

PENNSYLVANIA'S OPERATIONS INITIATIVES TO IMPROVE SAFETY

Ryan McNary

Chief of Traffic Operations and TSMO Performance



TRAFFIC OPERATIONS AND TSMO PERFORMANCE

Ryan McNary
Section Chief

Temporary Traffic
Control

Systems and
Performance

TMC Operations

Unit Functions:

- Work zone Policies and procedures
- Work zone manager policy
- Work zone pubs
- Pub 408 – Work Zones
- County and District work zone assistance
- Work zone safety and training
- Work zone metrics
- Work zone QAs
- Work zone product evaluation and development
- PSP MOU assistance
- Smart work zones
- Automated speed enforcement in work zones
- Industry outreach
- Delay Analysis and RULD
- Work Zone IOPs
- TSMO Performance Program support

Unit Functions:

Systems

- 511 & 511PA Connect
- ATMS
- RCRS
- Genetec
- RITIS & Multi-State Metrics Group
- Lane Reservation System
- Traffic Alerts Dashboard

Data Management

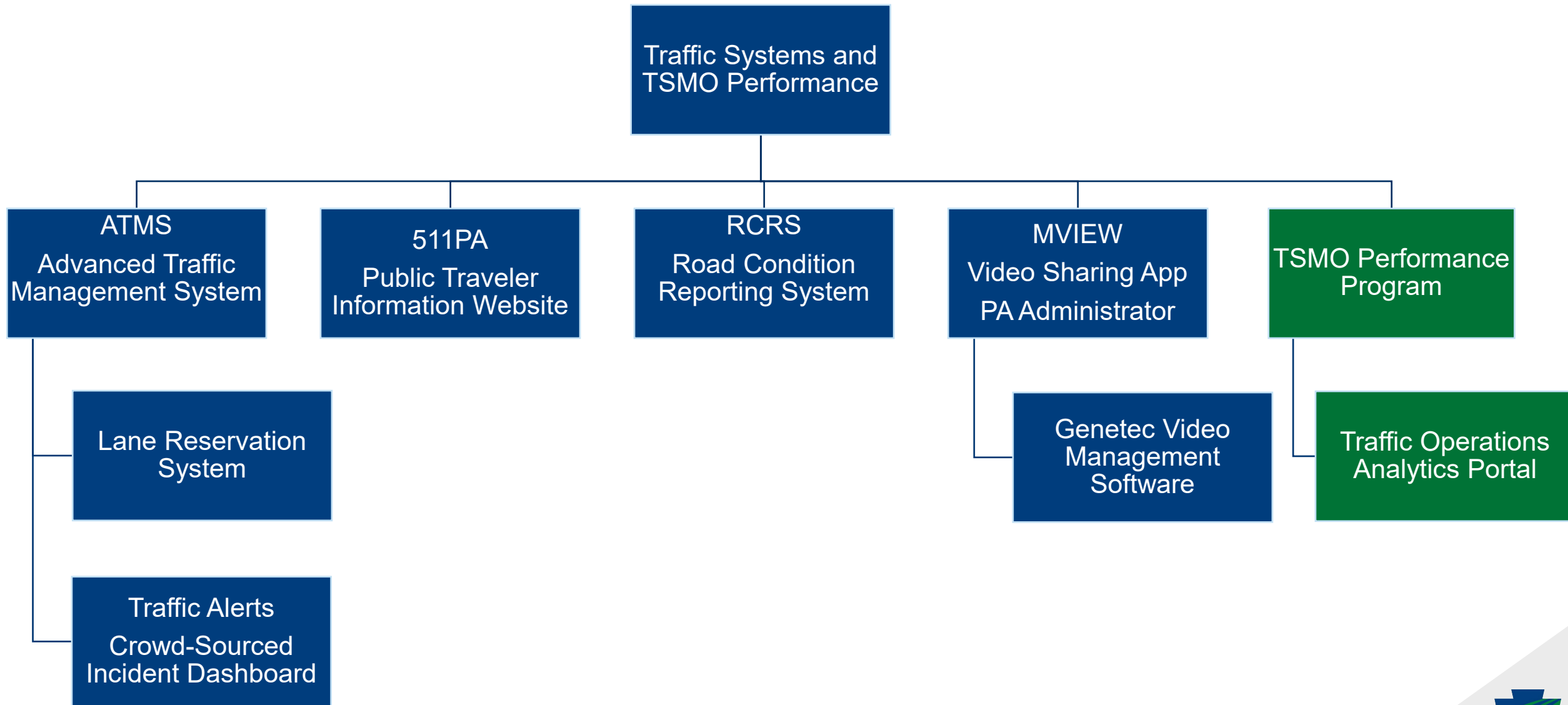
- Traffic Operations Analytics (TOA) tool
- Waze CCP Management
- INRIX Speed Data agreement
- Internal/External Data Feeds
- TSMO Performance Program
 - TSMO Performance Reports
 - TSMO Spotlight Reports
 - Executive Scorecard Evaluation
 - Metrics software evaluations

Unit Functions:

- STMC
- RTMCs oversight and coordination meetings
- Area Command Planning Support
- TSMO Guidebook
 - Part V Operations
- Traffic Ops Plans (TOPs)
- STMC/RTMC staff SOPs
- S/W TMC staffing contract
- TMC Training Subcommittee
- TMC Bootcamp
- Video Mgmt Requirements
- CMS Operating Standards
- Video recording
- TSMO Performance Program support



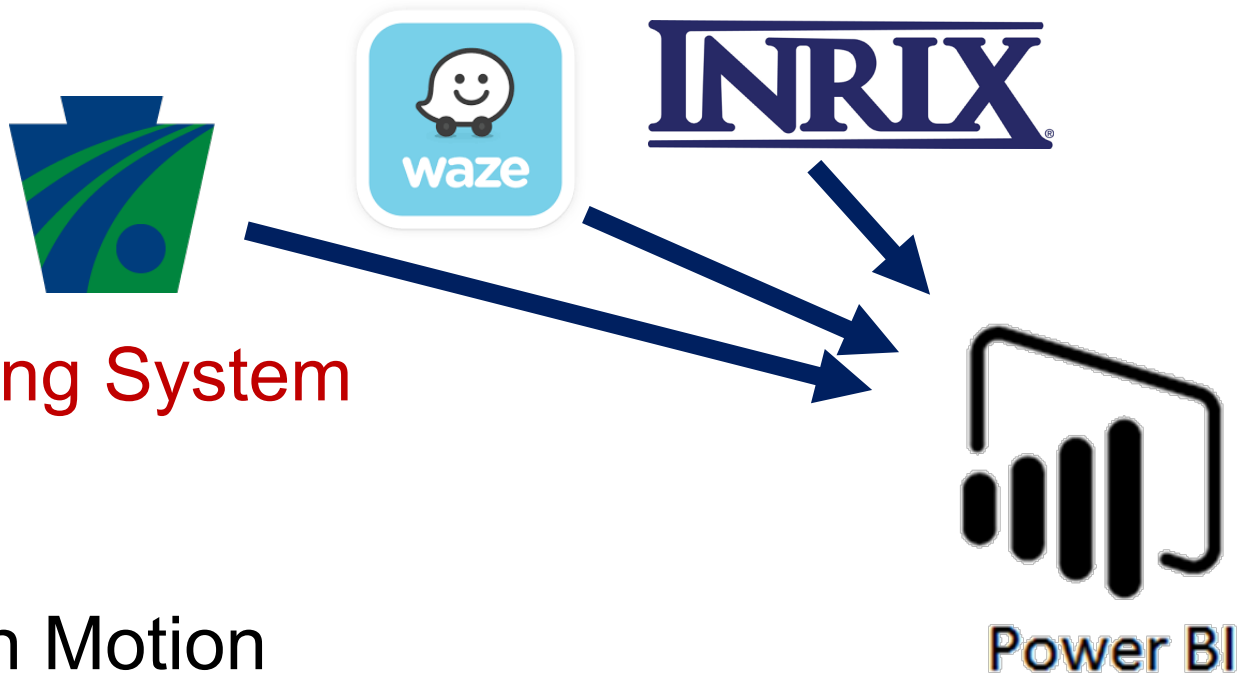
TRAFFIC SYSTEMS AND TSMO PERFORMANCE



UNDERSTANDING THE PROBLEM

UNDERSTANDING THE PROBLEM

TSMO Performance Database



- **Crash Records**
- **Road Condition Reporting System**
- Maintenance Database
- Weather Stations
- Traffic Counter/Weigh in Motion
- ATMS DMS Message History
- ITS Device Locations

Performance Reports Located at:

<https://www.penndot.gov/ProjectAndPrograms/operations> or Google "PennDOT TSMO"



DATA-DRIVEN INCIDENT TIMELINE

Select Dates:

1/1/2021 12/31/2021

Select all
 Core Network
 Non-Core Network

Select all
 First Responder
 PennDOT Responder

Select all
 Road Closed
 Lane Restriction

Interstate: All

TMC Name: All

Municipality: All

Route Number: Search

Cong Severity: All

Incident Count **22.31K**

Crash Count **13K**

RCRS Count **20573**

Avg Inc Influence **123 mins**

Avg Inc Clearance **90 mins**

Avg Road Clearance **93 mins**

TMC Personnel Count: All

Camera: All

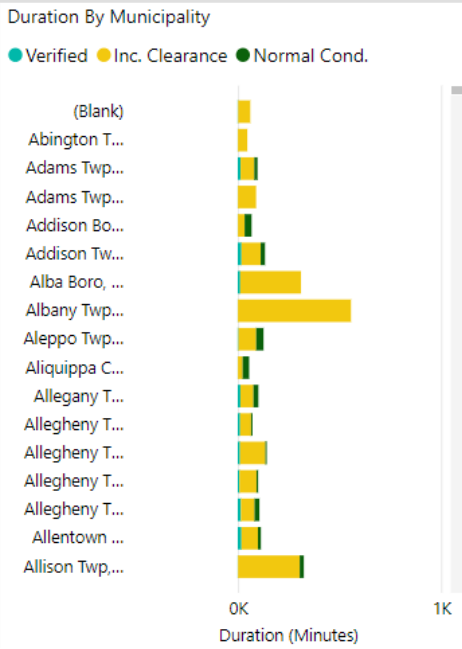
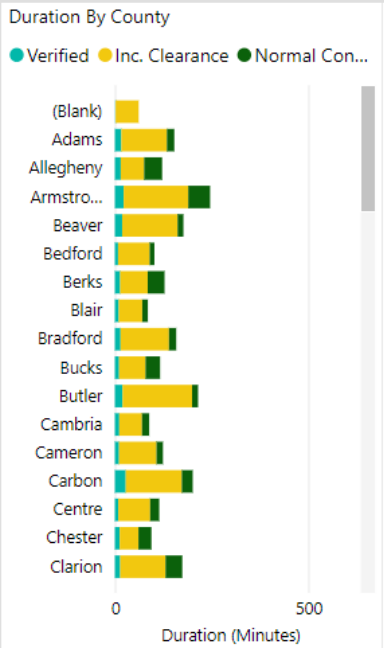
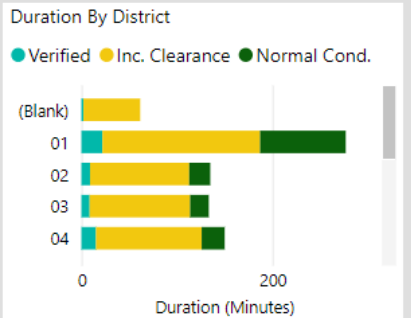
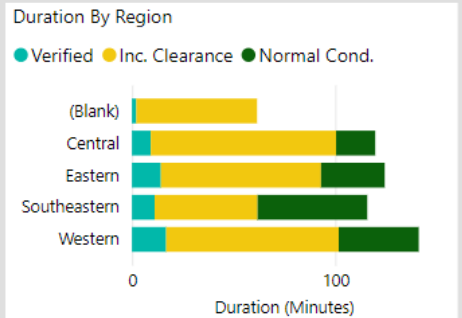
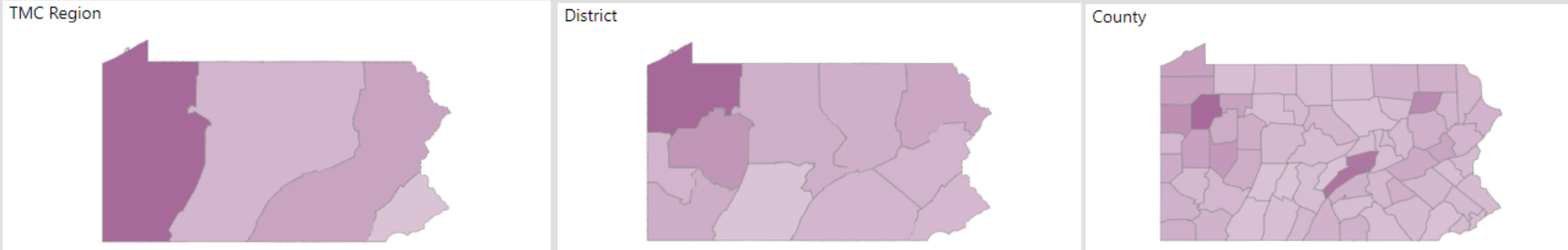
Camera Distance: 1 8043

RCRS Verify: All

Detected Time:
 Select all
 12:00 AM
 1:00 AM

Incident Timeline Summary - RCRS Events

*Darker shaded areas in map represent a higher average incident influence time relative to lighter shaded areas. Click on map regions to filter the bar charts and data grid.



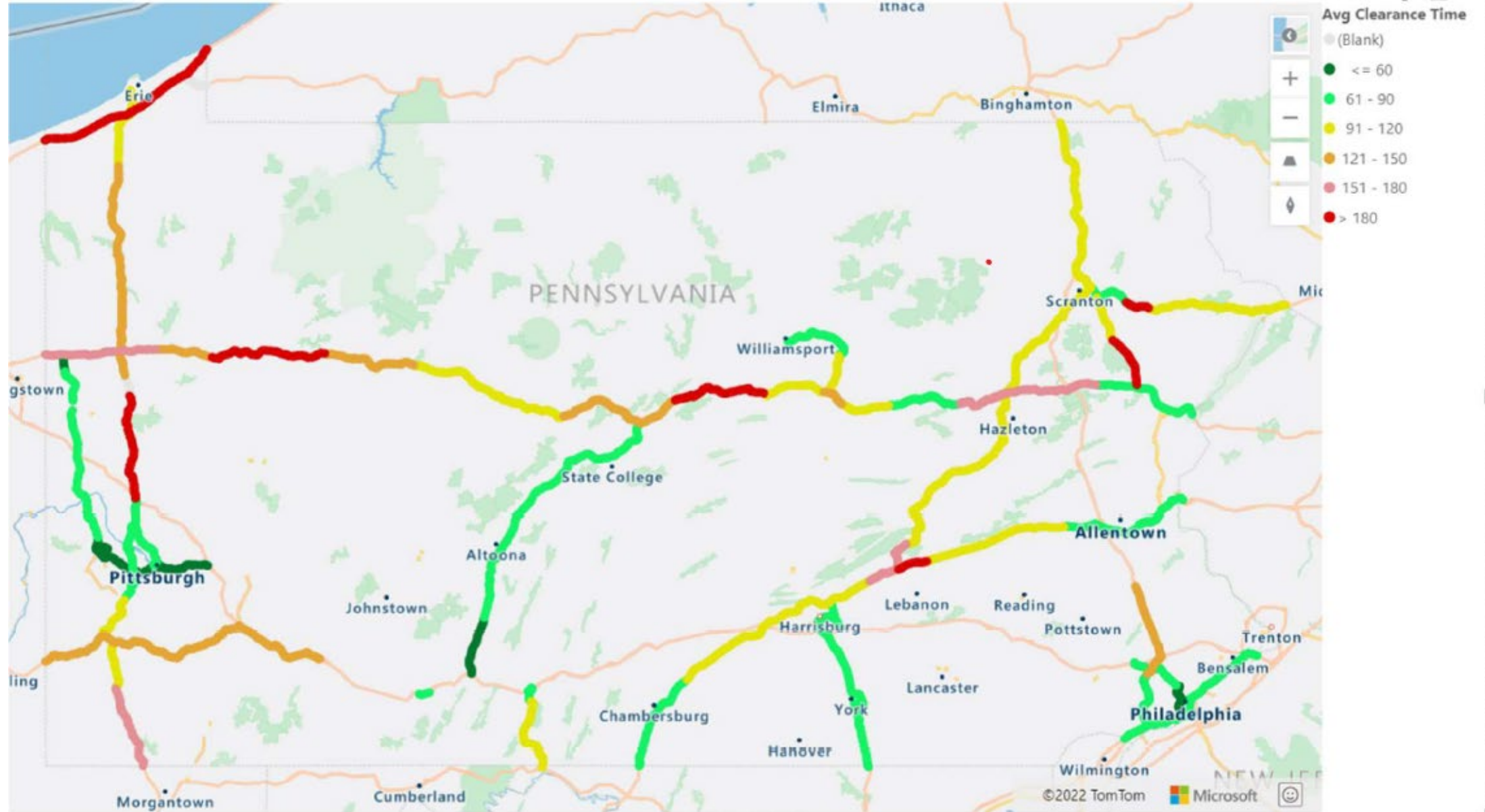
*To drill through to single incident detail view or Crash Attribute detail, right-click on any column and select drill through.

Incident	County	Municipality	Road	Bearing	RCRS ID	RCRS Rca
4763361	Fulton	Bethel Twp	I-70	W	579132	70
4763362	Perry	Howe Twp	US-22 US-322	E	579141	22
4763363	Somerset	Elk Lick Twp	MASON DIXON HW...	N	579146	219
4763364	Lebanon	Swatara Twp	I-81 AMERICAN LEG...	S	579148	81
4763374	Dauphin	West Hanover Twp	I-81	S	579158	81
4763381	Cumberland	Upper Allen Twp	US-15	N	579152	15
4763382	Philadelphia	Philadelphia City	I-95 DELAWARE EXPY	W	579161	95
4763383	Dauphin	West Hanover Twp	I-81	N	579165	81



OUTREACH TO TIM PARTNERS: CLEARANCE TIMES

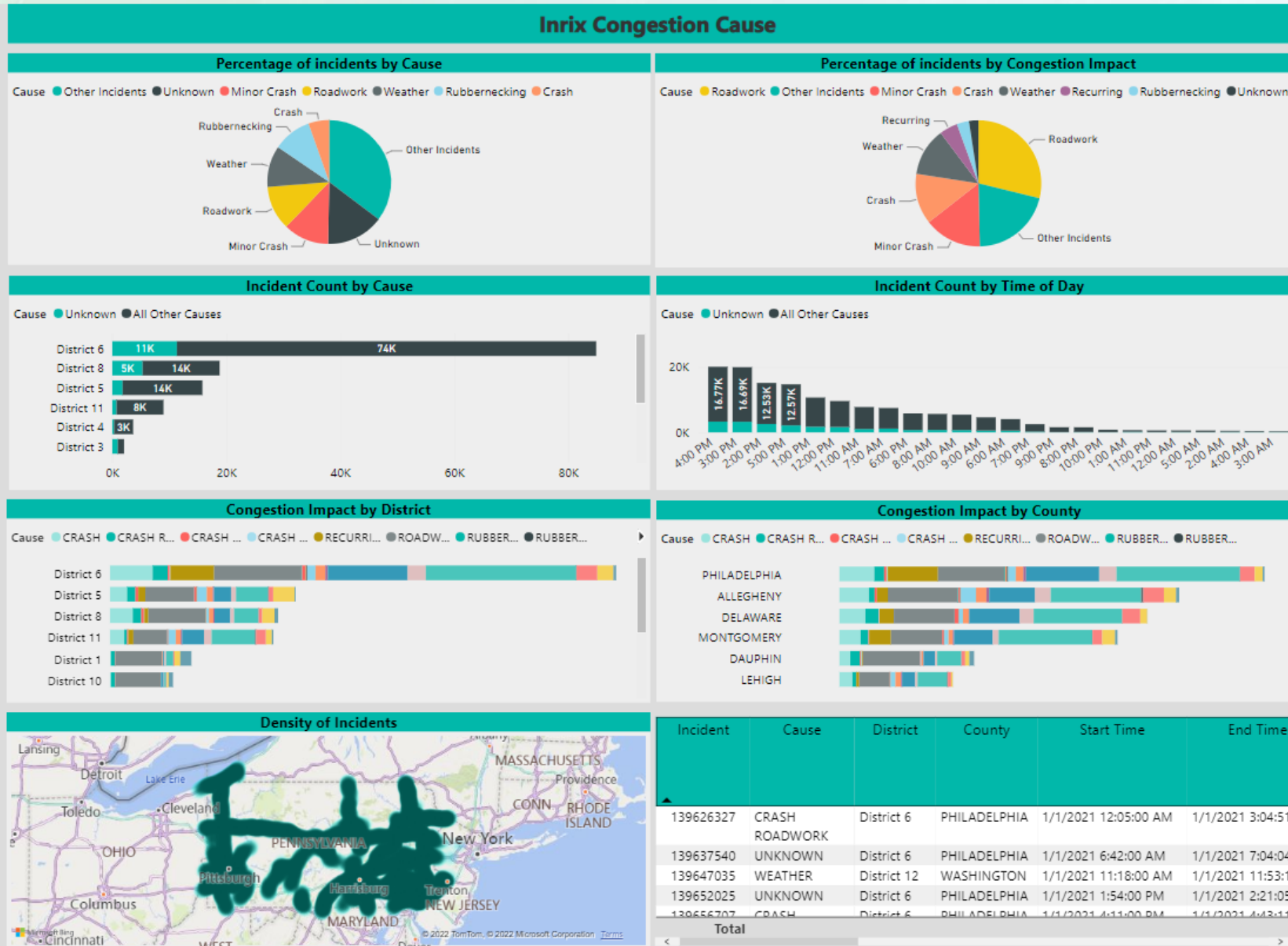
Interstate Incident Clearance Time by County



CONGESTION PIE CHART

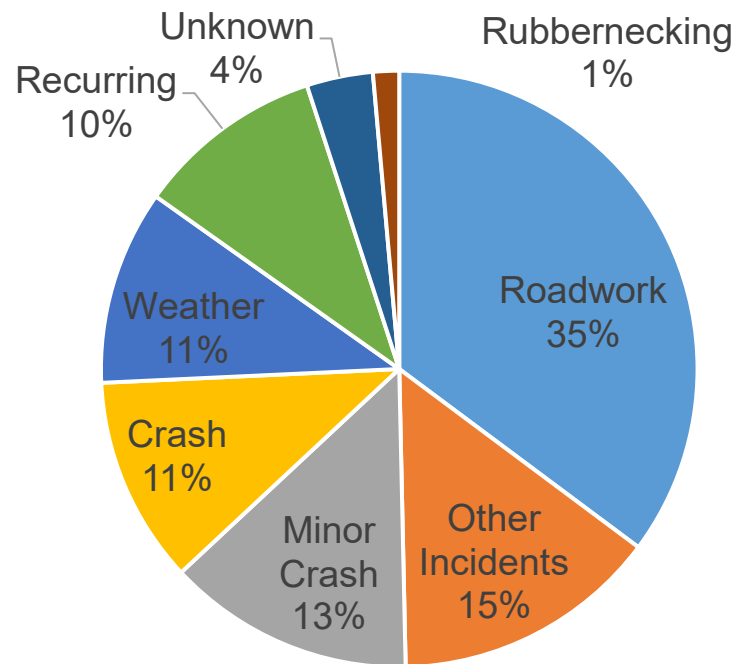
CMP_ID

- All
- Select all
- 001 EB
- 001 WB
- 002 EB
- 002 WB
- 003 EB
- 003 WB
- 004 EB
- 004 WB
- 005 EB

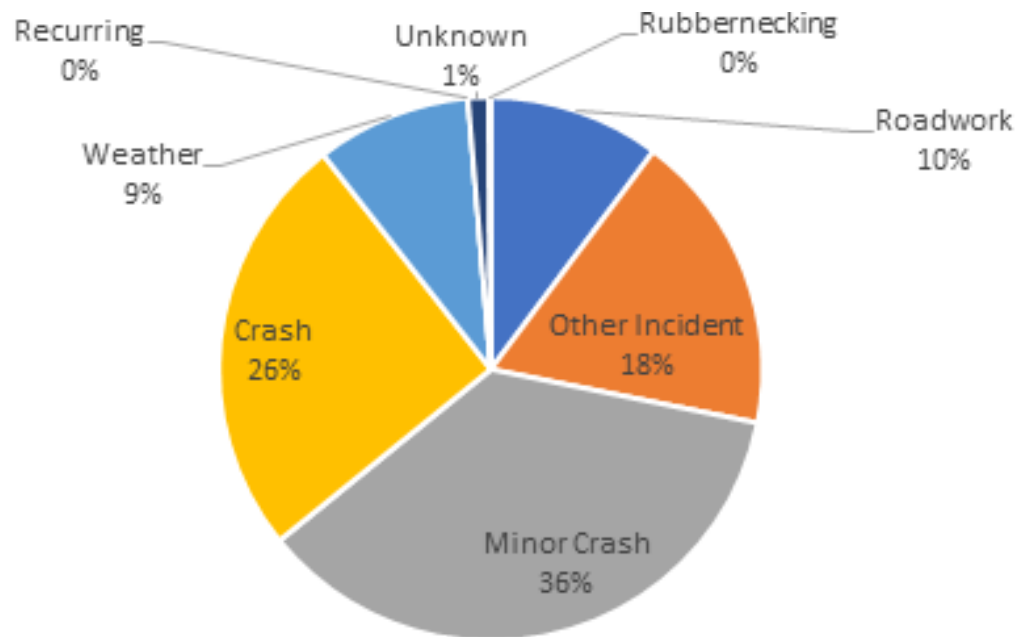


DATA-DRIVEN CONGESTION PIE CHART

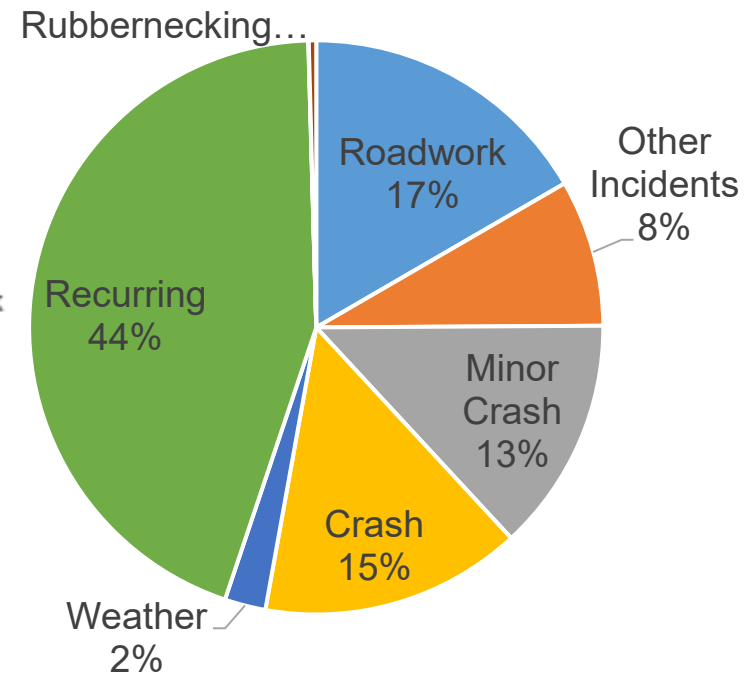
Pennsylvania



I-81 Dauphin County



I-95 in Philadelphia

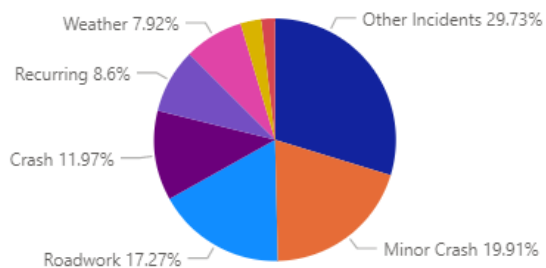


CONGESTION CALENDAR REPORT



Congestion Calendar on Core Network Roadway

Congestion by Cause (2018-21 only)



Date(s) Highlighted

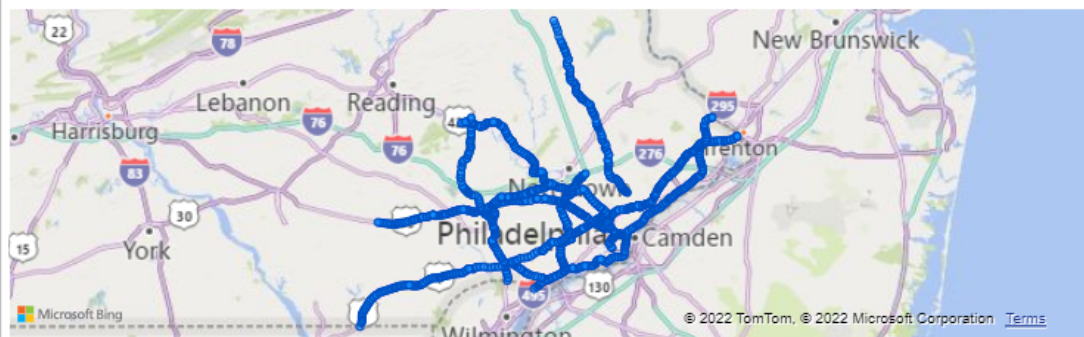
01/01/21 - 12/31/21

Congestion Impact Percent

38.69%

CAUSE	DISTRICT	COUNTY_NAME	START_TIME	END_TIME	DURATION	ROAD_NAME
CRASH	5	LEHIGH	5/5/2021 4:19:00 PM	5/5/2021 5:42:49 PM	83	PA-309
CRASH	5	LEHIGH	12/22/2021 9:19:00 AM	12/22/2021 10:12:58 AM	53	PA-309
CRASH	6	BUCKS	1/14/2021 3:16:00 PM	1/14/2021 4:10:50 PM	54	I-95
CRASH	6	BUCKS	1/19/2021 6:59:00 AM	1/19/2021 7:16:01 AM	17	US-1
CRASH	6	BUCKS	1/21/2021 5:19:00 PM	1/21/2021 6:40:39 PM	81	I-95
CRASH	6	BUCKS	1/29/2021 5:09:00 PM	1/29/2021 5:50:43 PM	41	PA-309

Selected Route Locations



Districts	Counties	Munis	Routes	Segments
1	5	87	15	1714



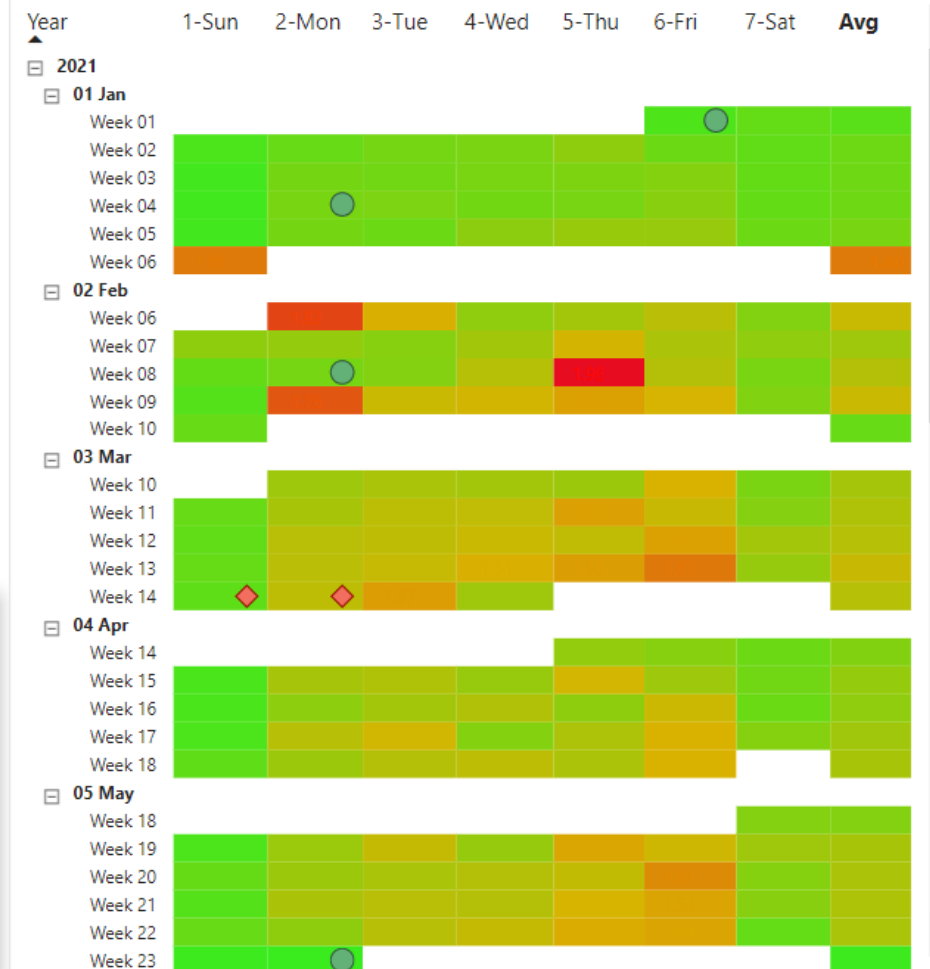
By Week



By Year/Month

Planning Time Index by Week Rural

Drill on Rows



⊗ - No Congestion Cause data ♦ - Only Recurring Congestion data ● - Holidays

** Planning Time Index = 95th Percentile Travel Time/Free Flow Travel Time



TSMO OVERALL PROJECT OF 2021



Pennsylvania Department of Transportation is the 2021 TSMO Award Overall Winner

PennDOT's real-time incident and congestion information allows for actionable decisions to keep their highways safer for the traveling public.



CASE STUDY

TSMO PERFORMANCE PROGRAM AND TRAFFIC OPERATIONS ANALYTICS TOOL

By Pennsylvania Department of Transportation

IN THIS CASE STUDY YOU WILL LEARN:

- 1 How PennDOT linked PennDOT's Crash Reporting System (CRS) and Road Condition Reporting System (RCRS), with traffic speed probe data from INRIX, and crowd sourced incident data from Waze to help make TSMO decisions.

DOT and vendor data resources that related to TSMO. It was decided to start to investigate ways to join internal data sources from safety and operations, such as PennDOT's Crash Reporting System (CRS) and Road Condition Reporting System (RCRS), with traffic speed probe data from INRIX, and crowd sourced incident data from Waze via their connected citizens program.

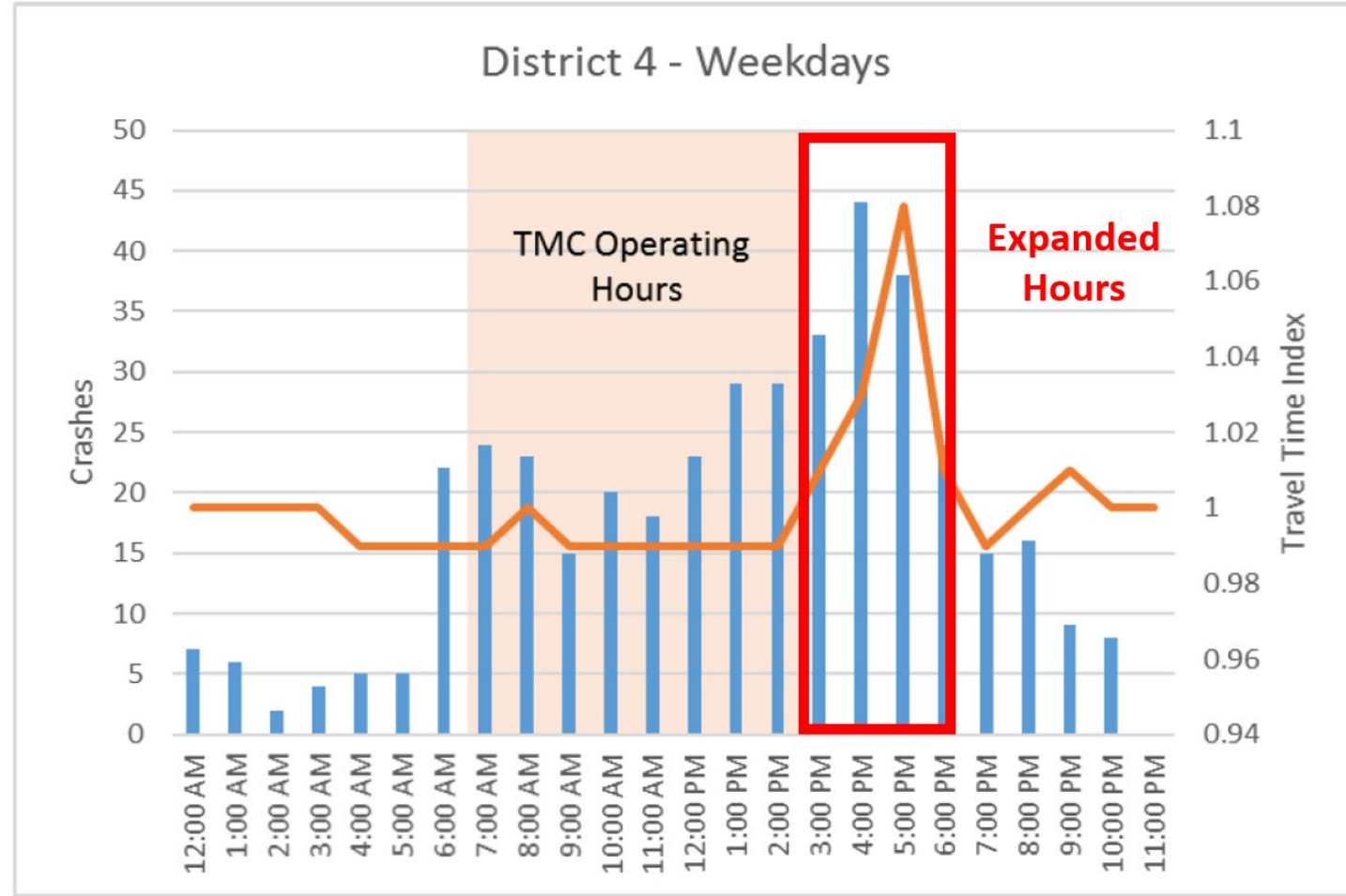
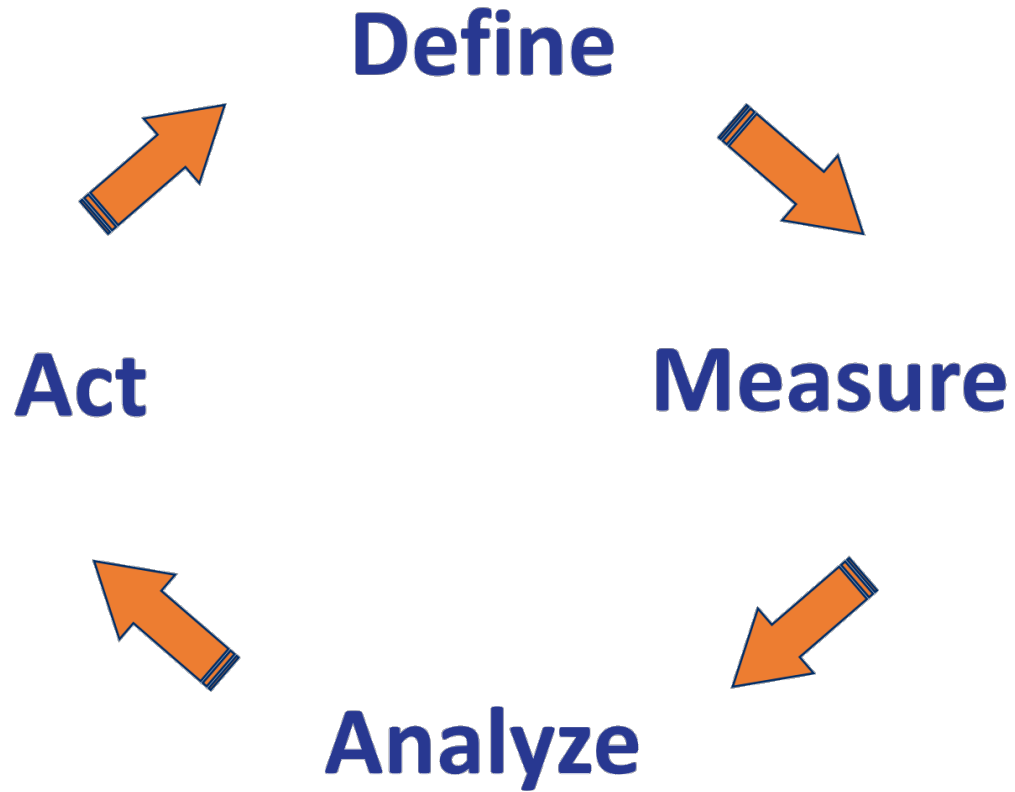
TSMO ANALYTICS DATA



USING OPERATIONS DATA TO CHANGE BUSINESS

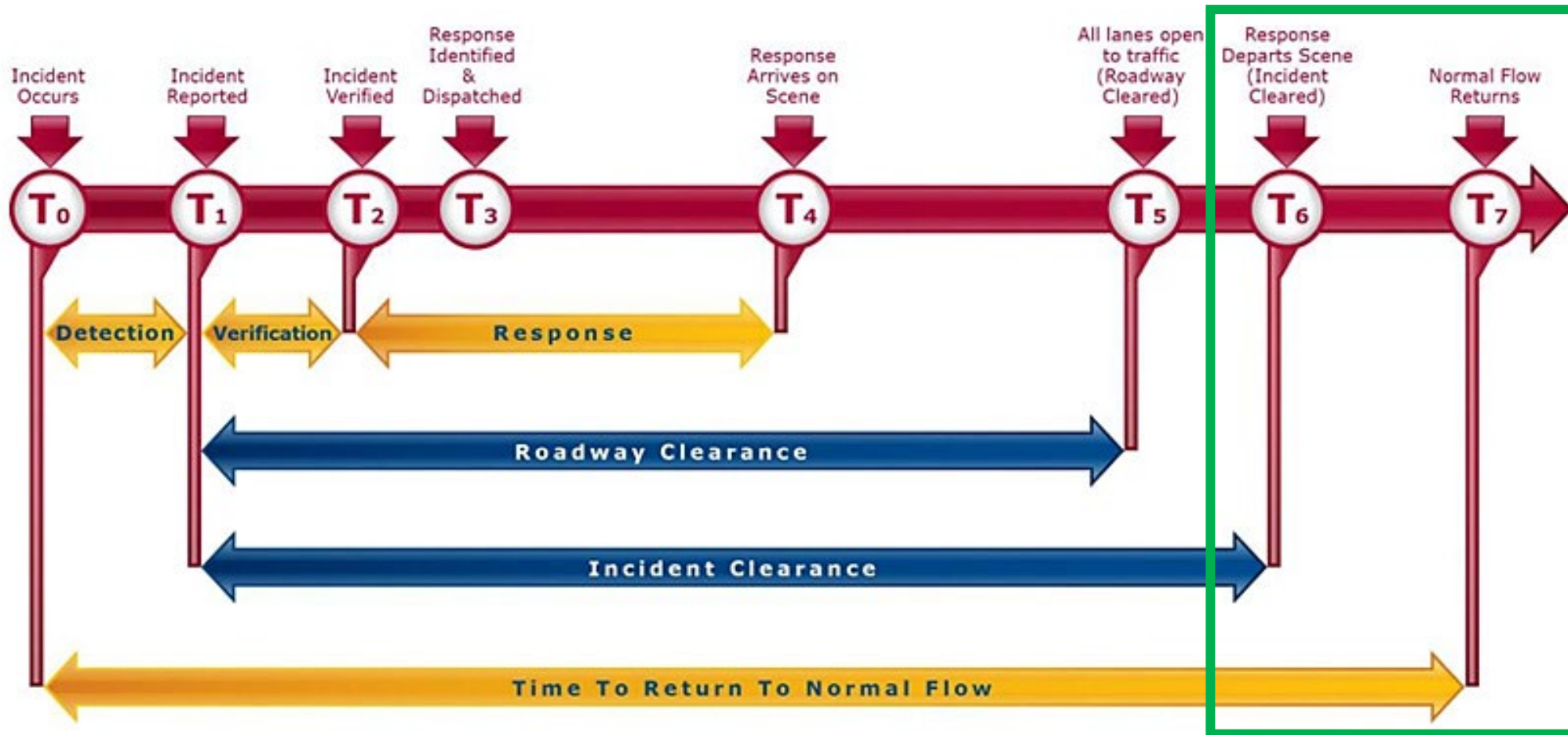


TMC OPERATIONS ADJUSTMENTS

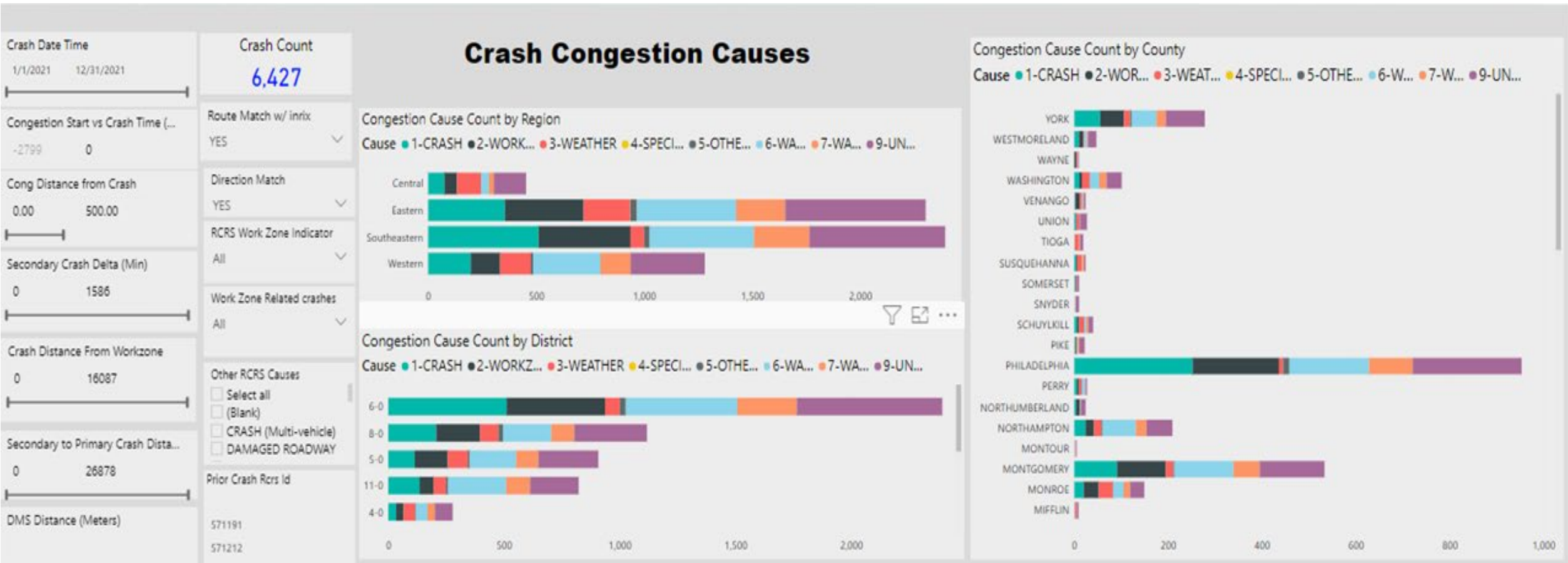


“INCIDENT INFLUENCE TIME”

“Incident Influence Time” is measured from time the incident occurs until traffic returned to historically normal speeds

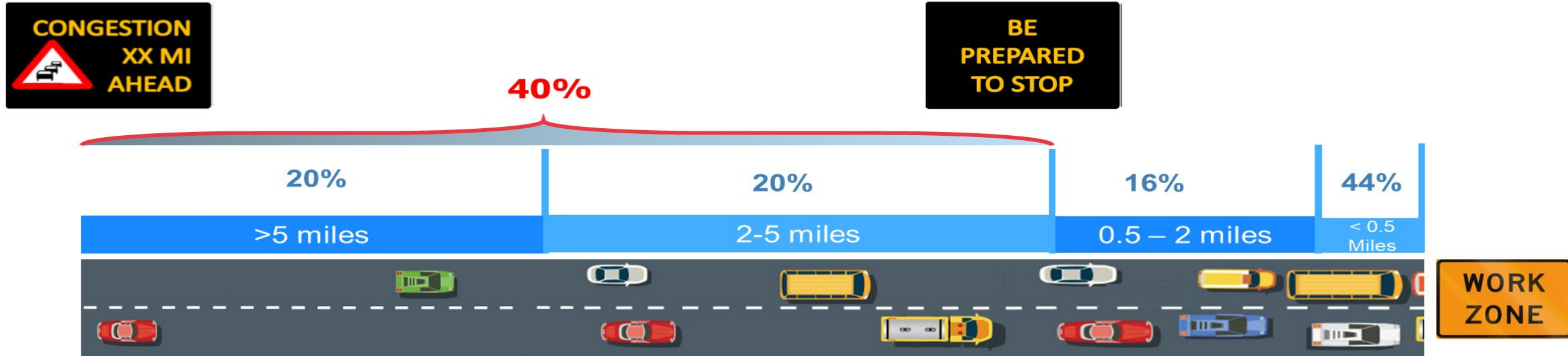


CRASHES IN CONGESTION



VIRTUAL QUEUE PROTECTION

1014 Crashes in Work Zone Congestion in 2021



- 10+ Virtual Queue Protection Corridors deployed during the last year
- Changing construction specs to utilize virtual solution
 - Cost savings in hundreds of thousands of dollars per project
- Streamlined request process and simple set up in ATMS



DEFINING HAZARDOUS DRIVING CONDITIONS

Hazardous Winter Conditions Highway Safety Performance

Condition	Greater Likelihood of Crash (Times More)	
	Commercial Vehicle	Non-Commercial Vehicle
Low Visibility ¹	2.2 x	3.2 x
High Wind ²	7.4 x	2.6 x
Freezing Surfaces ³	2.4 x	1.7 x
Freezing Rain ⁴	1.9 x	1.7 x
Slippery Surfaces ⁵	1.8 x	1.2 x

Notes:

¹ Low Visibility is based on a deficient RWIS visibility rating (<5)

² High Wind is defined as wind speeds 25 MPH or greater.

³ Freezing Surfaces include non-dry road surfaces with a surface temperature under 33°.

⁴ Freezing Rain includes non-snow precipitation with an air temperature under 33°.

⁵ Slippery Surfaces include a deficient RWIS grip level (<65) with an air temperature under 40° and some precipitation in the past three hours.

Piloting This Winter: Automated Protection Messaging for Adverse Driving Conditions (i.e., whiteouts)

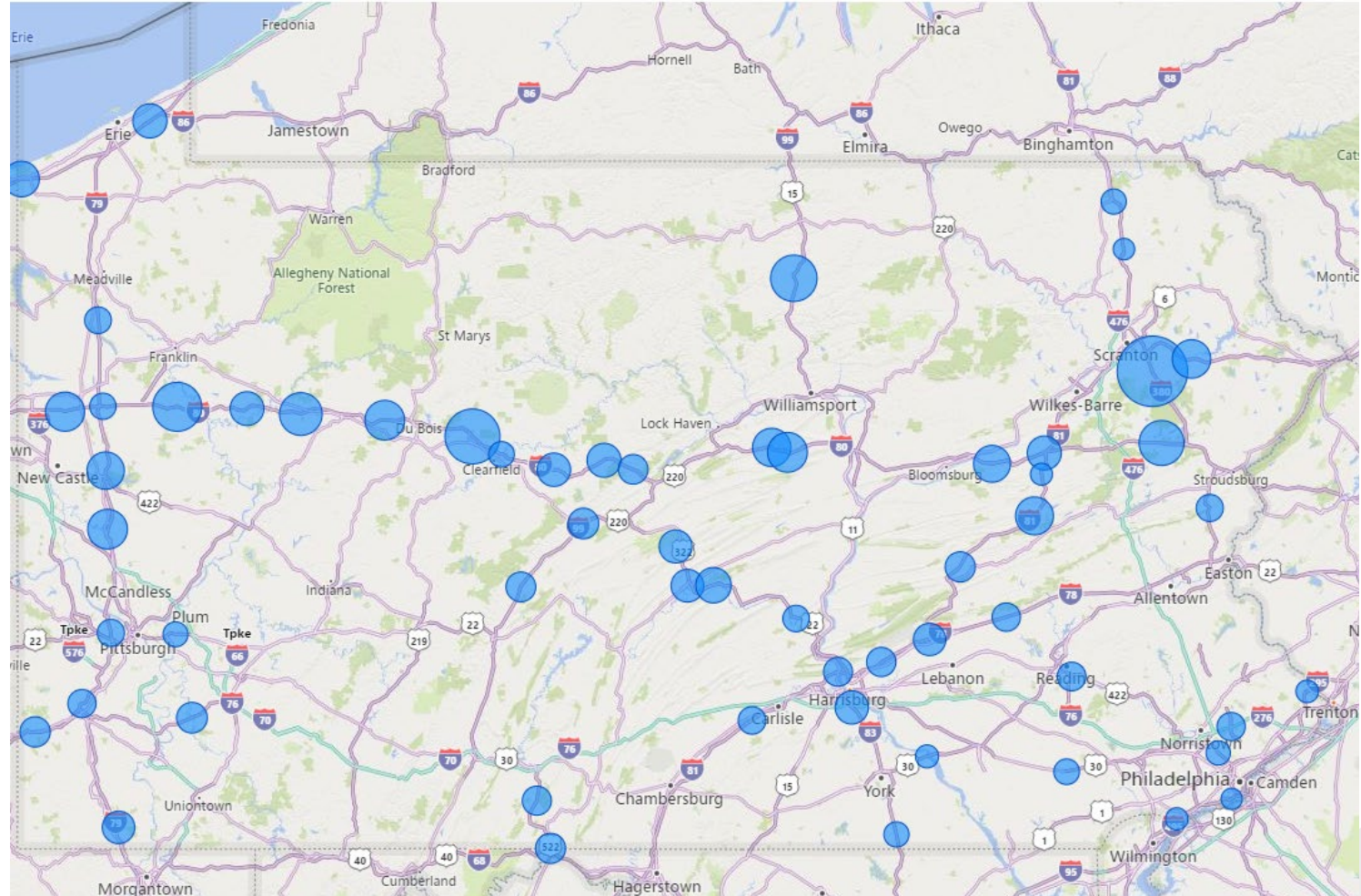


WHITEOUT CONDITIONS DEFINED

Most frequent locations since 2018

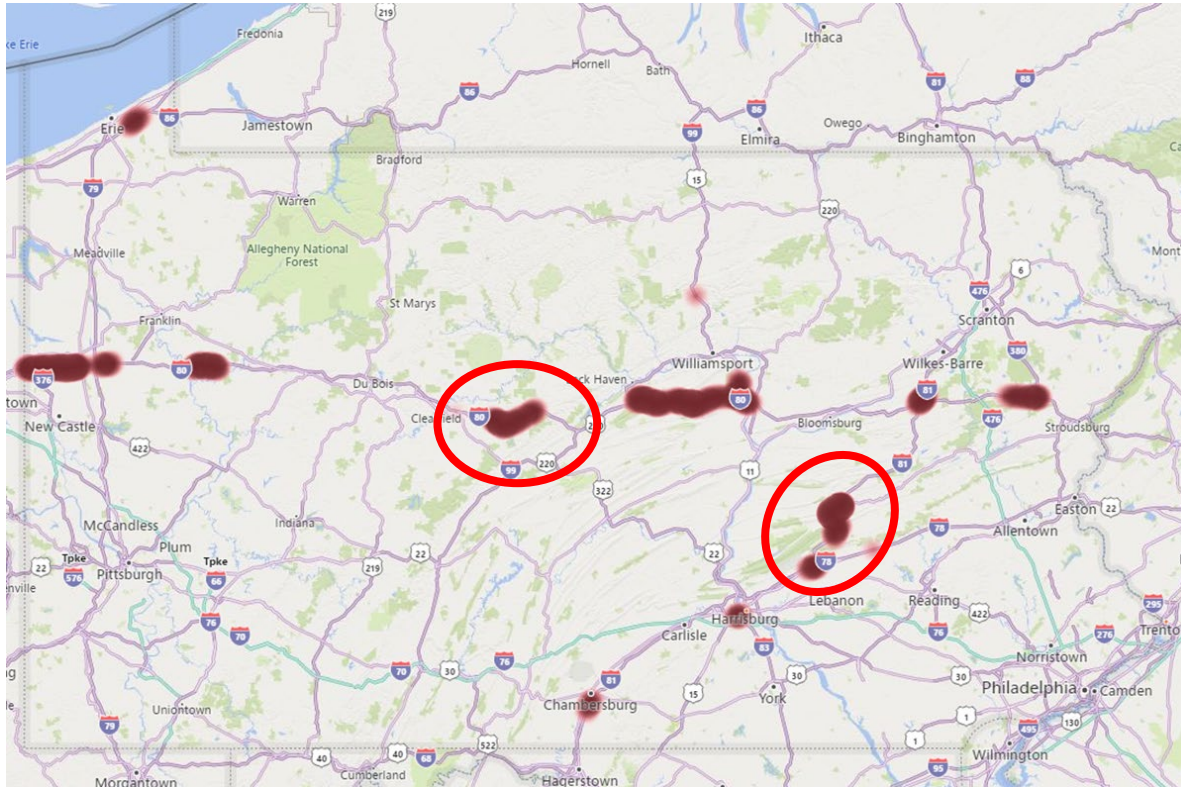
RWIS Pilot Parameters:

- Snow/other form of frozen precipitation
- Visibility < 1.5 Miles
- Rain Intensity $\geq .04$

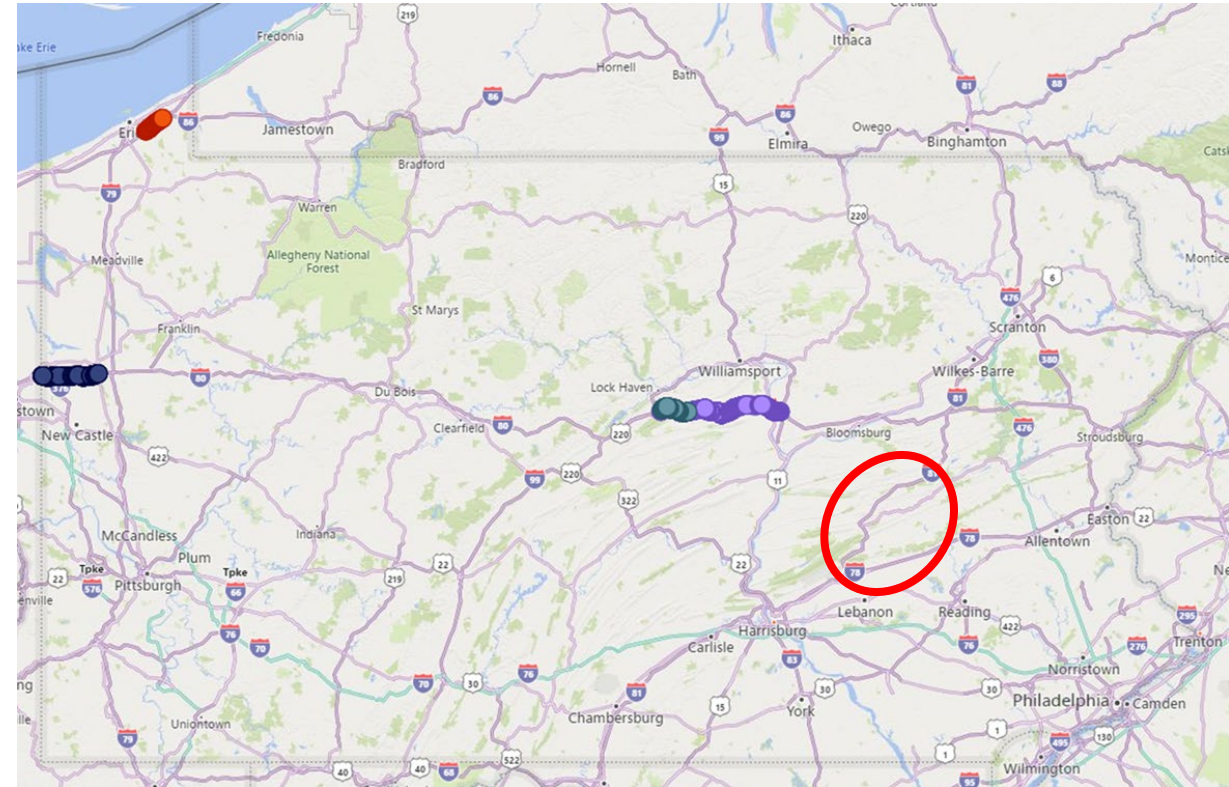


2018 – 2021 CRASHES IN WHITEOUT CONDITIONS

Closures 3+ Hours in Whiteout Conditions



10+ Vehicle Crashes in Whiteout Conditions



STRATEGIC WEATHER MANAGEMENT

2 Corridors have been established (I-80 and I-81)



IMPROVING DEPARTMENT DATA SHARING WITH PUBLIC



TIM PARTNER WEB VIDEO SHARING - MVIEW

MView

MAP

WALL

INCIDENTS

ALERTS

PROFILE

HELP

LOGOUT

Search for markers/devgroups/orgs...

ORGANIZATIONS

REGIONS

- + MD Baltimore City DOT
- + MD Harford County DPWT, Sheriff, EM/911/Public Safety
- + MD MDTA - Maryland Transportation Authority
- + MD Montgomery County DOT
- + MD Prince George's County DPWT
- + MD SHA - State Highway Administration
- + MD Town of Ocean City - PD
- + MView Stream Verification
- + PA PennDOT - Pennsylvania Department of Transportation
- + VA Alexandria City Traffic
- + VA Arlington County, PD, Fire/EMS, DOT, OEM
- + VA VDOT - Virginia Department of Transportation
- + VA Virginia Beach City
- + VA Winchester City Traffic, OEM

Links Filter Shortcuts Layers Incidents Search for cameras...

The map displays a large number of blue camera icons distributed across the Eastern United States, including parts of Pennsylvania, New Jersey, Delaware, and Virginia. Two red diamond markers indicate incident locations. The map interface includes navigation controls at the bottom and a search bar at the top right.

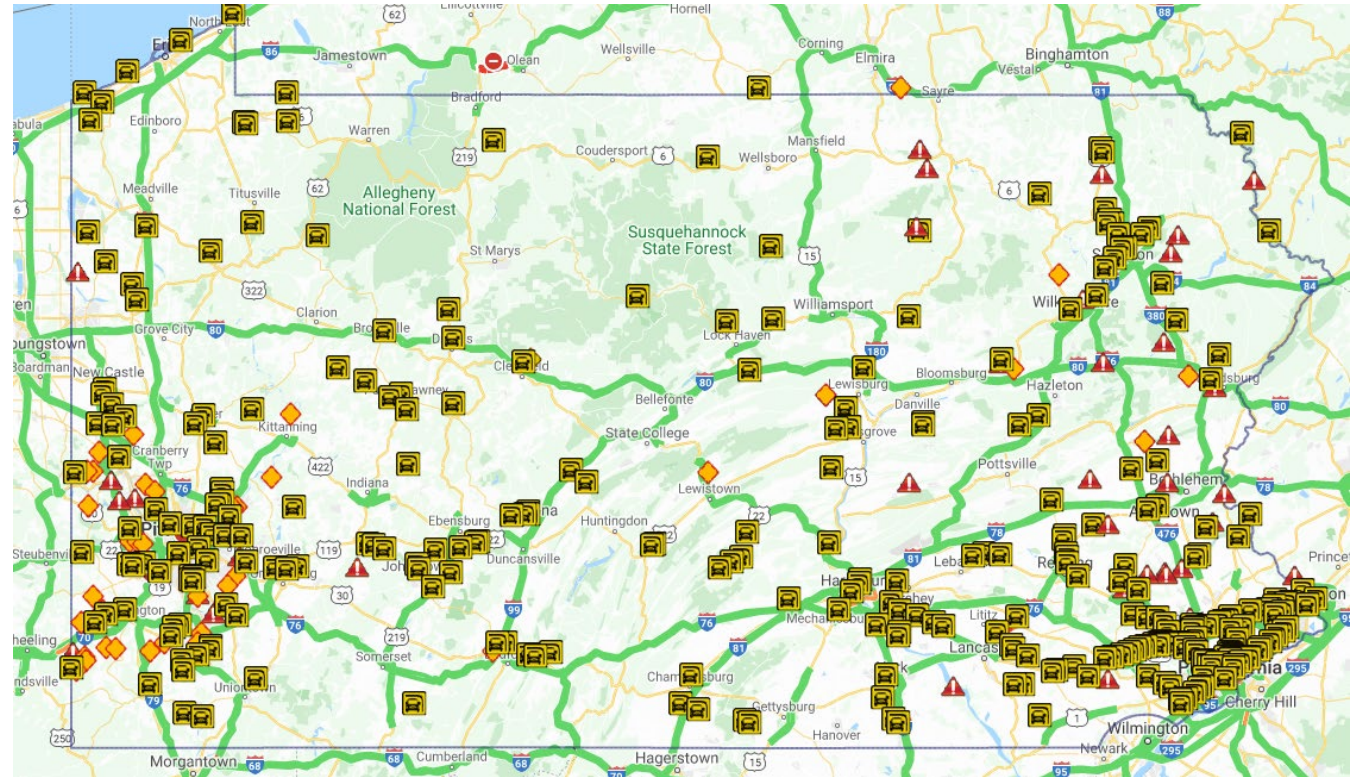


511PA LOW BRIDGE LOCATIONS

Clearance <
13'6"

Over state-
owned roads

Audio alerts in
mobile app



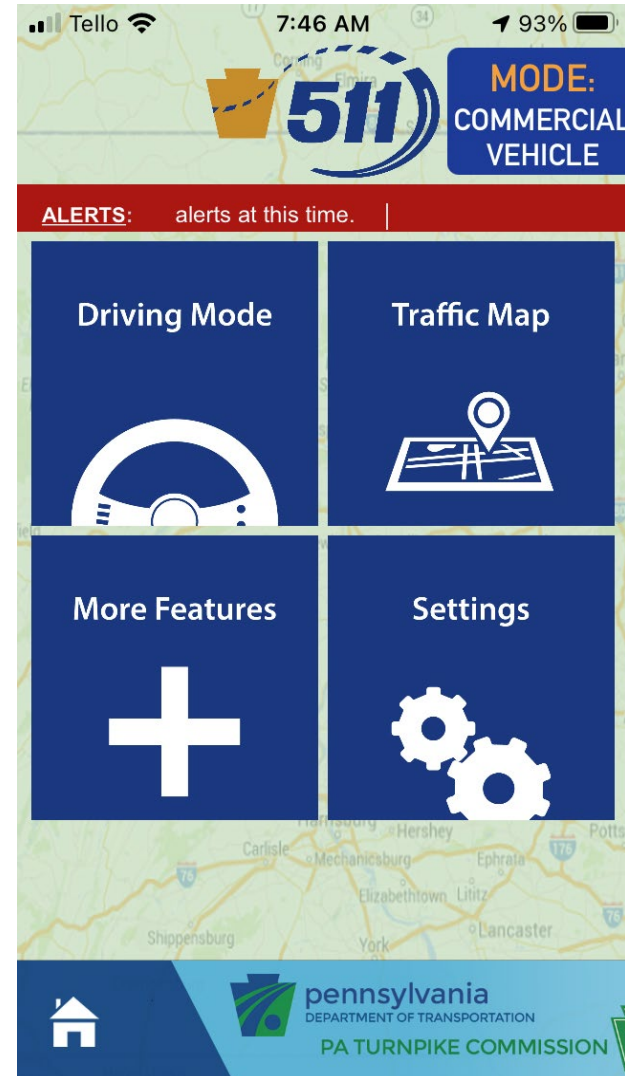
511PA MOBILE APP ENHANCEMENTS

Expanded CMV Profile

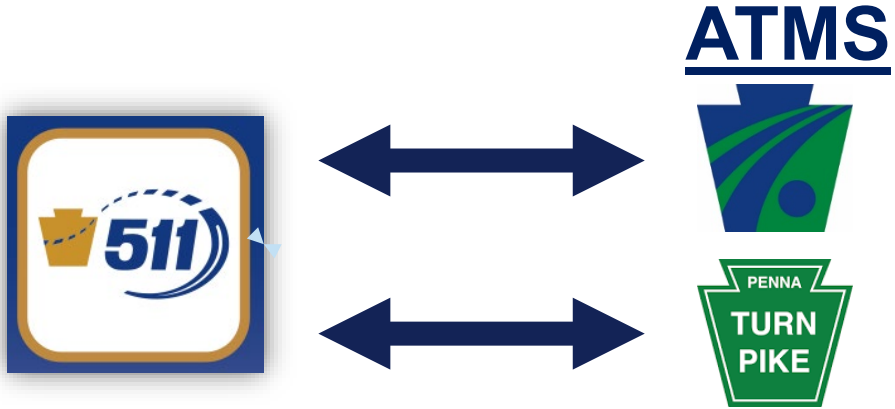
- Work zone restrictions
- Vehicle type specific alerts (winter restrictions)

Route Based Alerts

- Limit to alerts relevant to route/direction of travel
- Truck Specific Detouring for incidents



PILOTING VIRTUAL HAR WINTER 22

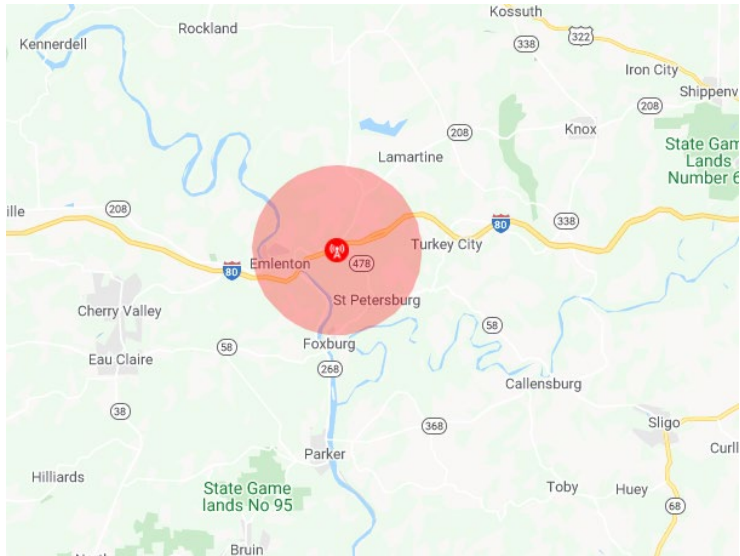


511PA Website with voice

IVR – Priority Floodgate

Geofenced DriveMode Voice Alert

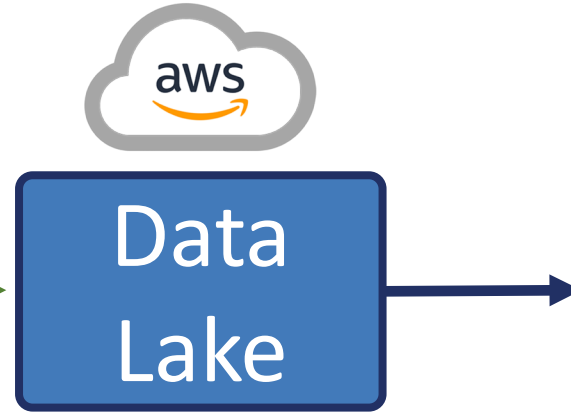
Geofenced Push Notifications with voice



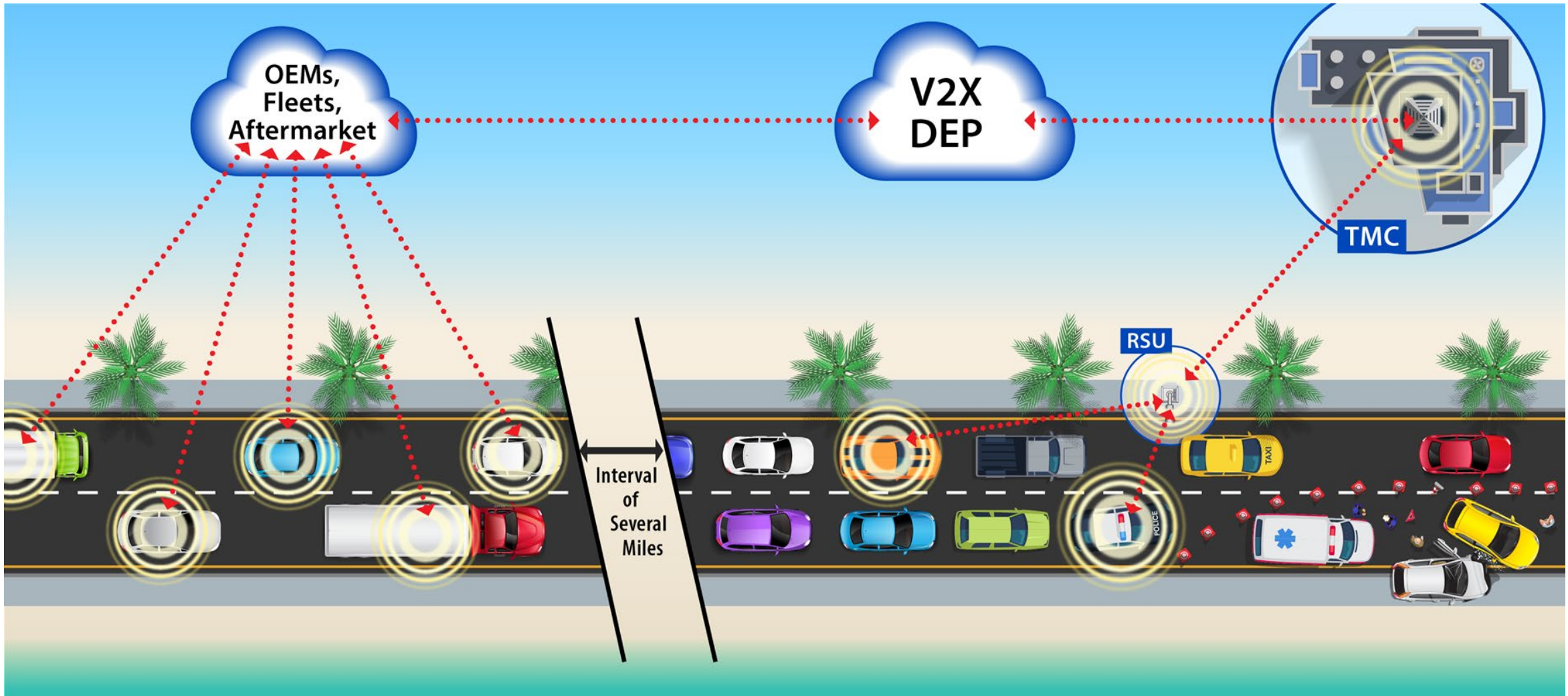
NEW SOLUTION FOR DATA SHARING



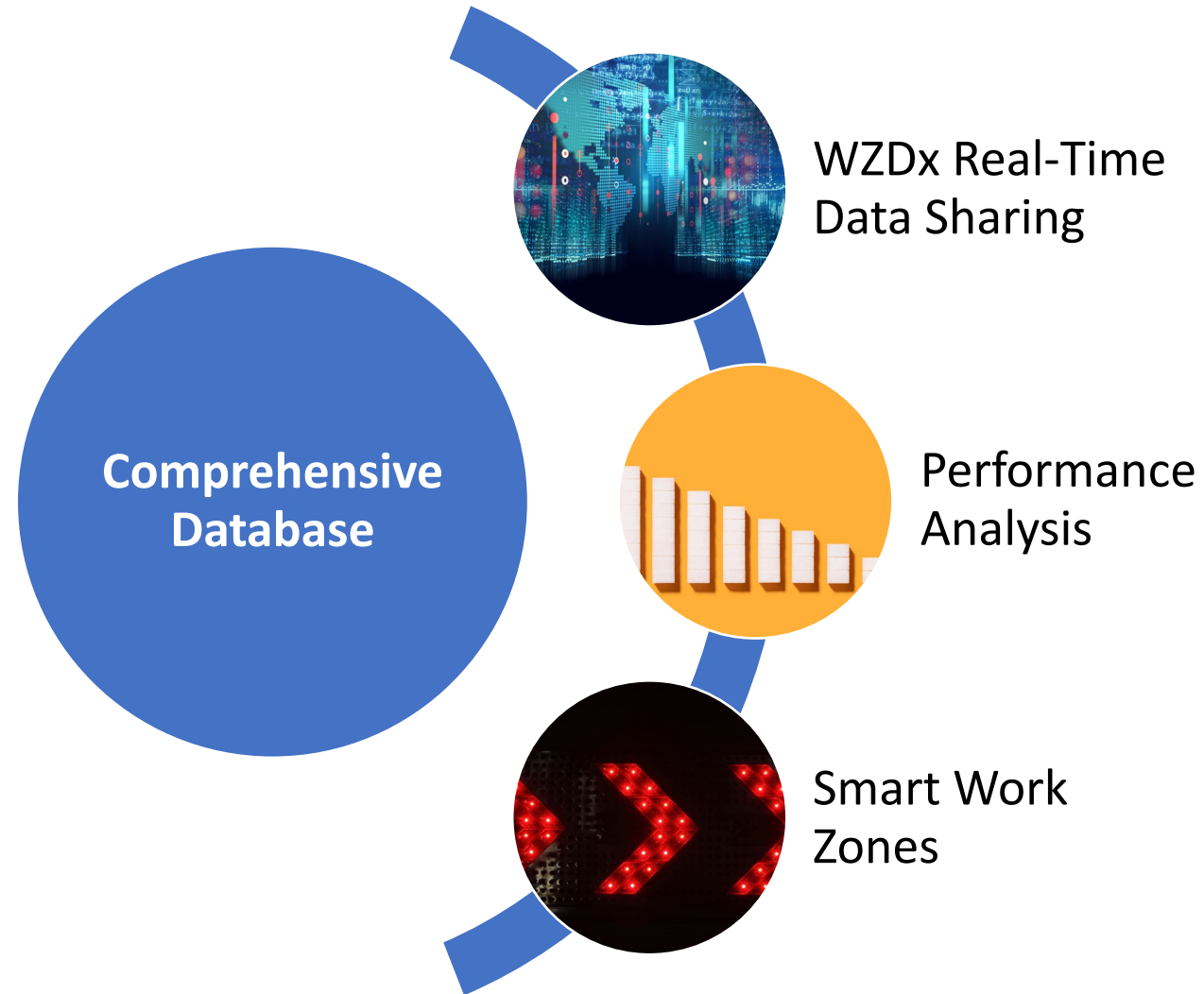
CONNECTED AND
AUTOMATED VEHICLES



CONNECTED VEHICLE – USE CASE



ROADMAP: DIGITAL TRAFFIC CONTROL PLANS



THANK YOU

Ryan McNary

Chief of Traffic Operations and TSMO Performance