plan to identify locations for installation of lighting improvements, coupled with technology that can help us monitor safety, identify additional safety concerns at these locations, remotely signal maintenance needs, and track safety improvements after the installation.

Primary Technology Areas: Data, Smart Infrastructure
Project Partners: TxDOT Fort Worth District
Project Location: City-wide

CHALLENGE DEFINITION & BACKGROUND

As the City of Arlington prepares an SS4A Safety Action Plan, stakeholders, the public, and the crash data all highlight a common concern: the need for improved visibility and lighting to improve safety on roadways. Crashes occurring outside of daylight conditions represent 62% of fatalities and 49% of serious injuries. While roadway lighting can improve visibility and safety, it can be difficult to monitor for maintenance needs. This project aims to use data will be used to direct lighting improvement at safety hotspots across the City and deploy smart monitoring infrastructure to reduce maintenance burdens.

PROPOSED SOLUTIONS

- **Leverage Data:** Lighting improvement locations will be prioritized using crash data and stakeholder input
- **Smart Infrastructure:** Partner with a vendor(s) to install smart infrastructure devices to monitor safety and maintenance needs
- **Monitoring:** Smart infrastructure devices will be used to track post-implementation benefits and identify new safety concerns

EXPECTED BENEFITS & PERFORMANCE MEASURES

- **Improve Safety:** Improve nighttime visibility and reduce crashes at key locations in Arlington
  - *Baseline Data: crash data from 2018-present, stakeholder input*
  - *Metric: number of crashes in year after lighting improvements, particularly fatal and serious injury crashes*
- **Improve Maintenance**: Increase uptime for lighting improvements through smart infrastructure
  - *Baseline Data: maintenance records from 2023*
  - *Metric: light uptime percentages for year after lighting improvements*

SCALABILITY

- Data analysis methods can be shared for use by others.
- Lessons learned about smart infrastructure will be applicable in other communities.
- Safety improvements with most success at reducing crashes can be replicated in other similar locations.

Team Austin

Congress Avenue Smart Corridor

Presenter: Boniface Njoroge, Consulting Engineer, City of Austin, Boniface.njoroge@austintexas.gov
Project Lead: City of Austin

Project Abstract: The Smart Corridor Initiative (SCI) uses connected infrastructure and emerging technologies to improve the safety, traffic management, multi-modal access, incident management, and accessibility of the Austin transportation network. Congress Avenue was chosen as the first Smart Corridor Project in Austin because it is a mixed-use thoroughfare and part of the high-injury network. Through this project, Congress Avenue will receive ITS technology such as wrong way driving detection and warning systems, eco-approach and departure signals, and safety devices for vulnerable road users.

Primary Technology Areas: ITS Technology, Connected Vehicle Applications
Project Partners: CapMetro, CAMPO, TxDOT Austin District
Project Location: Congress Avenue

CHALLENGE DEFINITION & BACKGROUND

The City of Austin has experiences explosive growth that has introduced and magnified challenges such as lack of accessibility to transportation, increased congestion, greater potential for traffic crashes, air quality issues, and a larger metro area requiring more connectivity. Congress Avenue is the primary corridor leading to the Texas State Capitol and serves as an alternative to I-35. It sees high use by vulnerable road users and is part of the high- injury network. Additionally, Congress Avenue is connected to K-12 grade schools, St. Edwards University, and the Texas School of the Deaf. Two of the city's busiest bus service routes run along Congress, and it is a tourist, commercial, and music destination.

PROPOSED SOLUTIONS

- **ITS Technology for Safety:** Add innovative detection and warning technologies to strengthen the protection of vulnerable road users, including wrong way driver alerts and traffic incident detection and management.
- **Connected Traffic Management:** Install connected infrastructure and leverage technology to increase flow.
- **Multi-modal Operations:** Provide facilities and enhanced safety equipment to make multi- modal options more accessible and attractive.

EXPECTED BENEFITS & PERFORMANCE MEASURES

- **Improve Safety**: Advance safety measures for vulnerable road users
  - *Metric: Incidents (crashes, injuries, deaths)*
- **Enhance Traffic Management:** Decrease congestion, maximize traffic flow, and reduce carbon emissions
  - *Metric: Travel time reliability*
- **Increase Multi-modal Transport:** Provide reliable alternative modes of transportation and protect vulnerable road users
  - *Metrics: Biking and pedestrian counts, Transit rider counts*

SCALABILITY

- **Expand the Smart Corridor Initiative** applications to improve the safety and operations of other major corridors across Austin and Texas.
- **Share and organize traffic data** with robust system architecture in place.
- **Grow the network of public-private partnerships** by providing infrastructure that supports connected and automated technologies.

Team Bryan-College Station
Reimagining Wellborn Road (FM2154) Into a Complete Street

Presenter: Daniel Rudge, Executive Director, Bryan-College Station MPO, drudge@bcsmpo.org
Project Lead: Bryan-College Station MPO

Project Abstract: TxDOT is spending $103 million to do a grade separation at Bush/Wellborn Road. The project includes three levels with a separate level just for bicyclists and pedestrians. North Wellborn ties in to the Texas A&M multi-user transportation network. However, South Wellborn does not have facilities for vulnerable road users. This project will conduct a case study on how to transform FM 2154 (Wellborn Road) into a complete street template for others in Texas to use. This would include not just geometries and facilities but also consideration for how vulnerable road users would navigate the corridor. This would include considering the development of a Smartphone app to assist persons with disabilities and recommending nighttime visibility design.

Primary Technology Areas: Data
Project Partners: Texas A&M Transportation Institute, City of College Station, TxDOT Bryan District
Project Location: Wellborn Road, College Station, TX

CHALLENGE DEFINITION & BACKGROUND

TxDOT is investing $103 million to convert Bush/Wellborn intersection to an interchange. South of Bush Drive, Wellborn Road is challenging to navigate for bicyclists, pedestrians and the disabled; half of the corridor lacks even a sidewalk. There is a need to improve safety and connectivity to Texas A&M and multiple transit routes. Wellborn Road is the primary route to the Texas A&M campus and serves significant multi-modal traffic. This project will study how the segment of FM 2154 between George Bush Drive and Harvey Mitchell Parkway can be converted into a Complete Street suitable for all vulnerable road users, including ITS design for vulnerable road users, a smartphone application, and roadway lighting.

PROPOSED SOLUTIONS

- Evaluate existing conditions using a walk audit in partnership with Brazos Valley Center for Independent Living
- Develop example intersection geometrics, template for right-sizing facilities, and illumination recommendations
- Provide guidance to end users on how to navigate a complete street
- Install ITS for pedestrians: hybrid beacons at key intersections, pedestrian lead time crossing with audible countdown, pedestrian only phase in signals
- Develop a smartphone app for disabled users to navigate the corridor

EXPECTED BENEFITS & PERFORMANCE MEASURES

- Injuries and fatalities by mode
- Travel time index
- Sidewalk condition ratings
- Number of audible countdown crossings
- Percentage of students who walk, bike, or take transit to class

SCALABILITY

- Many small urban and rural areas of Texas have roads designed to rural roadway standards although they are increasingly serving multimodal users
- There are very few Texas or southwestern US examples of complete streets design and implementation

Team El Paso

El Paso International Port ITS Design

Presenter: Omar Martinez, Assistant Director of Legislative Affairs, City of El Paso, martinezol@elpasotexas.gov
Project Lead: City of El Paso

Project Abstract: The City of El Paso plans to develop an integrated ITS system at four ports of entry to support real-time information for commercial traffic, transit, and multimodal at the crossings. The project is supported by the U.S. Department of Energy NREL Laboratory, the ASPIRE NSF Engineering Research Center, local universities, and three levels of government in both the United States and Mexico. This proposal would supplement the ITS work by installing low-cost emissions sensors at ports of entry and across the network to monitor air quality and idling-related emissions.

Primary Technology Areas: Smart Infrastructure, Data
Project Partners: TxDOT El Paso District, Texas A&M Transportation Institute, El Paso MPO
Project Location: Bridge of the Americas and Ysleta Port of Entry

CHALLENGE DEFINITION & BACKGROUND

El Paso is a confluence of cultures and commerce. Home to six Ports of Entry (POEs) that are responsible for processing $109+ billion in U.S.-Mexico trade, it is an epicenter for international goods movement. Four bridges in the region support commercial vehicle traffic. With the rapid rise in truck traffic, however, El Paso's roadways are facing gridlock, idling vehicles are polluting its air, and the health of its communities is suffering. Reducing greenhouse gas emissions from the transportation sector is an essential component to mitigating climate change, and poor air quality has a major health impact on El Paso residents. Focusing on mitigating congestion at ports will reduce transportation-related disparities and increase air quality for disadvantaged communities.

PROPOSED SOLUTIONS

- **ITS technologies for the Bridge of the Americas and Ysleta Port of Entry:** Software integration, fiber optic communications, lane management systems, dynamic message signs, closed-circuit television cameras, ground vehicle sensors, signal phasing and timing
- **Low-cost emissions sensors:** Emissions sensor data will measure air quality at ports of entry and throughout the network. Air quality information will be integrated with regional ITS systems to inform infrastructure design, operations, and efficiency improvements at ports.

EXPECTED BENEFITS & PERFORMANCE MEASURES

- **Reducing Congestion:** Integrating ITS design at ports of entry will improve movement of commercial vehicles
- **Improving Air Quality:** Idling-related emissions disproportionately impact Historically Disadvantaged Communities in El Paso

SCALABILITY

National supply chain reshoring trends along the U.S.-Mexico border are leading to increases in demand for industrial, commercial, and warehousing space in border communities. The proposed ITS and emissions sensors can be replicated along every land port in the U.S.-Mexico border (in both countries) and in other ports around the world with similar congestion issues and traffic volumes.

Team Fort Worth
Smart Parking in Fort Worth

Presenter: Kelly Baggett, Innovation Coordinator, City of Fort Worth, Kelly.baggett@fortworth.gov
Project Lead: City of Fort Worth

Project Abstract: To reduce congestion, improve flow in downtown destinations, and address idling-related emissions, the City of Forth Worth seeks to deploy smart parking IoT systems that guide drivers to available spots, predict and optimize parking operations, and support dynamic demand-based pricing in the Fort Worth Southside and Stockyard areas.

Primary Technology Areas: Smart Infrastructure, Data
Project Location: Southside and Stockyards

CHALLENGE DEFINITION & BACKGROUND

Fort Worth has a growing population, leading to increased traffic headaches and challenges. The increasing population leads to higher vehicle usage, causing significant parking challenges and traffic congestion. Traditional parking management lacks real-time data, leading to inefficient space utilization and increased time spent searching for parking. Excessive emissions from vehicles searching for parking contribute to urban pollution and environmental degradation. Poor parking experiences can frustrate drivers, consume resources, and impact access to local businesses. This project will developing and deploy smart parking systems that guide drivers to available spots, reduce congestion, and optimize space.

PROPOSED SOLUTIONS

- **Digital Twin Technology to aid Smart Parking:** Create a virtual replica of the physical parking infrastructure in Fort Worth target areas to monitor, analyze, and optimize parking operations in real-time.
- **Smart City IoT Integration:** Implement sensors and IoT devices to gather real-time data on parking space availability, traffic flow, and vehicle movement.
- **Artificial Intelligence Predictive Analytics:** Implement AI algorithms to predict parking demand, optimize space allocation, report to dashboard, and provide dynamic pricing based on demand.
- **Arc GIS Plus:** Build out layers in Fort Worth Lab's overall 3D comprehensive planning and modeling.

EXPECTED BENEFITS & PERFORMANCE MEASURES

- **Reduced Congestion:** Streamlined parking processes decrease the time drivers spend searching for spaces, reducing traffic congestion.
- **Environmental Improvements:** Lower vehicle emissions due to reduced search times contribute to a cleaner urban environment in North Texas.
- **Improved User Experience:** Drivers benefit from easier, faster parking solutions, leading to higher satisfaction and increased customers and business for local establishments.

SCALABILITY

- **Modular Design:** The system can be implemented in phases, starting with high-demand tourist areas, like the Stockyards, and expanding citywide.
- **Adaptability:** The technology can be adapted to other Texas cities and integrated with existing IoT programs.
- **Data-Driven Expansion:** Continuous data collection and analysis will allow for informed decisions on scaling and optimizing the system.
- **Interoperability:** Ensure compatibility with various IoT devices and platforms to facilitate seamless integration and futureproofing therefore enabling Smart City infrastructure.

Team Permian Basin
Permian Corridor Assessment and Mitigation Program (PCAMP)

Presenter: Michele Hagemann, Grant Writer, City of Midland, mhagemann@midlandtexas.gov
Project Lead: City of Midland

Project Abstract: Team Permian Basin is comprised of five local governmental entities, the regional MPO, several private and public agencies, and utilities. Team Permian Basin is leading the way in the development of a regional assessment and mitigation program that would utilize drones to collect real time data concerning transportation conditions and community assets. This includes but is not limited to maintenance needs, litter abatement, inventory of all right-of-way facilities, and road obstructions. In addition to transportation innovation, this program will have a broad impact upon public safety, education, workforce development, and economic development.

Primary Technology Areas: Unmanned Aerial Systems
Project Partners: Permian Basin MPO, City of Odessa, Ector County, Permian Road Safety Coalition
Project Location: Regional

CHALLENGE DEFINITION & BACKGROUND

Litter along roadways in Midland and Odessa has grown significantly over the past decade with the heavy commercial vehicle activity in the region. Debris can create hazardous driving conditions, impacting driver's visibility and safety. Much of the litter in the region is caused by tires from blow outs or failure to properly secure items in the back of truck beds or commercial vehicles. TxDOT Odessa District was determined to have the most litter along roadways of all the surveyed areas throughout the state. In 2024, TxDOT Odessa District budgeted over $400,000 just for litter removal in the Permian Basin. This project proposes a regional effort to use a shared UAS fleet for hazard identification and litter mitigation.

PROPOSED SOLUTIONS

- **Regional UAS Fleet:** Partnership between regional transportation stakeholder to co-own and operate a UAS fleet to collect real-time information on the transportation network and hazards
- **Data Integration:** Leveraging crowd-sourced Waze data on traffic incidents and roadway debris to inform response and mitigation

EXPECTED BENEFITS & PERFORMANCE MEASURES

- **Asset Management:** Inventory and inspection of assets using a regional shared UAS fleet
- **Improved Corridor Operations:** Collecting real-time information on traffic incidents, roadway conditions, and hazards.

SCALABILITY

- **Expanded Use Cases:** Once the partnership model is established, the Permian Basin region can expand use cases beyond incident management, hazard identification, and asset inspection.
- **Strategic Partnerships:** Rural regions that have constrained resources may replicate the shared-fleet model for equipment purchases.

Team San Marcos

Developing a Train Detection and Alert System Using Google AI & Cloud

Presenter: Sabas Avila, P.E., Director of Public Works, City of San Marcos, savila@sanmarcostx.gov
Project Lead: City of San Marcos

Project Abstract: With over 212,000 at-grade rail crossings in the U.S. and trains reaching over 1 mile in length, trains are causing significant traffic delays. Using Artificial Intelligence, Google AI and the City of San Marcos will develop a train detection and alert system to notify Emergency Management and Multi-Modal Transportation Providers. This system will allow Emergency Management and Multi-Modal Transportation to avoid long queues and congestion.

Primary Technology Areas: Data
Project Partners: Google Public Sector
Project Location: City-wide

CHALLENGE DEFINITION & BACKGROUND

San Marcos, TX is located on the I- 35 corridor between Austin and San Antonio. The city is bisected by two Union Pacific Rail Lines and includes 24 at-grade railroad crossings. Nationally, more than 2,000 incidents and 200 fatalities occur each year at railroad crossings. Railroad crossings are causing 656 hours of vehicle delays per day in San Marcos and can add 6 minutes to emergency response times. Most railroad crossings lack interoperability with existing traffic management systems and real-time communication infrastructure. Small and Rural Multimodal Transportation Providers do not have the personnel or resources to develop or staff a Traffic Management Center (TMC). Basic railroad communication and interoperability improvements start at $1M. There is a need to provide low-cost, interoperable, and automated solutions to improve safety and connectivity.

PROPOSED SOLUTIONS

- Utilize Google Cloud to **automatically detect trains** using common traffic cameras and YouTube feeds.
- Develop automated train detection system using traffic video and Google Cloud to **provide near real-time alerts**.
- **Leverage IoT** to develop alert system to broadcast alerts to emergency management providers, multi-modal transportation providers, and the traveling public through WAZE.

EXPECTED BENEFITS & PERFORMANCE MEASURES

- **Improve Safety**: Address safety at major intersections
  - *Metric: Emergency Management response times*
- **Enhance Connectivity:** Improve connectivity to multi-modal transportation partners
  - *Metrics: Views and impressions on notifications to transportation providers and public*
- **Increase Efficiency**: Provide reliable transportation service and reduce congestion at major intersections
  - *Metrics: Delay and congestion*

SCALABILITY

- Low-Cost Entry using standard traffic cameras and cloud storage.
- Infinite Applications using AI to solve problems and reduce overburdening the workforce.
- Transferable to all multi-modal transportation providers.
- Replicate public-private partnership easily from small to large communities and transportation providers.

Team Tyler
Advanced Approach to Monitoring Illumination Data for Nighttime Crash Prediction

Presenter: Okan Gurbuz, Ph.D., Associate Research Scientist, Texas A&M Transportation Institute, o-gurbuz@tti.tamu.edu
Project Lead: Texas A&M Transportation Institute

Project Abstract: Research findings show heightened risk associated with nighttime driving, with both crash rates and higher fatality rates, especially in incidents involving vulnerable road users. The primary objective of this project is to develop a process for agencies to identify and assess areas prone to nighttime crashes and create predictive models in relation to roadway lighting. To achieve this, the team will use a smartphone application that will serve as the main data collection tool allowing the team to identify the roadway segments that are most susceptible to nighttime crashes. The predictive model will be integrated with a GIS-based map, resulting in an interactive dashboard that will display historical nighttime crashes and identify potential new locations or hotspots within the agency's boundaries. Given the high incidence of nighttime crashes, the research team proposes to conduct a pilot study in the City of Tyler.

Primary Technology Areas: Data, Prediction Models, Interactive Dashboard
Project Partners: TTI, UT Tyler, TxDOT Tyler District, City of Tyler
Project Location: City-wide

CHALLENGE DEFINITION & BACKGROUND

For the last ten years, Tyler, TX has had an above-average proportion of nighttime crashes when compared to the urban state average. Challenges with visibility can contribute both to nighttime crashes and to crash severity. Installing roadway illumination is a proven intervention, but there is a need to fine-tune decision frameworks that guide how, where, and when agencies install roadway illumination in order to act proactively rather than reactively.

PROPOSED SOLUTIONS

- **Smartphone-Based Data Collection:** Develop and utilize a smartphone application to collect location-based illumination data.
- **Model Development:** Prediction models to identify potential nighttime crash locations.
- **Data Integration and Dashboard Development:** Both historical crash records and predicted hot spots.

EXPECTED BENEFITS & PERFORMANCE MEASURES

- **Resource Allocation Efficiency:** Assess the efficiency of resource allocation based on the prioritization of high-risk areas for illumination improvements.
    - *Metric(s): Cost per high-risk area addressed*
- **Number of Nighttime Crashes:** Monitor the nighttime crashes in areas where illumination improvements are recommended.
    - *Metric(s): Number and proportion of nighttime crashes (crashes, injuries, fatalities)*

SCALABILITY

- After successful implementation in Tyler, the project can be scaled to other mid-sized and large cities (or Districts) in Texas facing similar issues.
- The framework can be adopted by other DOTs for a broader implementation, leveraging application and the data integration dashboard to enhance roadway safety across the U.S.