TxDOT – Safety & Innovations

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Texas Department of Transportation


HELP
#EndTheStreakTX
End the streak of daily deaths on Texas roadways.
TxDOT.gov (Keyword: #EndTheStreakTX)
#EndTheStreakTX Toolkit

Be where your feet are.

BEST PRACTICES

continuous improvement

Leadership Buy-in

Work Zone Safety

Awareness Campaigns

Stretch & Flex

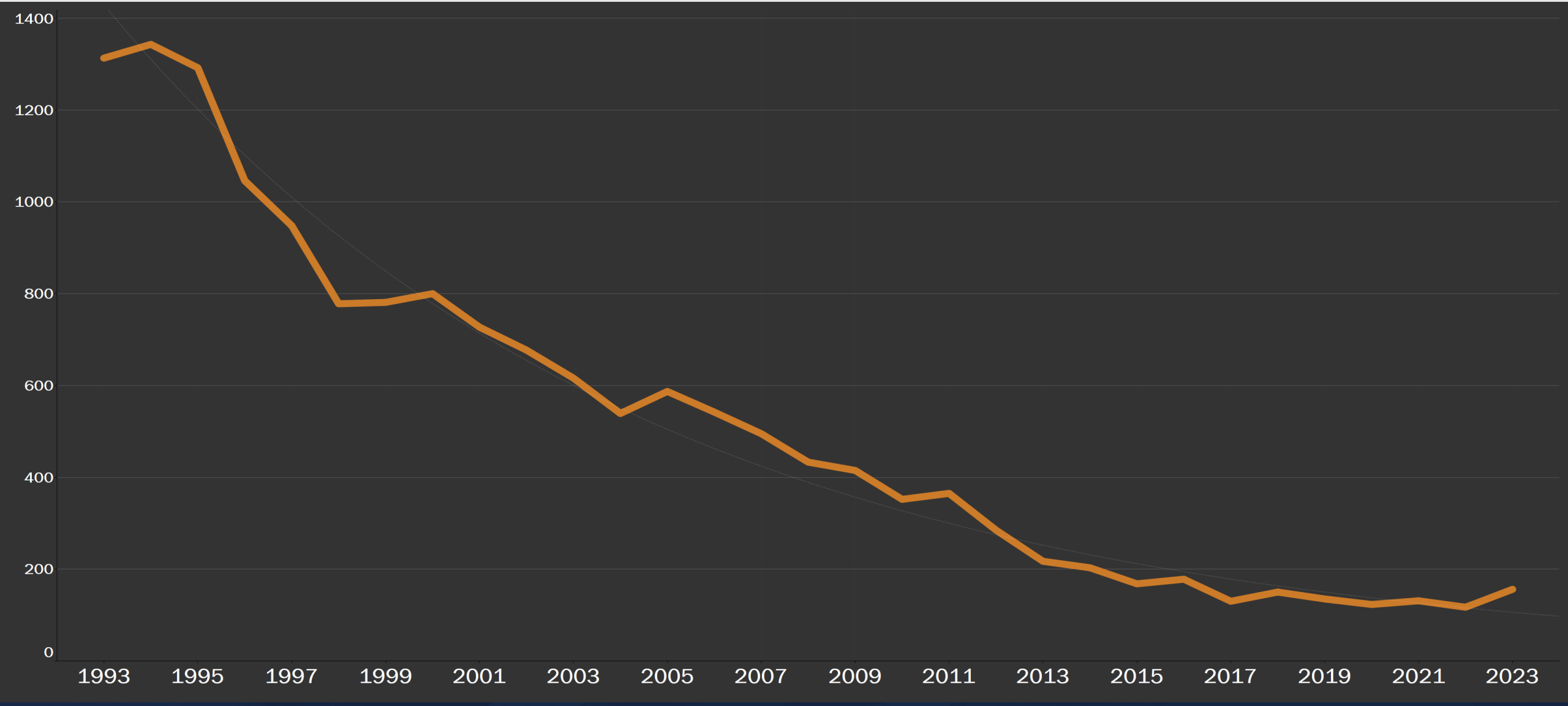
Safety is Intentional
Be Where Your Feet Are

TEXAS DEPARTMENT OF TRANSPORTATION

Safety: Mission ZERO

Injuries Per Year

152 Injuries/1.09 Incidence Rate FY2023



Forecast FY 2024

Vehicle Incidents

30% Increase in
Recordable Vehicle Incidents

Injuries

21% Decrease in
Lost Time Injuries

(Average of Last 5 Fiscal Years and FY24 YTD)

How do we get there? Foundation 14

- PPE
- Seatbelts
- Idling
- Parking Brakes
- Preventive Maint.
- Stretch & Flex
- Traffic Control
- Distracted Driving
- Blue and Amber lights
- Lights On
- Parking
- Backing
- Spotting
- 360 Walk-Around

Safety Apparel - Winter Weather PPE

Insulated Bib Overalls

3 Piece Winter Jacket

Insulated Pant Liners

Winter Weather PPE

Insulated Safety-toe Rubber Boots

Insulated Gloves

Ice Cleats

Face Coverings

PPE Pilots

Insulated Bib Overall

The Need: Winter weather operations after Uri in 2021 determined crews needed additional protection from unprecedented temperatures.

Pilot: Winter 2021-2022
Rollout: Fall 2022

Long Raincoats

The Need: Employee-led feedback indicated that they wanted more coverage in wet environments.

Pilot: Late summer 2022
Rollout: Early 2023

PPE PILOTS

move the needle

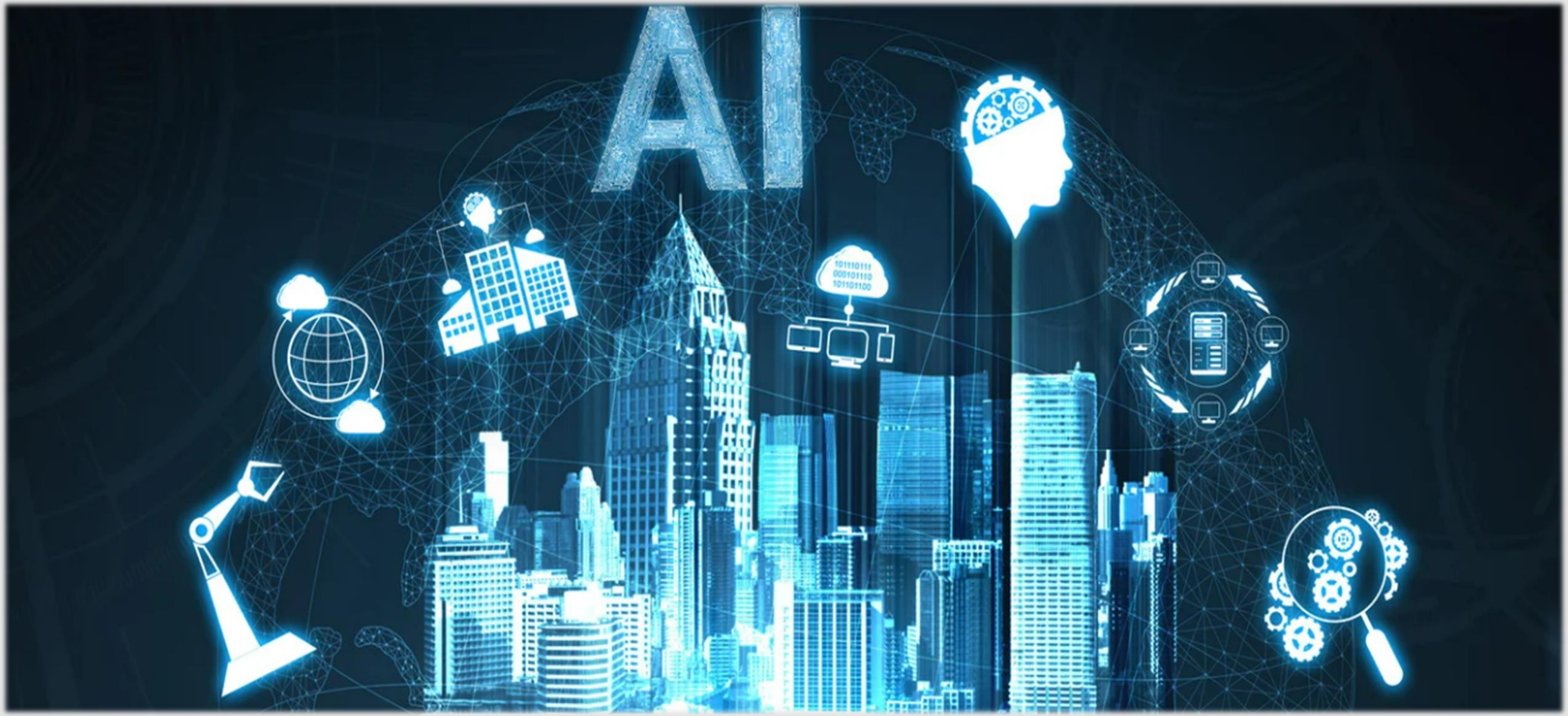
Safety-toe Footwear

We have provided more inclusive options on contract through the state's set aside program.

TEXAS DEPARTMENT OF TRANSPORTATION

Safety: Mission ZERO

Artificial Intelligence and Safety



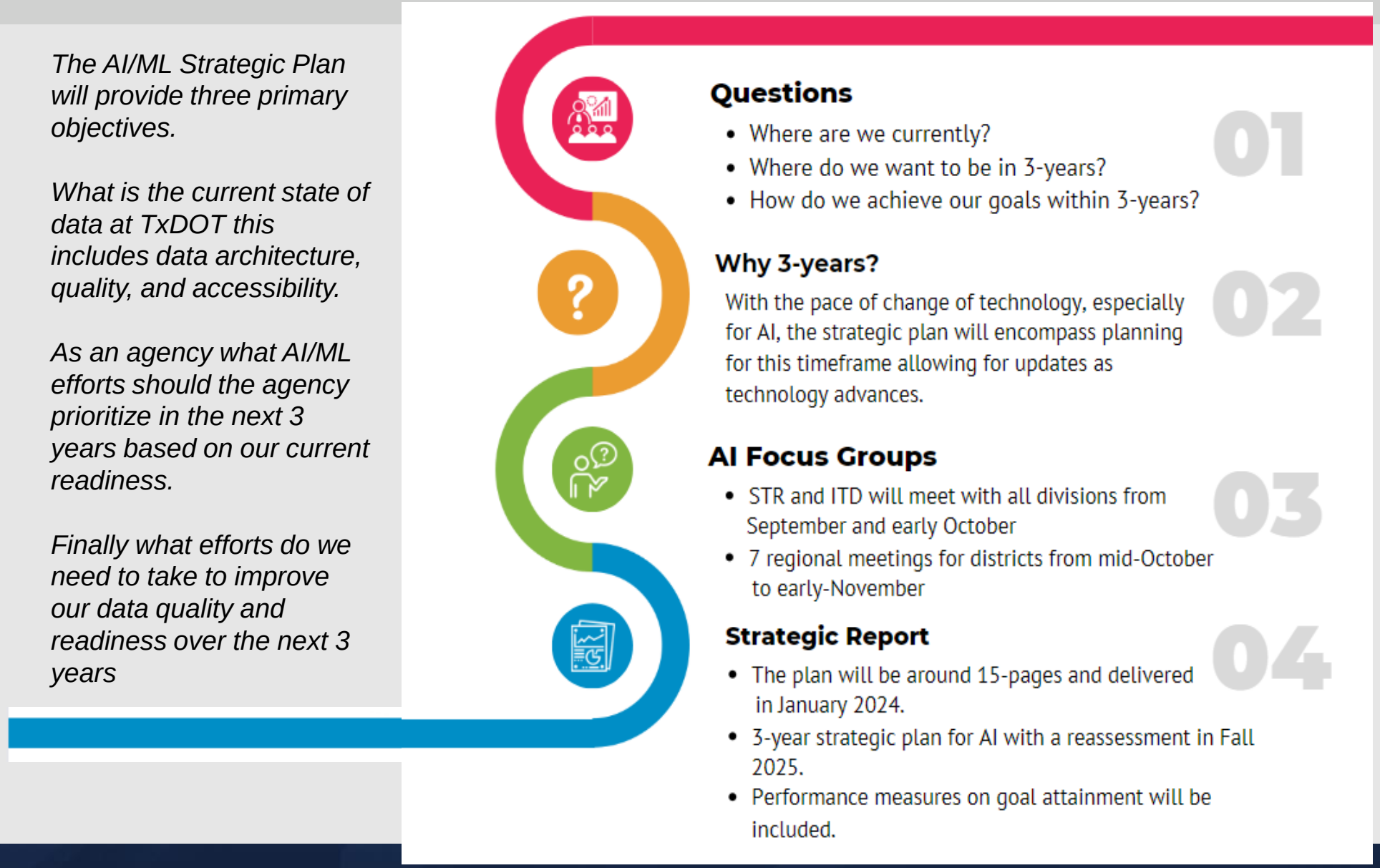
AI Strategic Plan

The AI/ML Strategic Plan will provide three primary objectives.

What is the current state of data at TxDOT this includes data architecture, quality, and accessibility.

As an agency what AI/ML efforts should the agency prioritize in the next 3 years based on our current readiness.

Finally what efforts do we need to take to improve our data quality and readiness over the next 3 years



Questions

01

- Where are we currently?
- Where do we want to be in 3-years?
- How do we achieve our goals within 3-years?

Why 3-years?

02

With the pace of change of technology, especially for AI, the strategic plan will encompass planning for this timeframe allowing for updates as technology advances.

AI Focus Groups

03

- STR and ITD will meet with all divisions from September and early October
- 7 regional meetings for districts from mid-October to early-November

Strategic Report

04

- The plan will be around 15-pages and delivered in January 2024.
- 3-year strategic plan for AI with a reassessment in Fall 2025.
- Performance measures on goal attainment will be included.

Future Use Cases

Traffic Management and Optimization

- Detect Incidents from either connected vehicle data or video feeds.

Accident Prevention and Safety Enhancement

- Analyze roadway design and influences to detect hot spots and recommended remedies.
- Asset Management and Predictive Maintenance
- Using LIDAR and Video collect, process, categorize, and store asset information in a database that provides details about the assets such as height of guardrails to know if you are following FHWA's recommended heights.
- Using traffic patterns, weigh in motion, and pavement type provide better prediction of when pavement will need rehabilitation or maintenance.

Budget Optimization

- Recommend funding categories on the entire UTP portfolio of projects to maximize all available funds and minimize the use of category 1 on non-preventative maintenance projects.

Key Takeaways

AI has great potential to improve TxDOT's ability to deliver projects, improve safety, and simplify our processes.

TxDOT should invest in smaller AI projects initially to show success before tackling larger projects.

Data and AI literacy and governance is needed across the agency to maximize the full potential of these tools.

REKOR ONE™
INTELLIGENCE SYSTEM

INCOMING
OUTGOING

INCOMING
OUTGOING

THIRD-PARTY DATA SOURCES

Connected Car Services	INRIX otonomo wejo
GPS Navigation	waze
Weather Forecasts	WU CLIMACELL
Events	ticketmaster
GPS Fleet Tracking	GREENROAD GEOTAB Zubie
Dash Cams	nexar

IN-VEHICLE DATA

- Average Speeds
- Harsh braking & acceleration zones
- Excess steering zones
- Incident Detection
- User Reporting

PUBLIC OUTREACH

twitter waze 511 Travel Info govDELIVERY get the word out.

TRAFFIC FLOW

- Lane Control
- DMS Boards (DYNAMIC MESSAGE SIGNS)

INFRASTRUCTURE DATA SOURCES

- ATMS
- CCTV
- RWIS
- CONTROLLERS
- SENSORS
- BLUETOAD

OTHER DATA SOURCES

- Law Enforcment CAD
- Future municipal, county, and state partners

Mobility Authority reposted

Mobility Authority TIM Center
@RMATIMCenter

Major crash 183A Toll frontage at Hero Way has all lanes closed. Traffic is being diverted onto the tolled lanes at this time. #ATXTraffic

Early Benefits of AI: Rekor Command (March to August)

34 %
Rekor uniquely identified incidents

11 min
median faster detection of incidents

70 %
Of new incidents were verified by operators

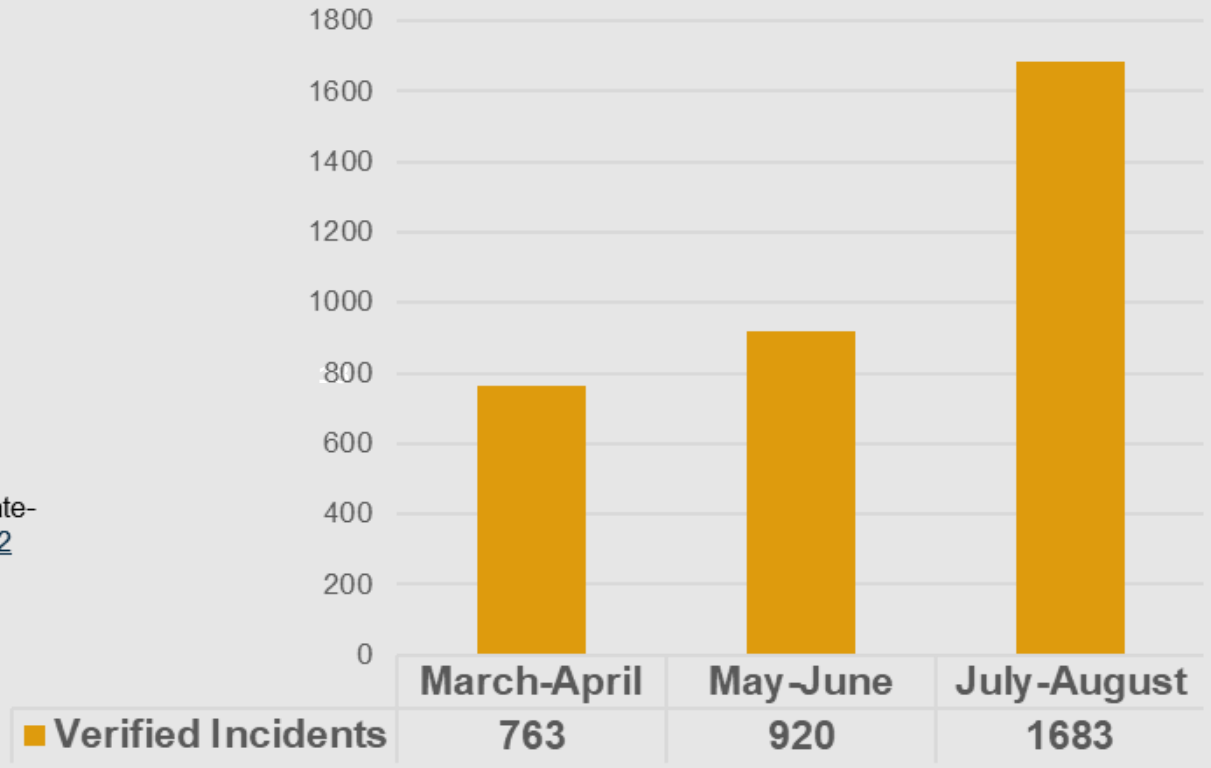
Potential Impact

- 29% reduction of chances of secondary crashes *

44 min avg faster traffic return to normal **

$8M reduction in direct cost to TxDOT Austin /YR **

Rekor Incidents Verified by Operators

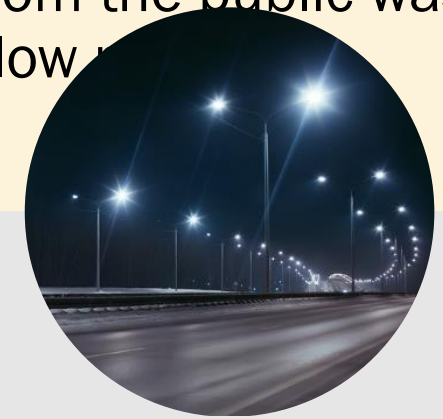


*Goodall, N. J. (2017). Probability of Secondary Crash Occurrence on Freeways with the Use of Private-Sector Speed Data. Transportation Research Record, 2635(1), 11–18. https://doi.org/10.3141/2635-02
*"Federal Highway Administration Focus States Initiative: Traffic Incident Management Performance Measures Final Report." *Introduction - FHWA Focus States Initiative: Traffic Incident Management Performance Measures Final Report - FHWA Emergency Transportation Operations*, ops.fhwa.dot.gov/publications/fhwahop10010/sec1.htm. Accessed 28 Aug. 2023.
***The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised)*, crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013. Accessed 28 Aug. 2023.

Illumination Outage Tracker – Fort Worth District (FTW)

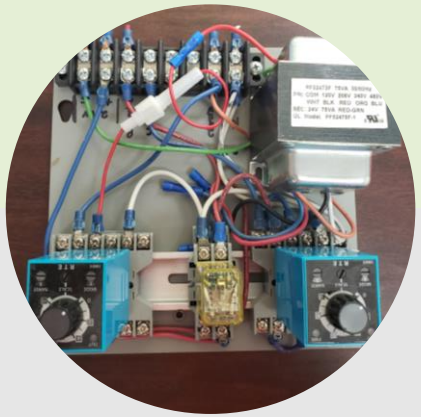
PROBLEM

- $2M copper theft resulted in only 60% active lighting, reducing roadway safety
- Tracking outages by relying only on night rides or notifications from the public was a slow



INNOVATION

- TxDOT master electrician developed original prototype
- Remote reading of low voltage indicates an issue with lighting
- System includes an app that provides notifications



BENEFITS

- Reduction in copper theft
- 89% active lighting, which improves roadway safety
- Lower costs, less travel, and timely repairs since lighting can be tested remotely

HELP Alerts – Fort Worth District (FTW)

log
INFORMATION LOGISTICS

INRIX

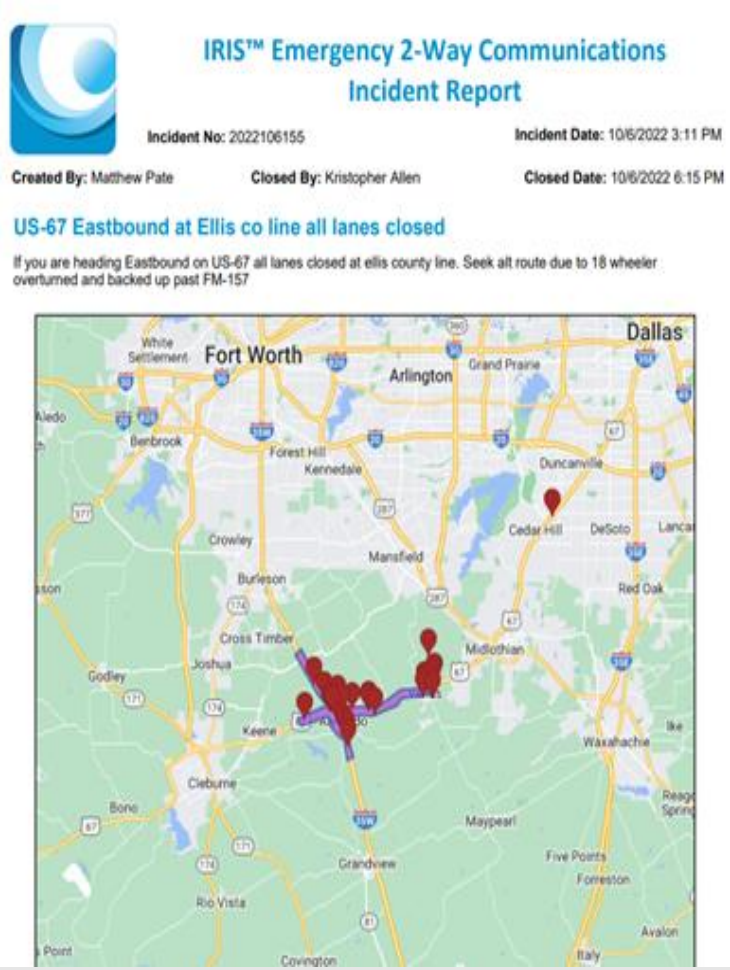
HELP Alerts™

Save Lives With HELP

HELP Alerts is an emergency alerting service for those extreme situations when travelers are stuck on a road for an extended period of time. HELP can reach all travelers in the area - no app needed. No pre-registration needed. No knowledge of your agency website or services needed.

HELP Alert-How it Works

- **HELP Alerts service push a Wireless Emergency Alert (WEA) to travelers in and approaching a major incident area. The WEA message relays instructions for registering for road closure updates.**



- **Full Lane Closures in one or both directions lasting 4 or more hours**
- **Once registered, users can receive updates about the closure as well as send messages to the agency's representatives.**
- **The emergency alert system can also issue one-way alerts to warn drivers of upcoming dangers or extreme conditions.**
- **The alerts operate through the Integrated Public Alert & Warning System (IPAWS), FEMA's national system for local alerting that provides authenticated emergency and life-saving information to the public.**

IRIS HELP (Highway Emergency Linked Platform) ALERT

1

Create New Closure

The agency traffic operator draws a boundary around the effected area on a map. These coordinates are used to identify and communicate with stranded travelers.

2

Event Information

The operator enters information that is displayed on a dynamic special event web page. Simultaneously a texting and IVR phone system are automatically activated for the emergency event.

3

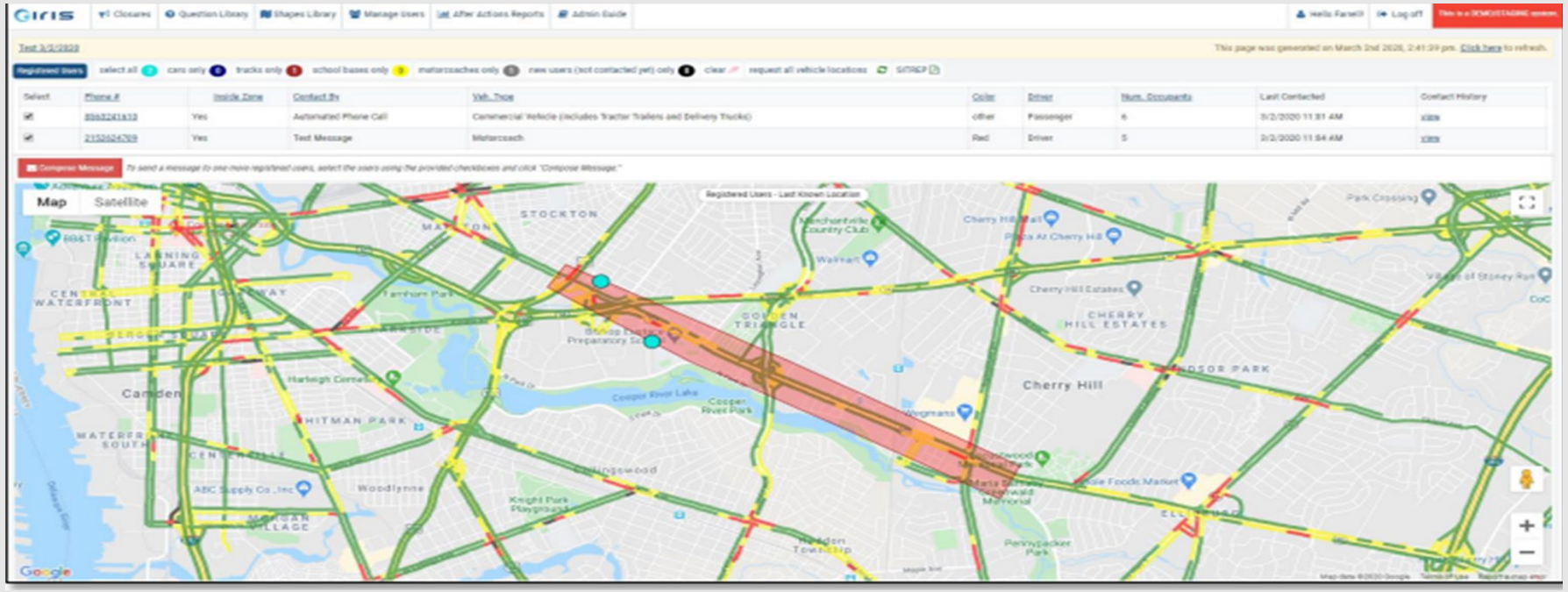
Driver Opt-in

Travelers visit the event website to participate in communications for the closure. As part of the opt-in process, travelers respond to agency-specified questions, which provide critical information about the queue extent and composition.

4

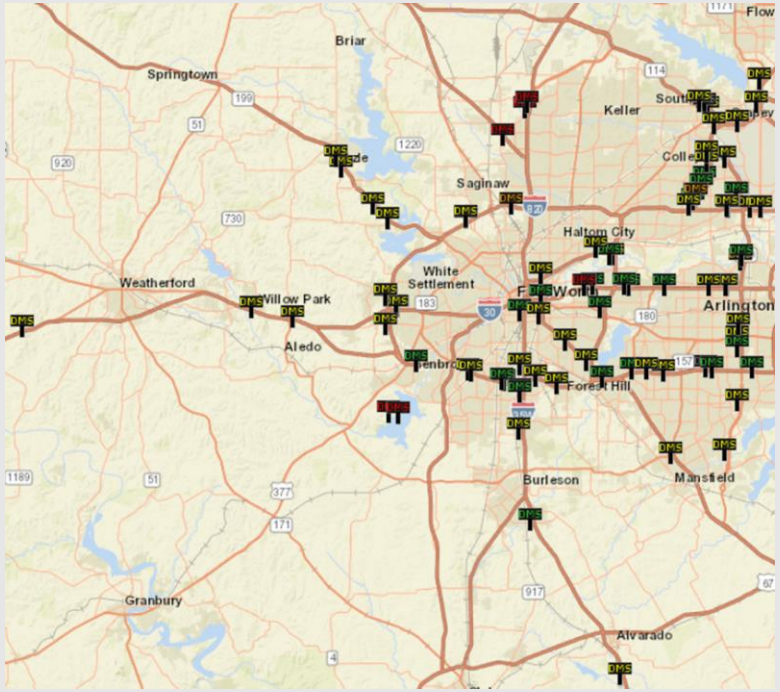
Two-Way Contact

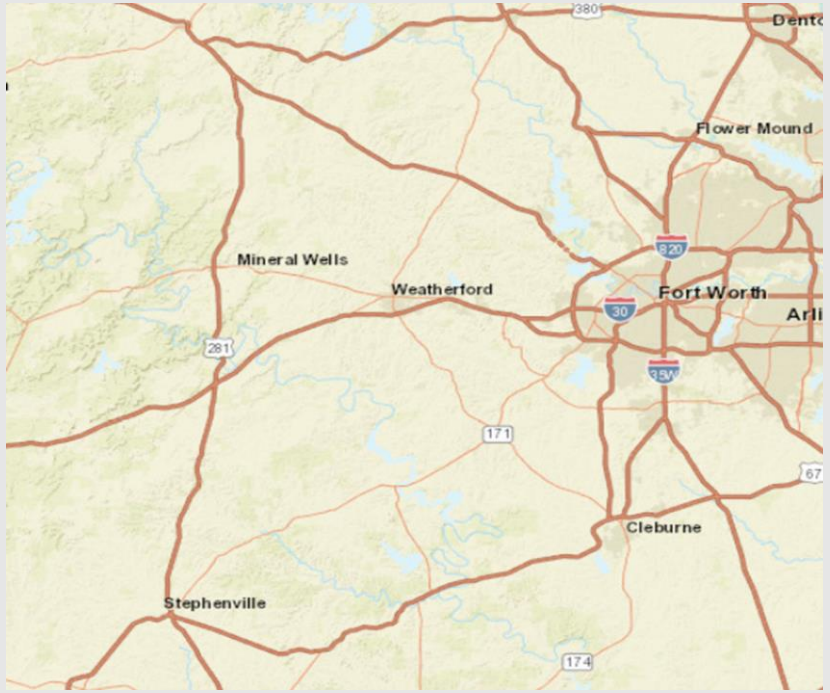
Traveler locations are displayed on a map for agency staff. Throughout the event, operators send messages and instructions to participating travelers. The web page & phone system are automatically updated with the same information.



HELP Alert-Safety Benefits

- Gives drivers more information about situation
- Allows for one-on-one communication
- Increased our coverage area

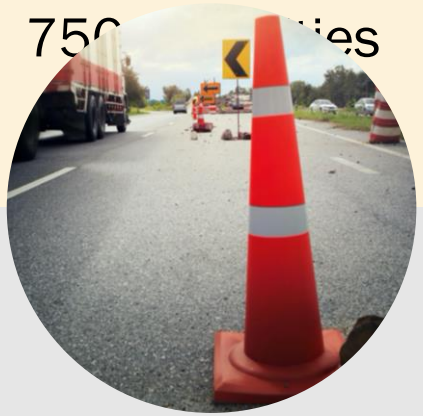




End-of-Queue Crash Mitigation – Waco District (WAC)

PROBLEM

- Crash risk from road work-related traffic queues
- I-35 Waco Project
  - 94K work zone crashes
  - 37K injuries
  - 750 [illegible]ies

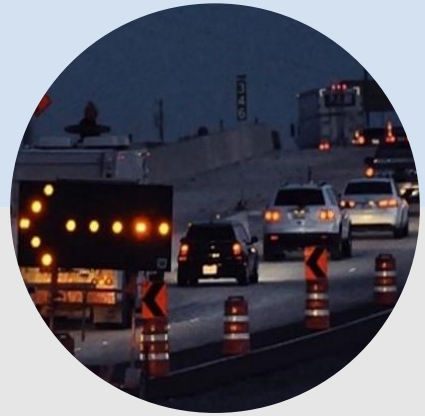


INNOVATION

- Deployment process tailored to conditions
- End-of-queue warning systems deployed across 500+ lane closure nights
- Developed TxDOT specs for EOQ mitigation

BENEFITS

- 60% reduction in crash risk
- Deployed in several districts
- Specs adopted in at least eight other states
- Real-time information on current conditions



Real-time Rail Crossing Monitoring System – Houston District (HOU)

PROBLEM

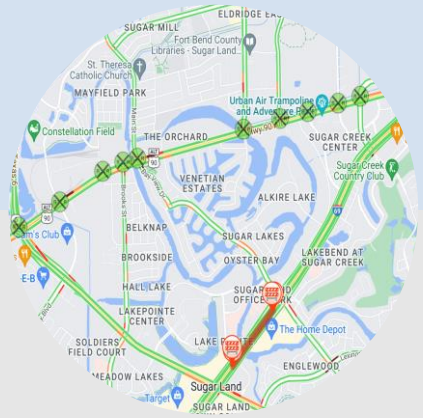
- Lack of precise information on clearance intervals
- Delay to traffic operations
- Delays to emergency resp routing

INNOVATION

- Doppler radar/LiDAR system monitors the presence, speed, direction, and length of a train, and gate closures
- Kiosks at fire stations and police headquarters alert emergency services of blocked crossings
- Traveling public informed via TranStar website, mobile app

BENEFITS

- Enhanced emergency response time
- Low power consumption and cost
- Applicability to other locations

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