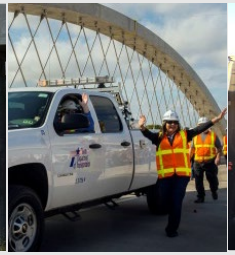
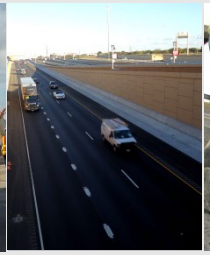




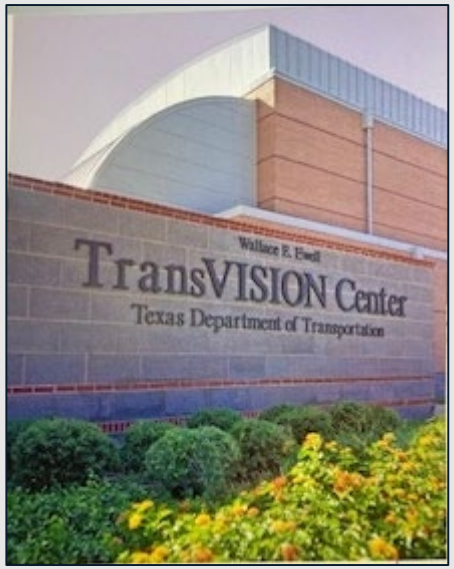

FORT WORTH DISTRICT

Driving the Future: The Use of Technology in Traffic Operations

Federico Hernandez, P.E. – District Traffic Engineer

Photo by Liam Frederick

Transvision-TXDOT-FTW TMC-CAPABILITIES



- Texas Department of Transportation's (TxDOT) sophisticated TransVISION Center (TMC) opened in 1985 and is currently tasked to keep 2.3 million vehicles safe while traveling approx. 41.4 million miles per day.
- TMC utilizes over 400 CCTV's, 98 Dynamic Message Boards (DMS), 285 Traffic Safety Sensors(TSS), 19 Tapco Wrong Way Driver (WWD) devices and 4 Lane control systems (LCS). Operators can alert safety personnel about roadway incidents, post info to DriveTexas.org, Google mapping, Waze app, and 511DFW.org website. These tools protects the safety of the drivers in our district.

CAPABILITIES-CONT'D…

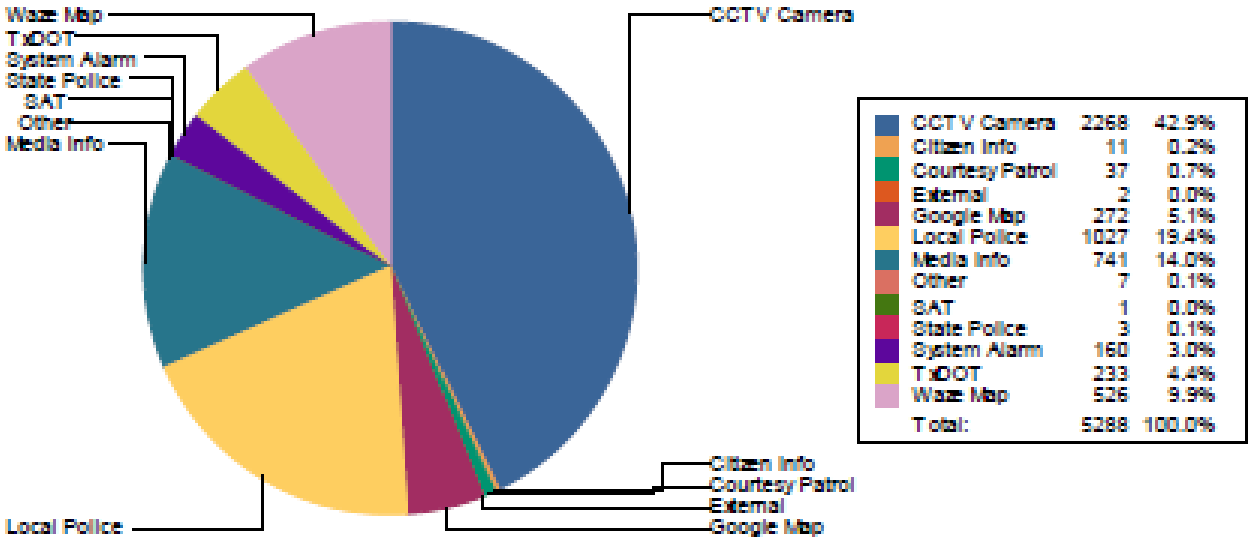
- TransVISION Center is manned 24/7, 365 by 18 Employees on 3 different shifts covering 8 to 10 hour watches. Each shift is led by a watch commander and 3-5 operation technicians. This cost approx. 2 million a year.
- One Lead Manager in charge of the TMC to fact check all tickets and constantly train personnel on changes or new technology and 1 ITS analyst to troubleshoot all outages on equipment. 99% uptime avg. for all gear.
- We share these vital traffic condition information with the Fort Worth Transportation Authority (The T), the Dallas Area Rapid Transit (DART), local cities, television and radio stations, and NTE/NTTA/Dallas District's ITS (DALTRANS). This gives drivers a better sense of the road ahead and smoother traffic flow

TXDOT TMC FY (21-23) RESULTS

- What does TxDOT FTW handle on a Daily Basis? We are the call center for all incidents throughout our 9 counties.

	FY-21	FY-22	FY-23(till Oct)
Total Incidents*	22,240	29,646	32,624
Total Crash	6738	6302	5288
Secondary	56	59	30
Incidents in WZ	29	31	55
Incidents with fatalities	59	47	37
Maint Calls*	2317	2666	2486
Signal/Illum/signs*	1870	2179	1823
Total	26,427	34,491	36,933
AVG number a tech handles a year/mon	1887/157	2463/205	2638/220

TMC DETECTION PROCESS BROKEN DOWN



CCTV Camera	2268	42.9%
Citizen Info	11	0.2%
Courtesy Patrol	37	0.7%
External	2	0.0%
Google Map	272	5.1%
Local Police	1027	19.4%
Media Info	741	14.0%
Other	7	0.1%
SAT	1	0.0%
State Police	3	0.1%
System Alarm	160	3.0%
TxDOT	233	4.4%
Waze Map	526	9.9%
Total:	5288	100.0%

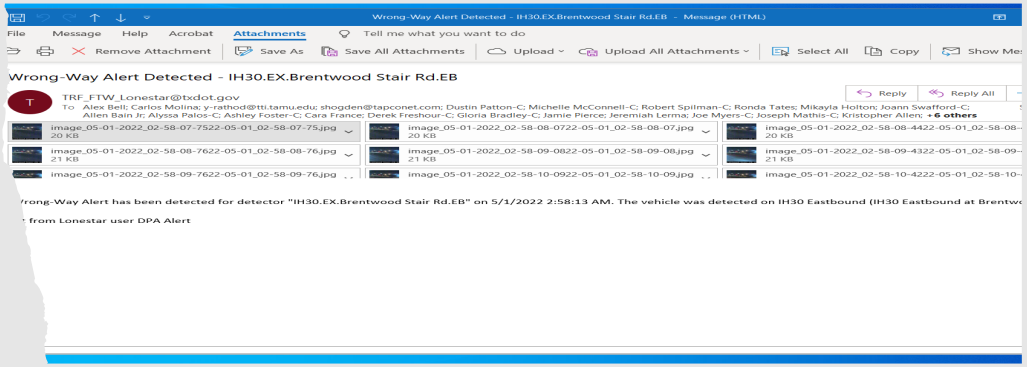
Greatest Tool for the TMC is the use of the CCTV and Calls from Local Police/Media speed of traffic. Newer Video Analytics (VA) Tech is helping to identify hazards a lot faster.

Wrong Way Driver Detection Tech

Wrong Way Driver Detection Tech

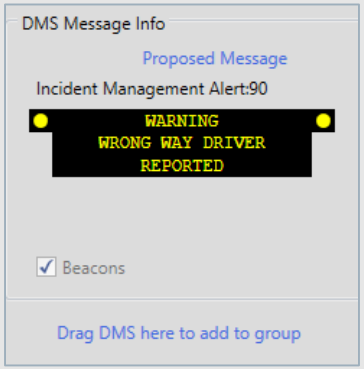
- ALERT ACTIVATION ZONE
- Thru our ATMS system(Lonestar), the First Screen that is sent to us in the TMC
- 1st person clicks PTZ(PAN/TILT/ZOOM) Nearest Camera
- Everyone else yells out Wrong Way Driver
- Another Team member is waiting on email that is sent once vehicle passes the CORRECTION ZONE
- Thru our ATMS Lonestar system our First Screen that takes over your monitor when the TAPCO system is Triggered in the ALERT ACTIVATION ZONE.

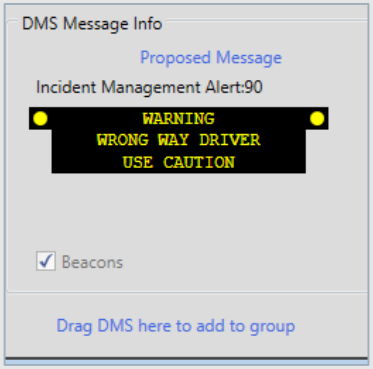
Wrong Way Driver Detection Tech

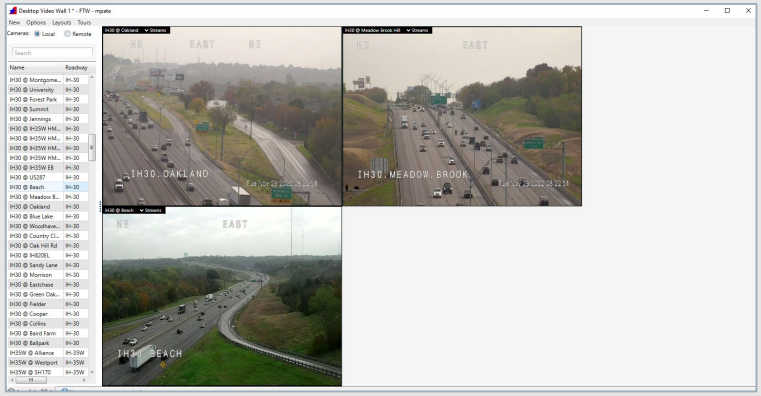


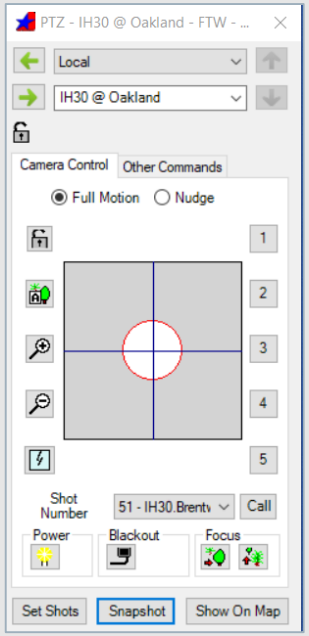
- CORRECTION ZONE/CONFIRMATION ZONE
- Once Car has passed correction zone and entered confirmation zone all members in the TMC receive an email showing pictures. To confirm not a lawn service, train, bicyclist, or any other type of false alarm
- If car is normally not moving over to make a correction you will be confirmed by the last picture in the group that is still travelling in the wrong direction
- We alert the Tech that took pts. to be ready to verify it entered our highway.
- With these photos we can determine make and model of WWD.

Wrong Way Driver Detection Tech









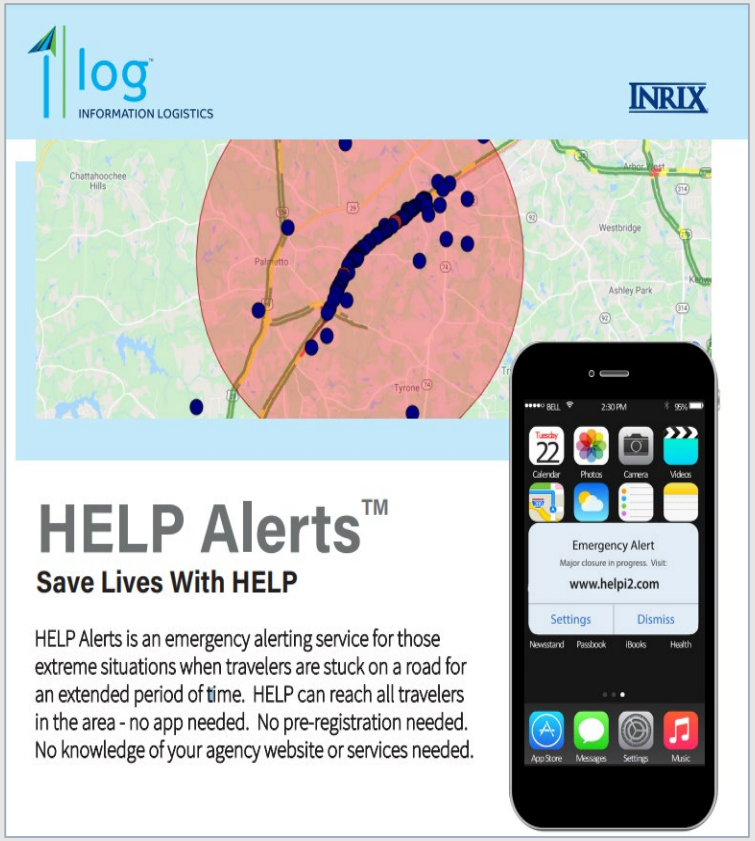
- Passed Confirmation Zone
- TMC member confirms that the WWD has entered highway calls 911
- Another TMC member enters incident into Lonestar and activates all DMS BOARDS
- TMC members would all then activate their Desktop Video Wall and watch WWD till caught or out of area.

Wrong Way Driver Detection Tech

YEAR	WWD ALERT	Self-Correct	911 Notified	PD Caught
2017	72	69	3	0
2018	83	76	7	0
2019	77	70	7	1
2020*	19	17	2	0
2021	160	152	8	3
2022-(Jan-Dec)	151	144	7	2
TOTAL:	562	528-Self corrected due to the TAPCO system in place	34 out of 562 Entered our highways at Tapco Locations	6 of those 34 have gotten caught, some of the 28 may have auto corrected on the highway or gotten off before police could locate.

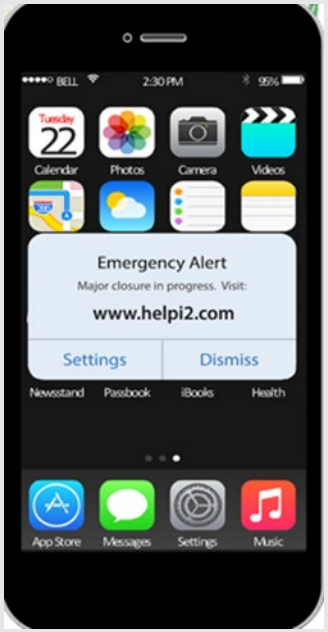
IRIS HELP (Highway Emergency Linked Platform) ALERT

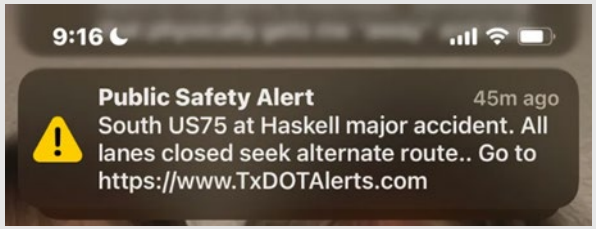
- The HELP (Highway Emergency Link Platform) Alerts are full lane emergency situations on roadways that will be sent to cell phones located in the geo fence set up by TxDOT Operators, much like Amber and Silver Alerts are sent on cell phones.
- There is no app to download, no AM station to tune to, and no prior signup for email/text services needed for drivers to participate
- 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.



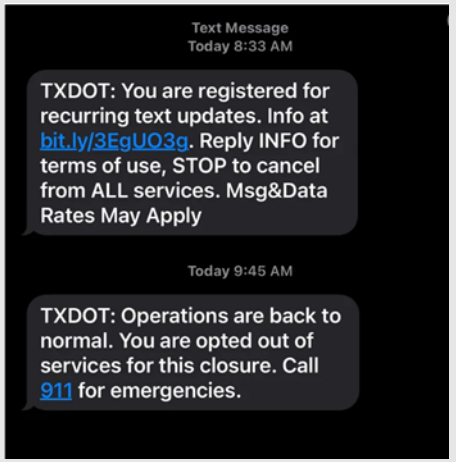
- Once registered, users can receive updates about the closure from the agency as well as send messages to the agency's representatives.
- The emergency alert system can also issue one-way alerts to warn drivers of upcoming dangers or extreme conditions.
- The alerts operate through the Integrated Public 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





Since 6/20/2022 been used about 150 times, with El Paso, Dallas and FTW using about 50 times a piece, most members 3100, normal 300



Save lives

A wireless emergency alert (WEA) notifies drivers to join the event for updates during the emergency, but it is the DOT who communicates directly with the trapped travelers to provide critical information.

Integrated with FEMA's IPAWS

FEMA has authorized the HELP platform for integration with WEA. With a few clicks, the emergency managers can approve the DOT request to issue a WEA alert (like an Amber Alert) to those in the impacted area.

Mitigate risks

HELP is an important tool that can communicate with travelers to help prevent injury or harm to those impacted by accidents or emergency situations on your roadways.

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

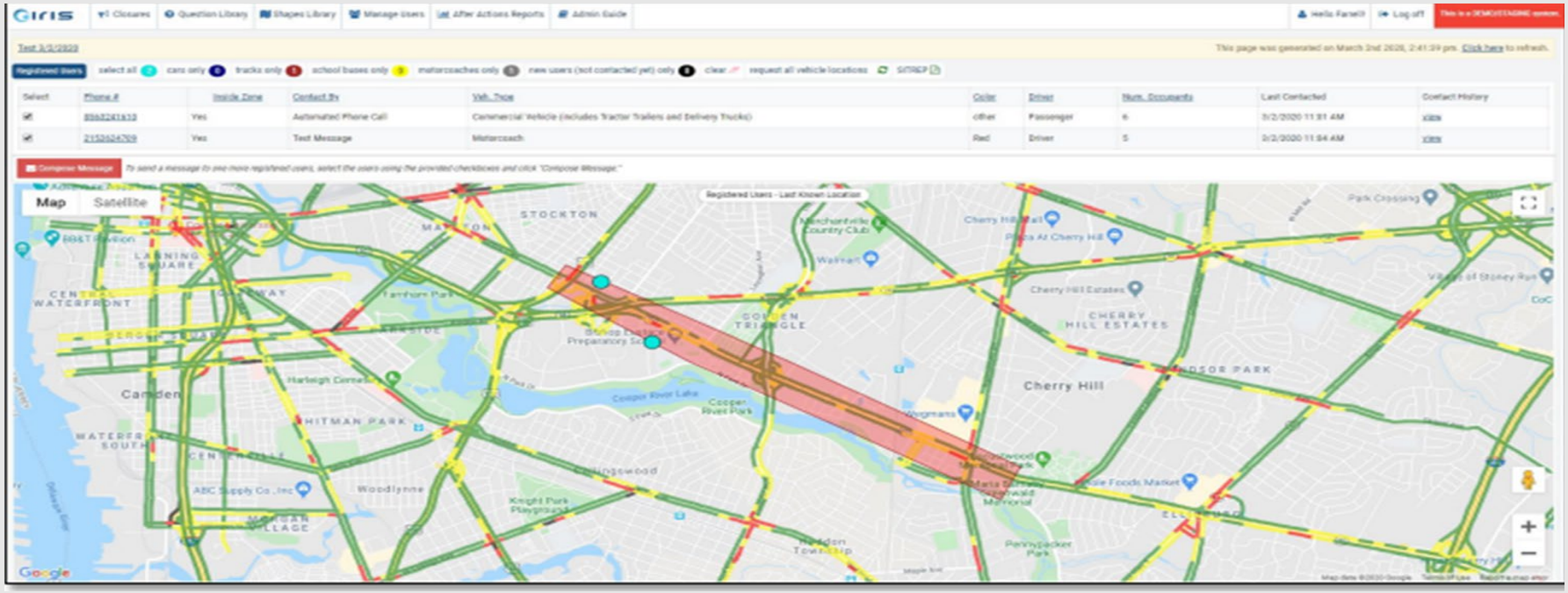
Driver Opt-in

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.



Reporting

After Action Report

IRIS™ Emergency 2-Way Communications Incident Report

Incident No: 20220711926 — Incident Date: 7/11/2022 9:39 AM

Created By: Jamie Pierce — Closed By: Matthew Pate — Closed Date: 7/11/2022 1:21 PM

IH-20 Eastbound Closed at 408 seek alt route

Overturned 18-wheeler across all lanes of traffic. Please seek routes Northbound to US-180 via SPUR-312 or Rte Williams.

7/11/2022 10:08:08 AM	Txdot maint trying to open at least 1 lane, should be closed for 2-3 more hours. Seek alt route	Matthew Pate	Multiple Participants
7/11/2022 10:15:40 AM	What kind of info are you looking for, accident EB closure should last 3 hours Txdot trying to open 1 lane.	Matthew Pate	Single Participant
7/11/2022 11:38:37 AM	Txdot stated Wrecker is working on loading the cement trailer to be removed from inside lane. Once this is	Matthew Pate	Multiple Participants
7/11/2022 1:04:34 PM	Tow Truck completed. Crews will sweep and clean lanes and open all travel lanes very soon.	Matthew Pate	Multiple Participants
7/11/2022 1:10:36 PM	Txdot Maint states, all lanes are open. Going to clear out frontage rds and then main lanes.	Matthew Pate	Multiple Participants
7/11/2022 1:20:16 PM	All Lanes open at this time. Thanks for signing up for TXDOT Help Alert System.	Matthew Pate	Multiple Participants
7/11/2022 1:21:24 PM	Operations are back to normal. You are opted out of services for this closure.	Matthew Pate	Multiple Participants

Messages Texted Back:

Message	
7/11/2022 9:41:02 AM	This is John Farrell from ILOG monitoring
7/11/2022 9:55:41 AM	All good just here for support if needed
7/11/2022 10:12:12 AM	Info
7/11/2022 10:21:30 AM	STOP
7/11/2022 1:20:37 PM	Stop

IPAWS Request Logs:

IPAWS Log

Status Date / Time	Status	Request By	IPAWS Event Template	Status By	Notes
7/11/2022 9:46:59 AM	Approved	Jamie Pierce	Transportation	Shannon Edwards	
7/11/2022 1:21:28 PM	Cancelled	Jamie Pierce	Transportation	Matthew Pate	

Area Impacted: Polygon

Coordinates: 32.7387161,-97.7632433|32.7362614,-97.7615267|32.7306296,-97.777491|32.7287525,-97.7661342|32.7260087,-97.7977472|32.7257199,-97.803412|32.7261531,-97.8080469|32.7274528,-97.8233248|32.727164,-97.8411775|32.7270196,-97.8653016|32.7257199,-97.8713899|32.7246534,-97.8780547|32.7241313,-97.8818613|32.7235537,-97.8888994|32.7187878,-97.8995424|32.716477,-97.9101854|32.7088774,-97.9577356|32.6870087,-97.9661578|32.6831078,-98.0028826|32.6766859,-98.0124956|32.6581089,-98.0489916|32.6328138,-98.0866006|32.6276094,-98.0749803|32.606821,-98.1139042|32.6060856,-98.1094843|32.5865416,-98.1117159|32.5669755,-98.1142908|32.6027396,-98.1122309|32.606644,-98.1175524|32.6109821,-98.1117159|32.6310791,-98.1093126|32.6385982,-98.1051927|32.6378734,-98.1029611|32.6278985,-98.1074243|32.6124281,-98.1089693|32.6286214,-98.0777269|32.6592651,-98.0440813|32.6807961,-98.0116373|32.6961103,-98.0114656|32.6965436,-98.0087191|32.6822409,-98.009234|32.6884535,-98.0013376|32.6935099,-97.9957464|32.7028997,-97.9616838|32.7144551,-97.9270082|32.7285209,-97.9064847|32.7215316,-97.9003049|32.7274528,-97.8867437|32.7293302,-97.8773023|32.7362614,-97.8913376|32.7338067,-97.8611661|32.7281749,-97.8726674|32.7294746,-97.8436587|32.7293302,-97.8225423|32.7284637,-97.8066628|32.7284637,-97.7990247|32.7326515,-97.7820302|32.7338067,-97.7753354

Participant Information:

Participants: 55

First Registrant: 7/11/2022 9:40 AM

Last Registrant: 7/11/2022 1:17 PM

Contact Method: Text - 55 Phone - 0

Participant Self-Reported Demographics:

Ad-Hoc Questions Summary

Question	Summary
What type of vehicle are you in?	46 participants answered: Car/SUV/Small Truck, 8 participants answered: Commercial Vehicle (includes Tractor Trailers and Delivery Trucks), 1 participant answered: School Bus
How many occupants are in your vehicle, including yourself?	32 participants answered: 1, 6 participants answered: 3, 12 participants answered: 2, 1 participant answered: 5, 1 participant answered: 14, 1 participant answered: 4
Are you the driver or a passenger?	44 participants answered: Driver, 11 participants answered: Passenger

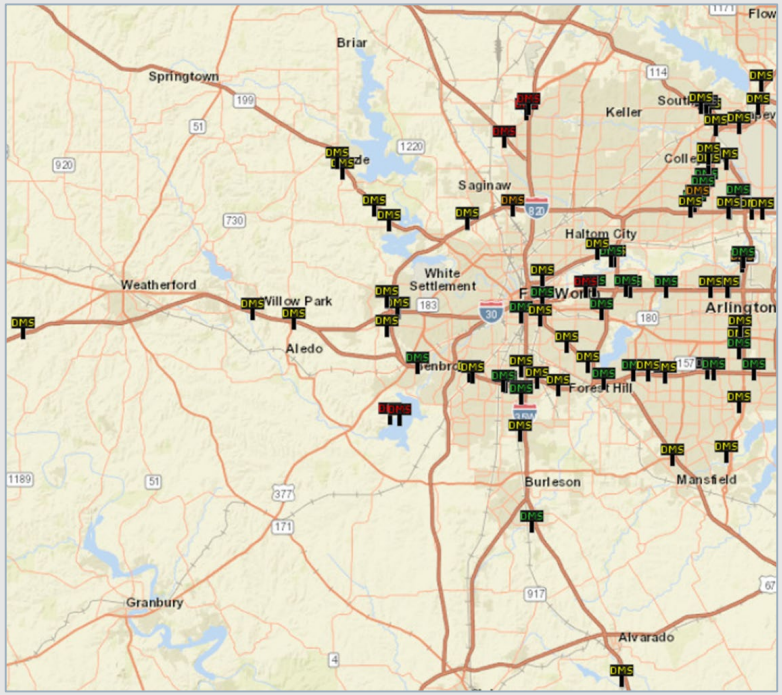
Notifications Sent:

Standard Messages: 7

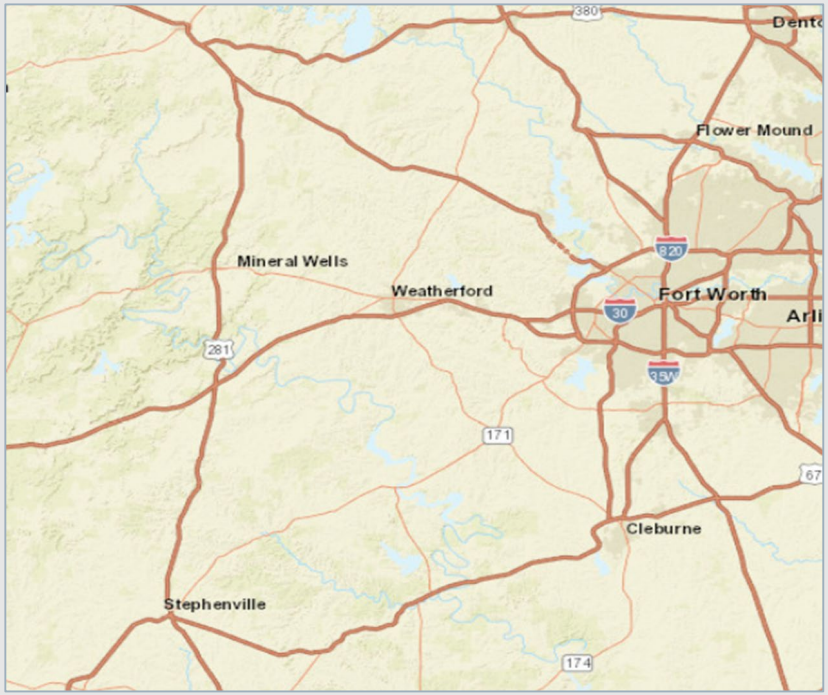
Safety Messages: 0

Date / Time	Message	Sent By	Sent To
7/11/2022 9:55:09 AM	how are you doing sir, maint dept already came back to us and stated that this was a must need	Matthew Pate	Single Participant

HOW THE HELP ALERT HAS ADVANCED OUR CAPABILITES-THE REACH

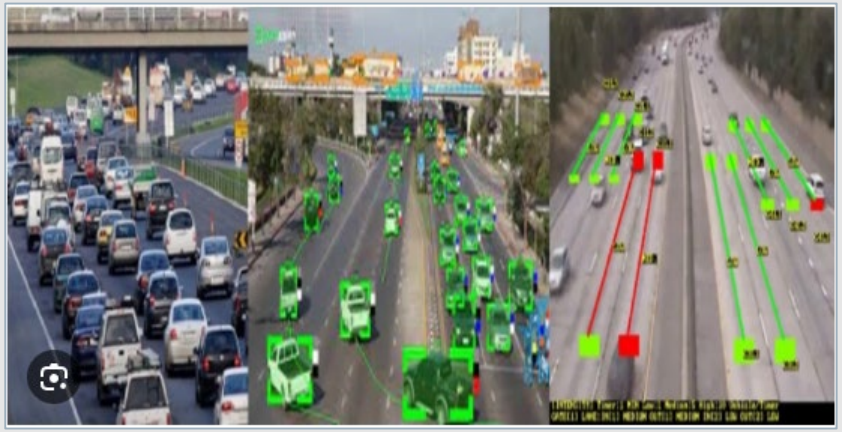


Up to June all we could reach out to is where DMS's where located.



NOW TMC CAN COVER ALL 9 COUNTIES ON THIS MAP

VIDEO ANALYTICS



TrafficVision™

Incident & Anomaly Detection

Real-Time Anomaly and Incident detection reduces response time and in-turn reduces secondary incidents and helping save lives.

With a system-wide view of traffic flow and provide an understanding of slowdowns, incidents, and anomalies on the roadways.

Increase roadway safety with real-time incident and anomaly detection of:

Slowed Traffic
Stopped Vehicles
Roadway Debris
Low Visibility
Pedestrians
Wrong-Way Drivers

Images of the detection are captured for visual verification.

Video clips leading up to and following the incident can be optionally created for review with a configurable retention timeframe to meet compliance requirements.

TRAFFIC VISION VIDEO ANALYTICS ON THE IH-30 Ped Alert Project

Currently on 12 CCTV'S on IH30 From Camp Bowie east to Beach.

58 alerts-12 True Alerts-3 FWPD removed people from Highway

Starting Jan 12, 2024 we are also using this Analytics to look for DV/AV and Collisions in that areas

Helps detect potential hazards to prevent catastrophe!

Smart Crash Cushions/Reacts!

Currently working to pilot this device to go active Feb 15, 2024 at IH-635/SH-121 Split on DFW connector

Illumination and Safety

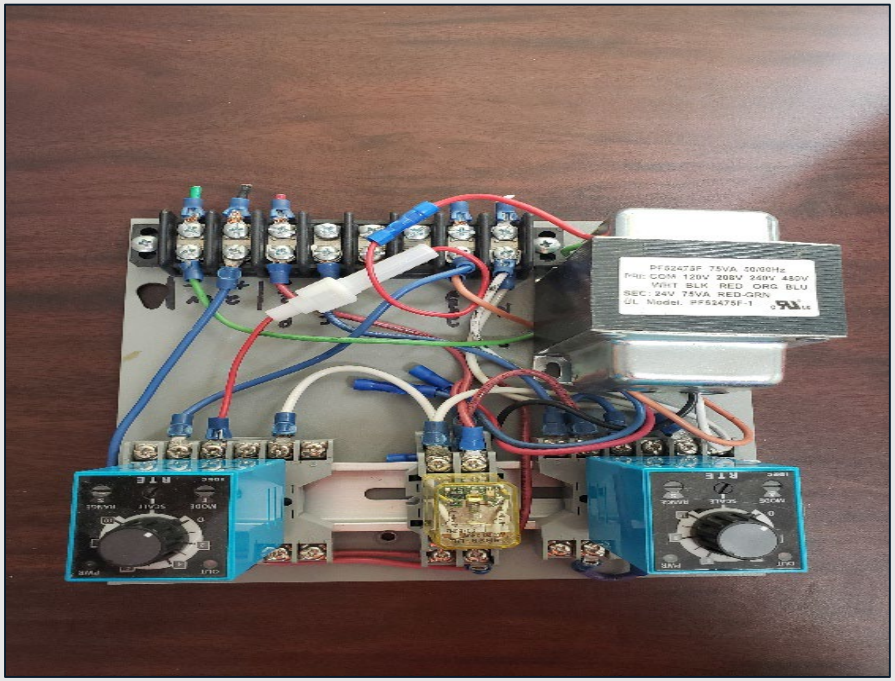
- 77% Pedestrian Crashes occur in dark conditions in urban setting
- 53% Pedalcyclist Crashes occur in dark conditions
- 31% statewide fatalities occur at night/not lighted

Copper Theft

- Copper theft had become big problem in the District
  - Each year approximately two million dollars of copper was stolen.

- Contractor damage from cuts with delayed notification
- Countermeasures
  - Locking groundboxes
  - Foam conduits
  - Burying groundboxes
  - Consolidating circuits
- Needed a way to monitor our system in real-time

Development



Original prototype developed by TxDOT staff.

- Our signal shop met and worked through several vendors to test many solutions
- Elecsys Systems was able to meet the requirements we had: -Pedestal based, remote monitoring, and communication through an app

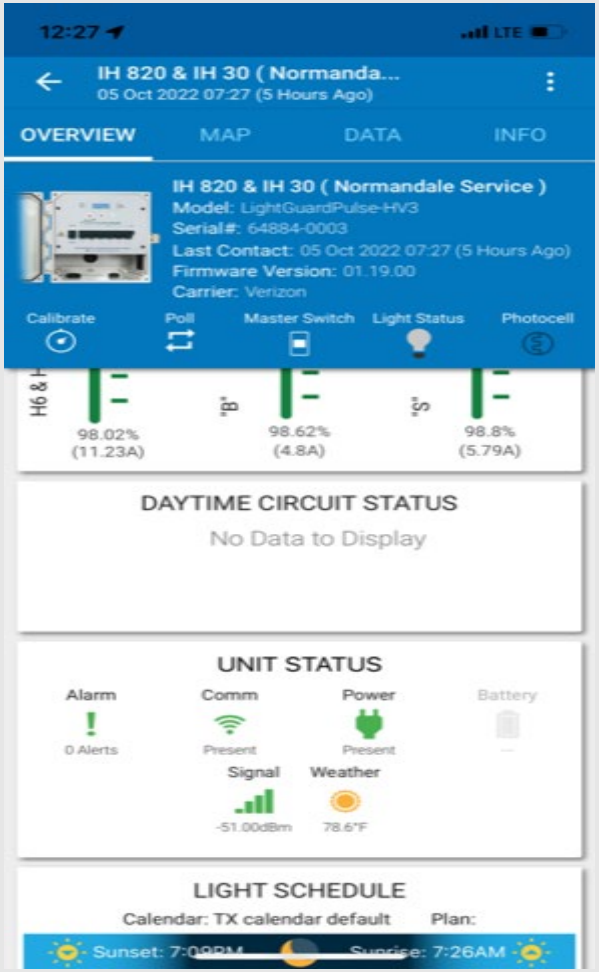
Elecsys

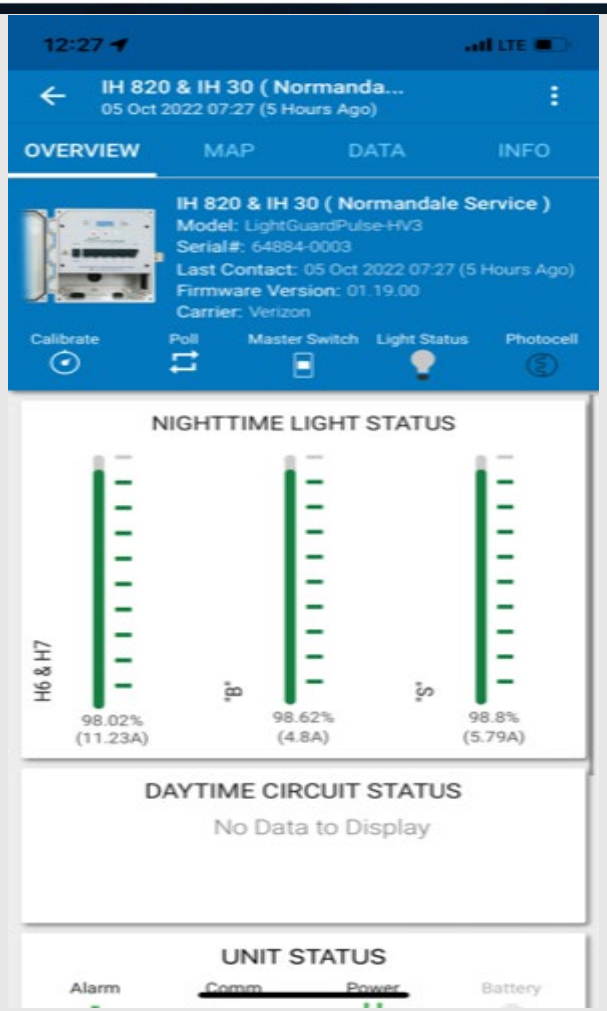
- Box that attaches to an existing service
- No upgrades to the foundation or service are needed
- Installed in-house

more Elecsys...

- Monitors amp drops in a circuit
- Sends an alert when the amps drop to 85% of what it should be
- TMC can do a camera check to see if contractor is working or if there is attempted theft

Mobile App-How it works





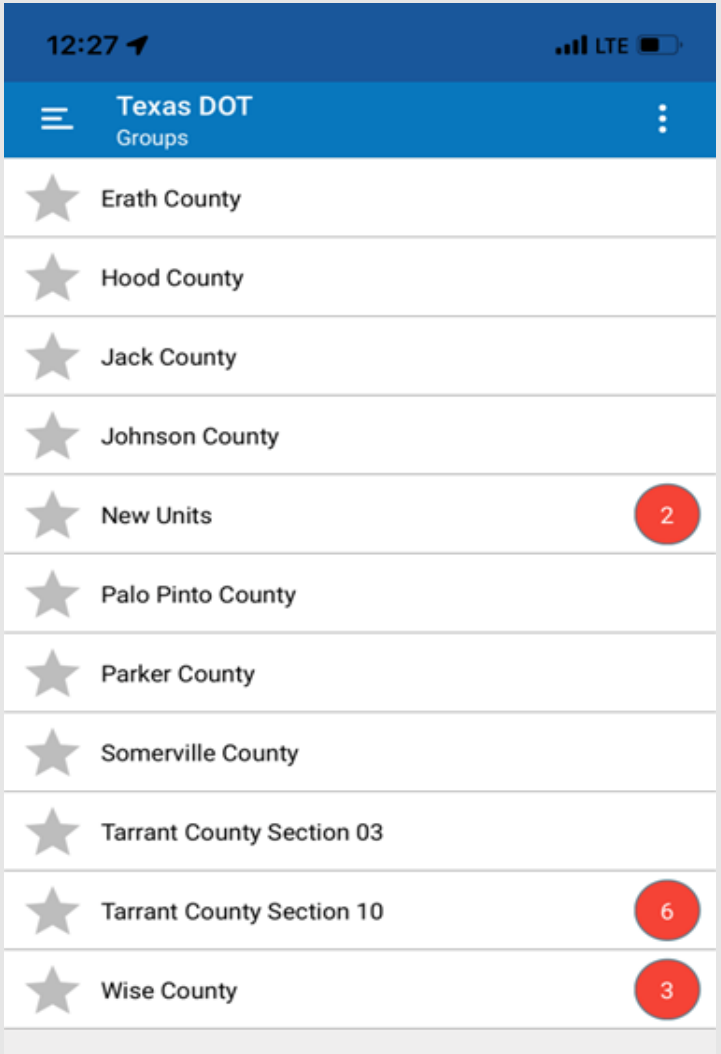
- Alerts
- Communication during testing of circuits
- Health of the system

more Mobile App…

- Notifications are sent to technicians via text through an app.
- Technician alerts TMC and TMC puts cameras (if present) on location to assess situation.
- The application can also be used for testing.
  - All-clear status when turning on circuits
  - App can remotely turn lights on/off for inspection

Status/Cost

- **Current counties where the system installed**
- **Approximately 85 out of 165 services have this monitoring**
- **Cost is approximately 2k/service with an $11/month fee**

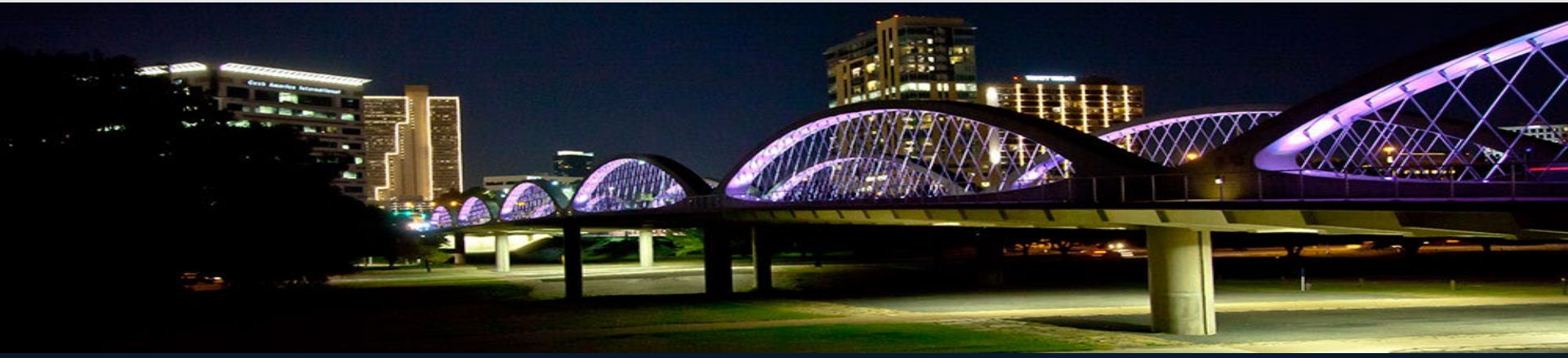


Safety Benefits

Public Safety:

Allows us to be more responsive with repairs

Increased uptime for illumination



more Safety Benefits…

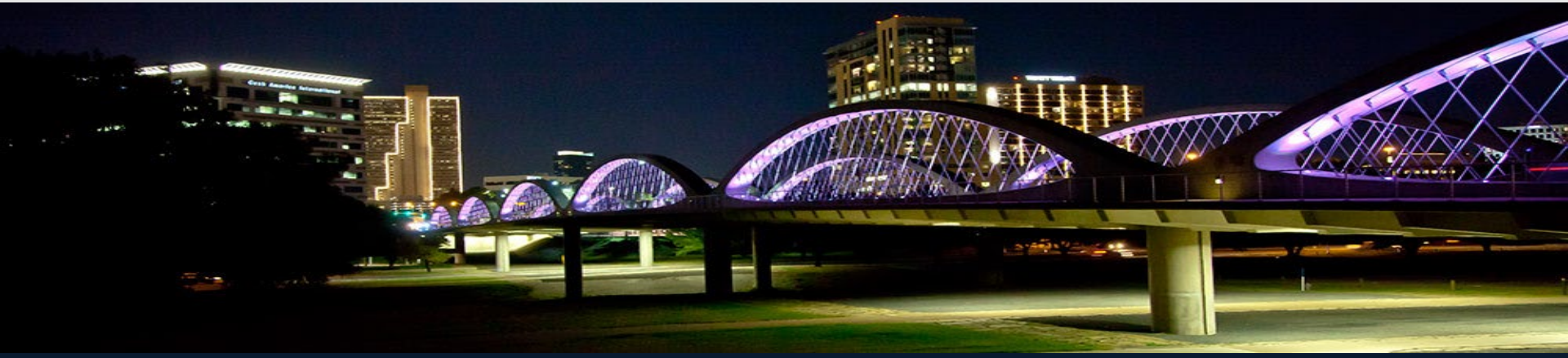
Employee Safety:

Reduces travel time to a location

Remotely turn system on and off with phone saves 2 hours/day when troubleshooting

App has an all-clear feature before turning on/off circuits

Lessens the need for lengthy night-time inspections



TMC Players...come visit us for a tour!

- TXDOT FORT WORTH TRAFFIC MANAGEMENT CENTER
- 24/7-365 Located at 2501 SW LOOP 820 @ McCart.
- Matthew Pate TMC LEAD
- Jamie Pierce 5AM-1PM Watch Commander
- Kristopher Allen 1PM-9PM Watch Commander
- Joe Myers 9PM-5AM Watch Commander
- 817-370-3661/62/63/64 and ext. 6657

TransVision Current Stats

- Opened June 2000
- TMC runs 24/7
- 18 operators

Field Network

420 CCTV
96 DMS
285 Traffic sensors
38 Wrong Way Driver devices
50 Cameras w Video Analytics

Optimize ITS Infrastructure to Detect Freeway Incidents
Fort Worth District (FTW)

2023 District Innovation Pilot Project

PROBLEM

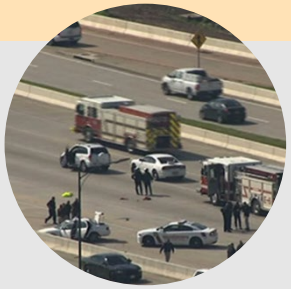
- 143 fatal ped crashes and 172 incapacitating crashes for 2021-2023 in FTW
- TMC has need for real-time detection of roadway anomalies

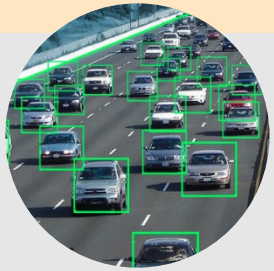
INNOVATION

- Use of video analytics and image processing to quickly detect roadway anomalies
- Minimize costs by use of existing ITS infrastructure

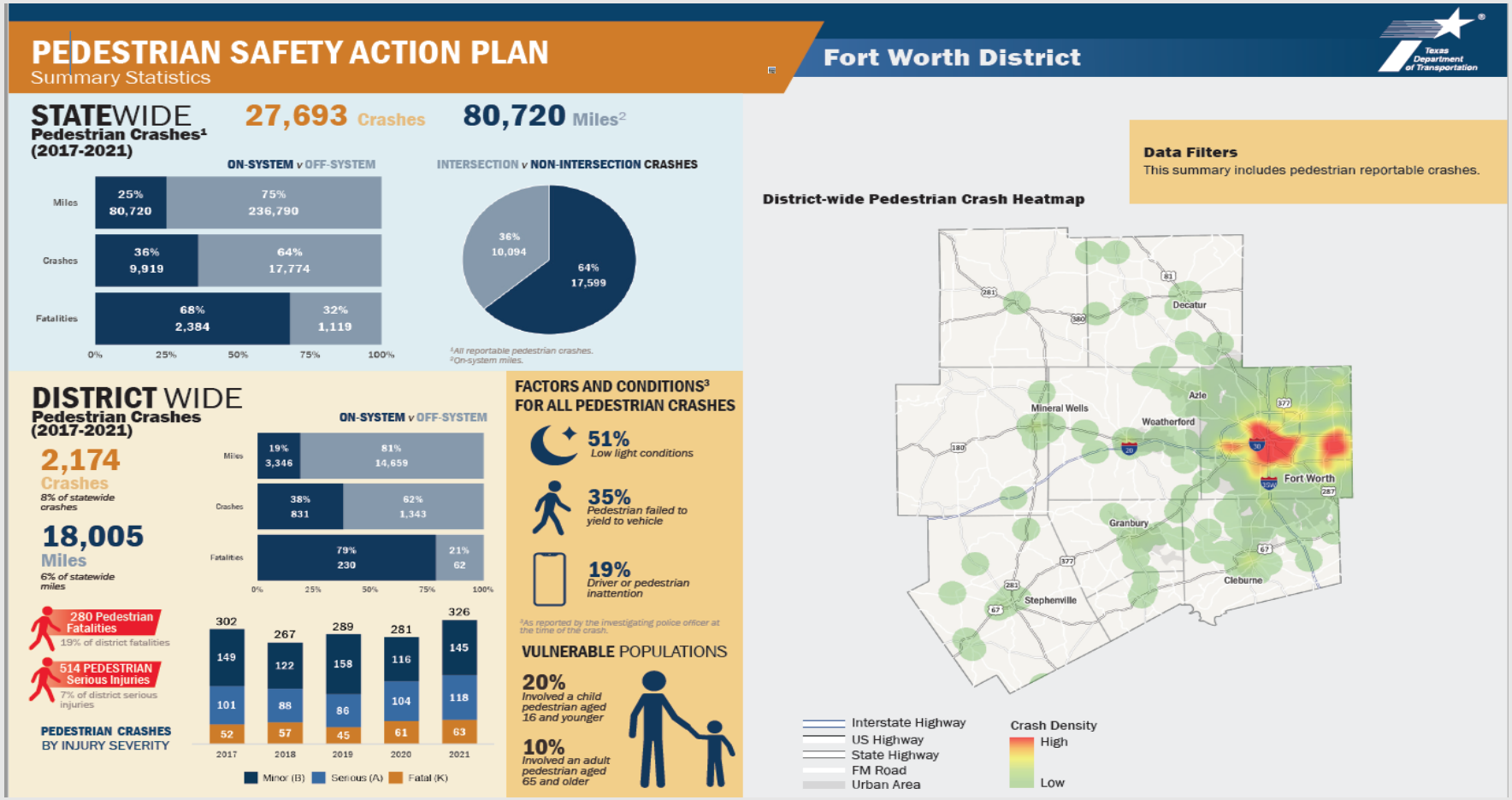
BENEFITS

- Prove the technology works
- Reduction in roadway anomaly-related crashes
- Improved TMC detection and response times to incidents
- Provide real-time notification of roadway hazards to approaching motorists





Problem-Pedestrian Crashes and Fatalities

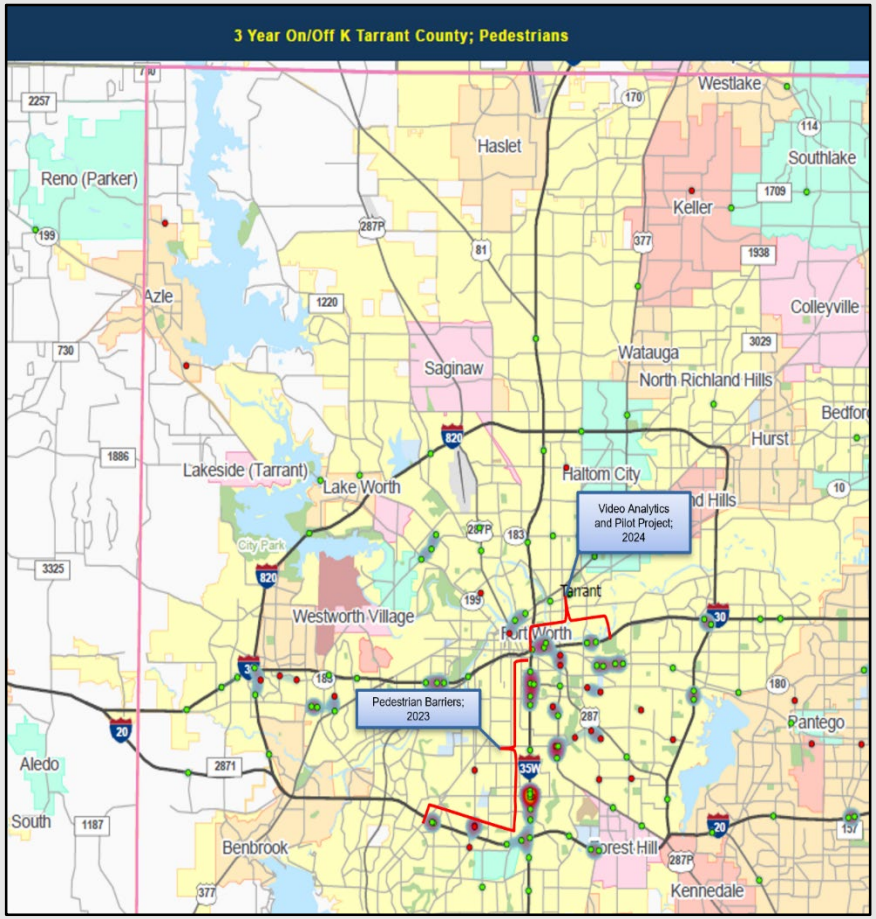


Problem-Pedestrian Crashes and Fatalities

Pilot Corridor Selection

IH 30 from Hulen to Beach(5 miles)

- 2 Fatal Ped Crashes (2023)
- 19 Incapacitating Injurys
- 95% Failure to Yield ROW (Ped)
- Near Downtown Area
- Pedestrian Activity observed by TMC



Technology

- TrafficVision Video Analytics on 10 existing CCTV
- Zones to detect anomalies

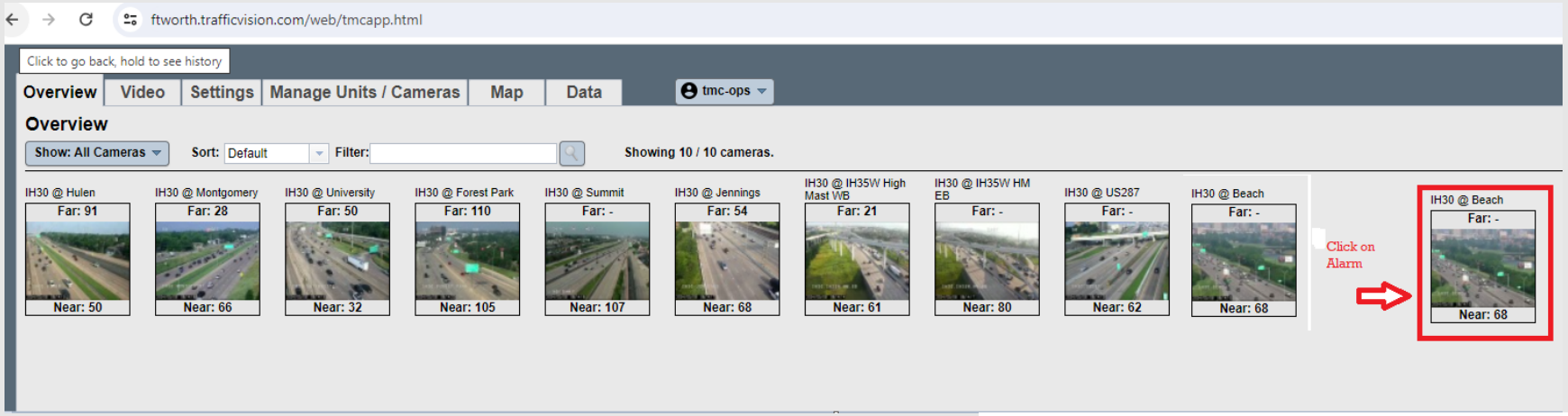
Alerts During Pilot

From: trafficvision.alerts@gmail.com <trafficvision.alerts@gmail.com>
Sent: Wednesday, March 20, 2024 10:25 AM
To: Joe@omnibond.com <Joe@omnibond.com>; AMLT-FTW <AMLT-FTW@txdot.gov>
Subject: Incident alert: Pedestrian @ NS-Z1 [IH30 @ Jennings]

This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sen

Snapshot: https://ftworth.trafficvision.com/publinks/1444667a-2357-425c-903a-24af96222a7d
Video: https://ftworth.trafficvision.com/playclip?src=/publinks/8073f41b-c775-4580-ae0c-7c705f9139b4

Process



1. Go to alert and verify if it is a true event
2. Observe pedestrian for 1-2 minutes.
3. Execute Pedestrian Alert as needed
4. Deploy DMS boards, Call 911

Pilot Project Results

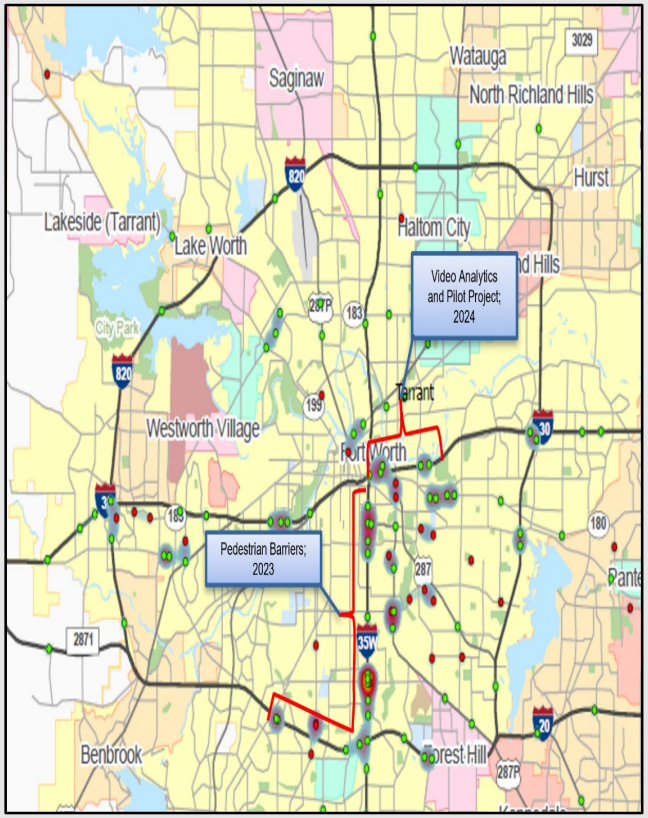
Traffic vision-Locations	PED-Alerts	False Alarms	PED on HWY	911 Called/DMS Boards Activated
IH-30 @ Hulen	44	10	34	0
IH-30 @ Montgomery	84	20	64	5
IH-30 @ University	41	7	34	3
IH-30 @ Forest Park	133	35	98	7
IH-30 @ Summit	60	12	48	3
IH-30 @ Jennings	53	10	43	3
IH-30 @ IH35W High Mast WB	55	12	43	0
IH-30 @ US-287	171	42	129	8
IH-30 @ Beach	102	21	81	3
TOTALS: Thru April 30, 2024	743	169	574	32

Expansion of Project

40 Cameras added on IH 35W from Meacham to FM 1187

Abandoned/Stalled Vehicle Detection added

July 2024	August 2024
255 Peds	121 Peds
15 DMS Activations/911 calls	13 DMS Activations/911 calls
11 Peds removed	5 Peds removed
460 Abandoned/Stalled Vehicles	492 Abandoned/Stalled Vehicles
	12 Congestion Alerts



Information Sharing with our Traffic Incident Management Teams (TIMS)

- Communication on the process
- Pedestrian Hot Spots for activity
- Abandoned Vehicle Hot Spots

Summary

- ✓ Proved the technology can work for pedestrian detection
- ✓ Added an additional hot spot
- ✓ Stalled and Abandoned Vehicles and Slow Traffic Alerts to the analytics

- ❑ Continue to work with law enforcement on communication
- ❑ Work to deploy smaller DMS in target areas
- ❑ Expand to other hot spots areas
- ❑ Use video analytics for additional wrong way driver det

HELP

#EndTheStreakTX

End the streak of daily deaths on Texas roadways.

TxDOT.gov (Keyword: #EndTheStreakTX)

#EndTheStreakTX Toolkit

Questions?