# ATI/ALDOT Collaborative Transportation Operation Project Updates

Alabama Transportation Planners Association
2023 Annual Conference

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***July 19 - 21, 2023 - Tuscaloosa, AL***

# ATI/ALDOT projects

- *ATCMTD (ACTION) - WCR*
- *ATCMTD 2.0  (PROACT) - North Alabama/Cullman*
- *ATSPM  - WCR & Statewide*
- *ALDOT HPMS - statewide*

# What is ATCMTD?

Fixing America's Surface Transportation Act or "FAST Act“

## ADVANCED TRANSPORTATION AND CONGESTION MANAGEMENT TECHNOLOGIES DEPLOYMENT

| Fiscal year | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Authorization | $60 M | $60 M | $60 M | $60 M | $60 M |

### Program purpose

The FAST Act established the Advanced Transportation and Congestion Management Technologies Deployment Program to make competitive grants for the development of model deployment sites for large scale installation and operation of advanced transportation technologies to improve safety, efficiency, system performance, and infrastructure return on investment.

# ATCMTD in WCR *(2018 - present)*

Initiative to deploy an **A**dvanced **C**onnected **T**ransportation **I**nfrastructure & **O**perations **N**etwork on ***freeway*** and ***arterials*** in and around Tuscaloosa

**ACTION** $16.8 million (USDOT $8m, ALDOT $4m, TCRIC $4.3m and UA $0.5m)

**West Central Alabama ACTION**

**Advanced Connected Transportation Infrastructure and Operations Network**

*Improving Efficiency, Capacity, and Safety through Technology Deployment*

# ACTION - technology deployment

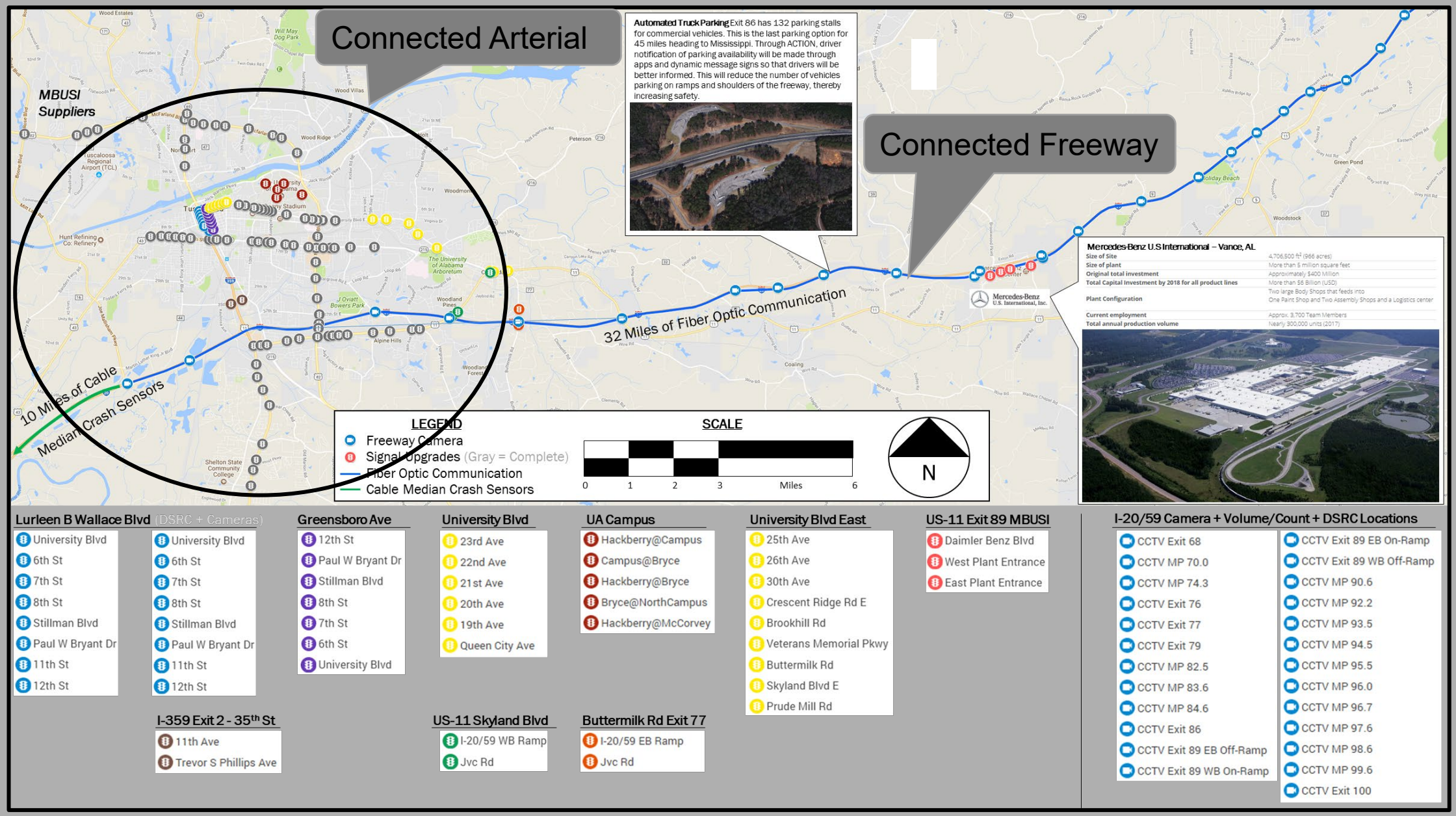
- *Network Pan-Tilt-Zoom Cameras*
- *Deep-Learning Algorithms for Camera Crash Detection*
- *Fiber optic communication*
- *Dynamic digital message signs (DMSs)*
- *Communication - Radios and Cellular*
- *Vehicle monitoring and counting system*
- *Advanced Traffic Signal Controllers*
- *Mobile Application Platform (Travel Safely)*
- *CV Traffic Communications*

# ACTION - Objectives

- **Deploy** sensors, communications, analytical tools, and technologies to *monitor and proactively manage* the freeway and arterial network for safer and more efficient operations.
- **Improve** system reliability and performance using data integration, analytics, and applications.
- **Enhance** mobility within the region to improve access to economic activities, education, employment, and healthcare, especially for underserved communities.
- **Increase** system level fuel economy and mitigate adverse environmental effects.
- **Provide** economic benefits to the region by improving system throughput and reducing delays.

# ACTION - Performance Goals

- **Improve** safety by reducing the number of secondary crashes by 20% in this area.
- **Increase** travel time reliability and system resilience by 25%, and increase transit accessibility and mobility.
- **Reach** at least 50% of the motorists in the region with apps and other information systems.
- **Achieve** systems-level fuel economy benefits by up to 5% and thereby reduce emissions.
- **Reduce** industry downtime for JIT and JIS manufacturing by 5%.
- **Integrate** at least 75% of intersections and 70% of the freeway network in the ACTION region.




**Lurleen B Wallace Blvd** (DSRC + Cameras)

- University Blvd
- 6th St
- 7th St
- 8th St
- Stillman Blvd
- Paul W Bryant Dr
- 11th St
- 12th St

- University Blvd
- 6th St
- 7th St
- 8th St
- Stillman Blvd
- Paul W Bryant Dr
- 11th St
- 12th St

**Greensboro Ave**

- 12th St
- Paul W Bryant Dr
- Stillman Blvd
- 8th St
- 7th St
- 6th St
- University Blvd

**University Blvd**

- 23rd Ave
- 22nd Ave
- 21st Ave
- 20th Ave
- 19th Ave
- Queen City Ave

**UA Campus**

- Hackberry@Campus
- Campus@Bryce
- Hackberry@Bryce
- Bryce@NorthCampus
- Hackberry@McCorvey

**University Blvd East**

- 25th Ave
- 26th Ave
- 30th Ave
- Crescent Ridge Rd E
- Brookhill Rd
- Veterans Memorial Pkwy
- Buttermilk Rd
- Skyland Blvd E
- Prude Mill Rd

**US-11 Exit 89 MBUSI**

- Daimler Benz Blvd
- West Plant Entrance
- East Plant Entrance

**I-359 Exit 2 - 35th St**

- 11th Ave
- Trevor S Phillips Ave

**US-11 Skyland Blvd**

- I-20/59 WB Ramp
- Jvc Rd

**Buttermilk Rd Exit 77**

- I-20/59 EB Ramp
- Jvc Rd

**I-20/59 Camera + Volume/Count + DSRC Locations**

- CCTV Exit 68
- CCTV MP 70.0
- CCTV MP 74.3
- CCTV Exit 76
- CCTV Exit 77
- CCTV Exit 79
- CCTV MP 82.5
- CCTV MP 83.6
- CCTV MP 84.6
- CCTV Exit 86
- CCTV Exit 89 EB Off-Ramp
- CCTV Exit 89 WB On-Ramp

- CCTV Exit 89 EB On-Ramp
- CCTV Exit 89 WB Off-Ramp
- CCTV MP 90.6
- CCTV MP 92.2
- CCTV MP 93.5
- CCTV MP 94.5
- CCTV MP 95.5
- CCTV MP 96.0
- CCTV MP 96.7
- CCTV MP 97.6
- CCTV MP 98.6
- CCTV MP 99.6
- CCTV Exit 100

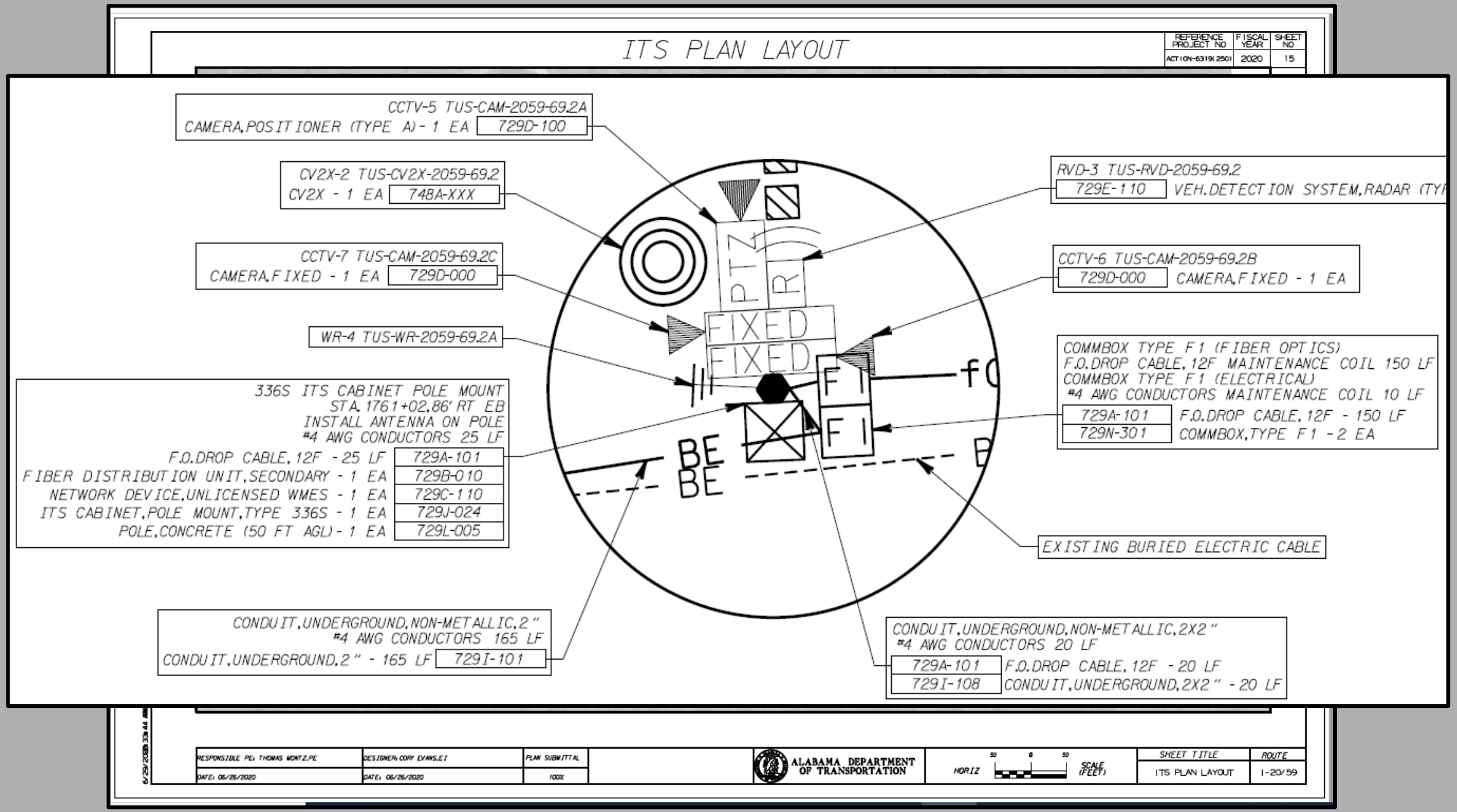
# ACTION - Deployment Plan

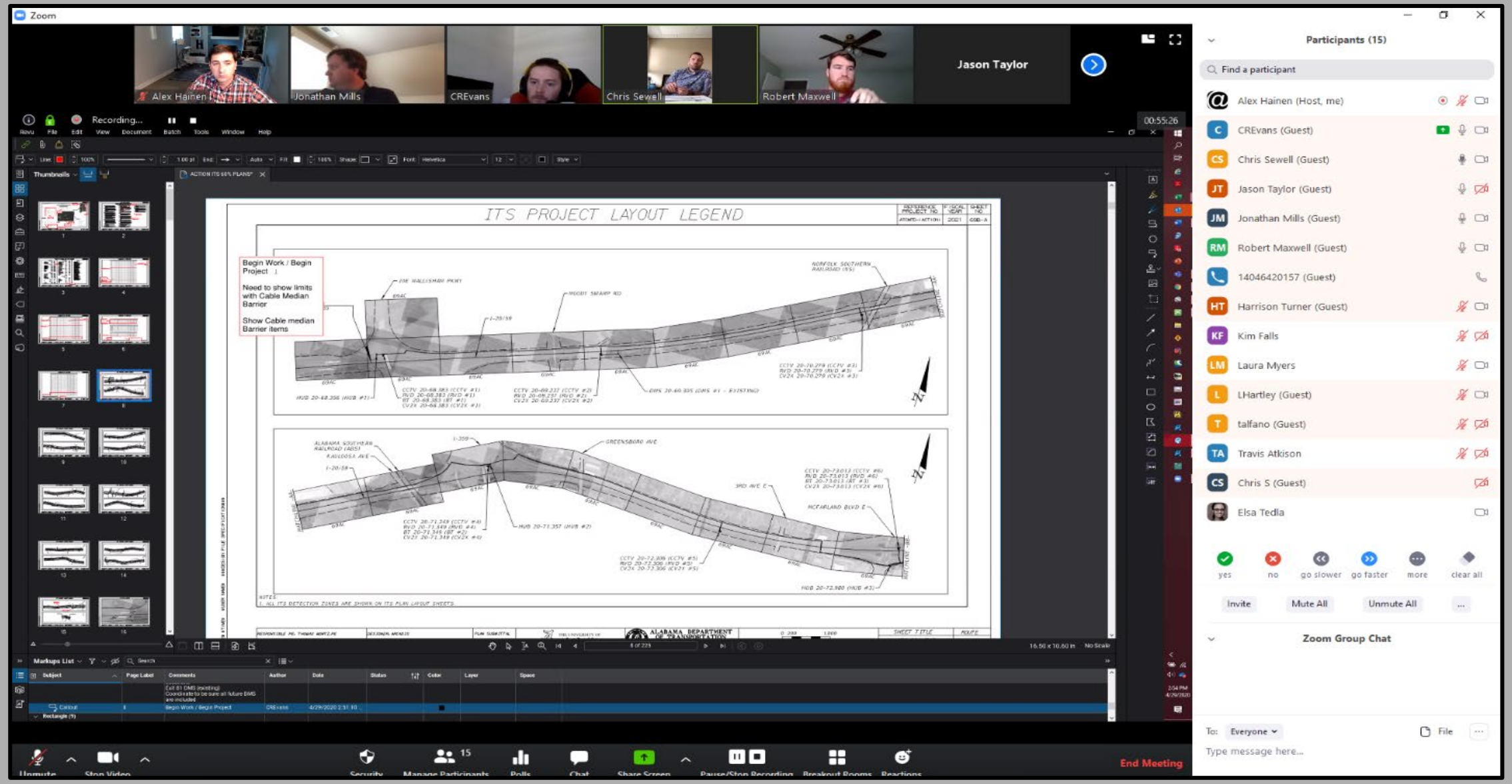
## Deploy Connected Freeway Components:

- 22 locations - interchanges 1-2 miles apart
  - camera pole, power, CV2X, volume/speed detection, and etc.
- Fiber over 20+ miles to link each camera location to the RTMC
- 3 Dynamic digital message signs (DMS)
- ASAP truck

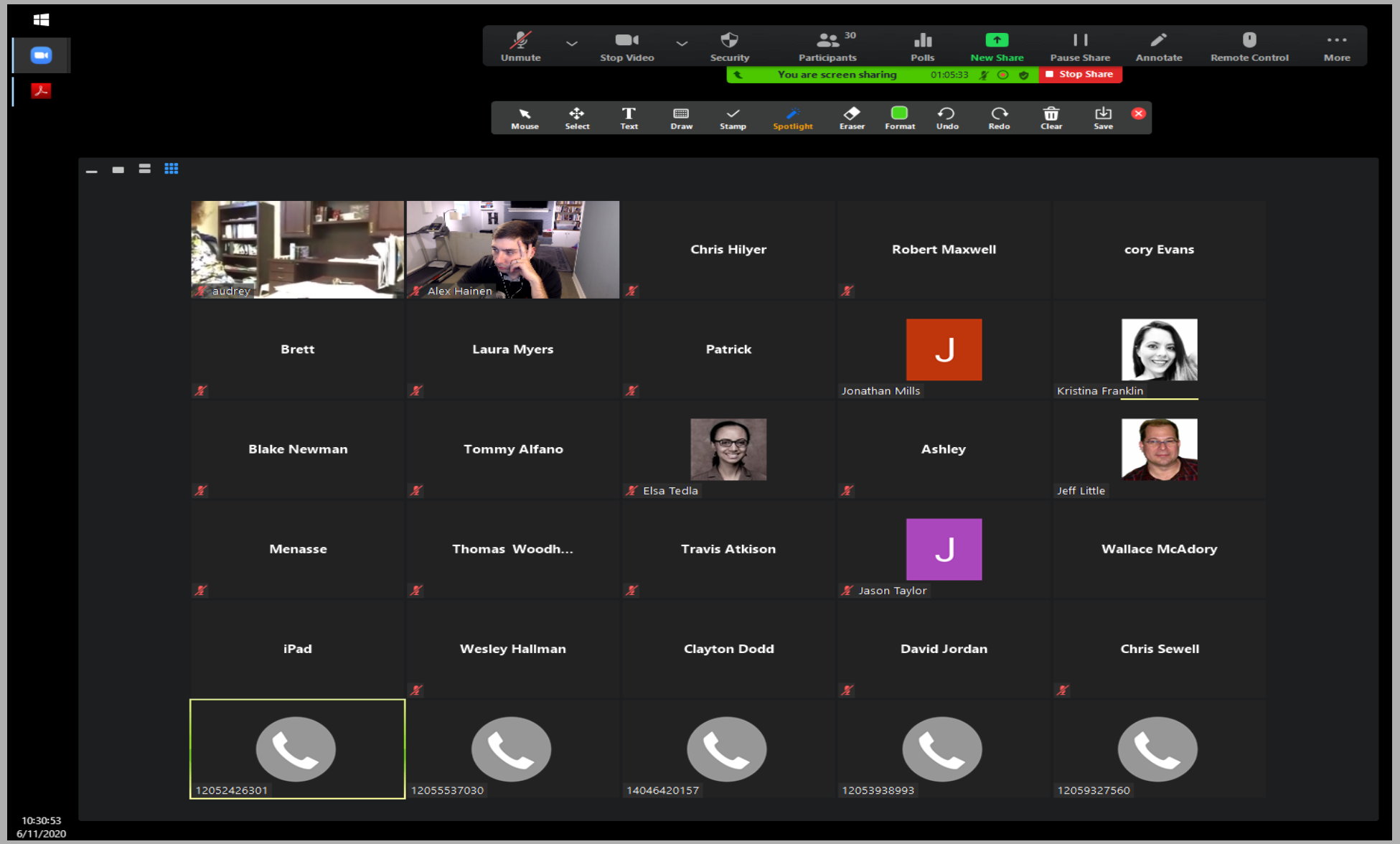

## Deploy Connected Arterial Components:

- Advanced detection
- Connected vehicle platform - *TravelSafely™*
- Hi-res controllers
- PTZ camera
- INRIX data




*30 - 60% Internal Plan Review - 4+ hrs*




*90% Plan Review with ALDOT - 10-12 hrs*

# ACTION - Challenges

COVID19

- **Remote work, supply chain issue => delayed project, increased $$**

Technology becomes obsolete before deployment

- **DSRC**

Proposed technology underperforms => alterative – but might not exist

- **Vehicle detection, e.g. Pucks, Radar, …**

Vendor proposed/promised product ≠ actual product performance

- **Cable median sensor, Radar**

Prices have gone up – some doubled

- **Fiber from $70k to $140k+**

Bid doubled the budget $9 - $11+ million

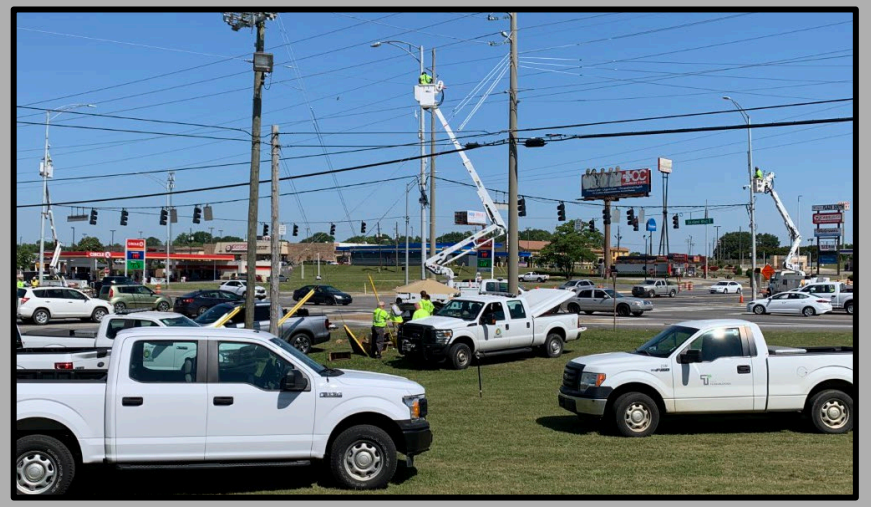
- **Forced re-bid => delayed project 9 - 12 month**

# Exploring Detection Alternatives ( 2019-2022)

## $1 million detection for 35+ Signals

### Iteris Radar (UA)

### GridSmart (ALDOT)



### MioVision (UA)

# Process/timeline in a nutshell

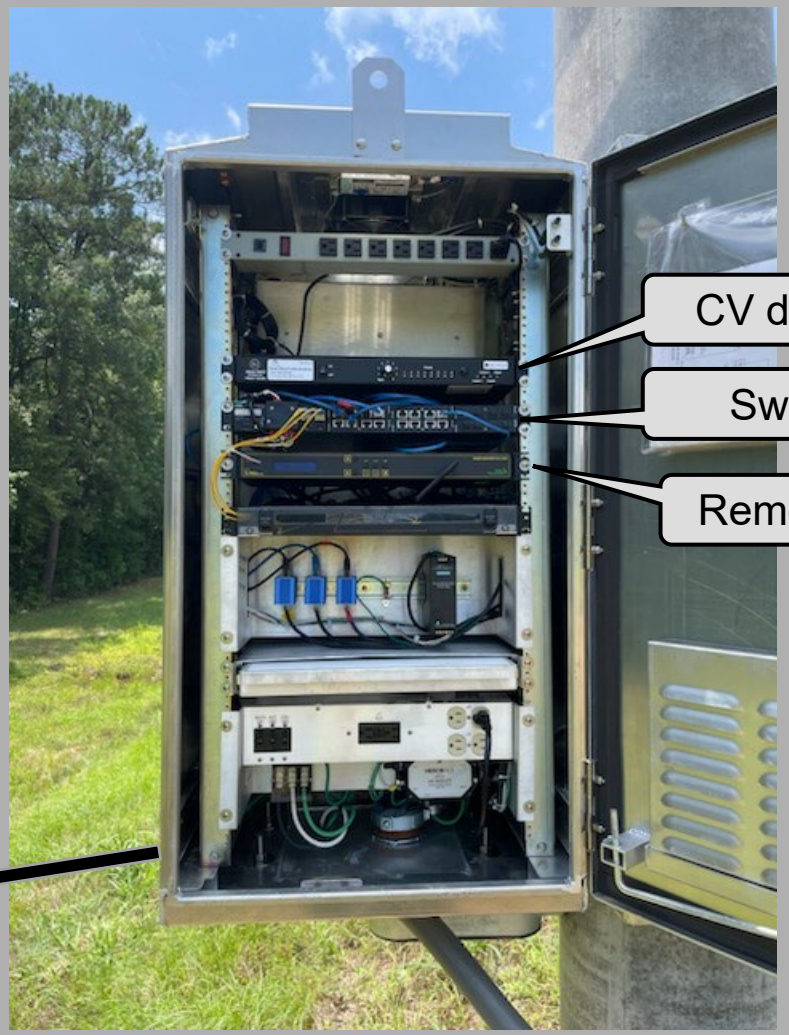
- Proposal 2017
- Award 2018
- Consultant selection and design 2019-2020
- Bid and letting 2021
  - Bid 1
  - Bid 2
- Construction started March 2022 **(5 years after proposal!)**
  - Team met every two weeks – zoom
  - Quarterly and annual reports shipped to FHWA
- And we are in 2023 and it is still on-going!

# ACTION - Current Status

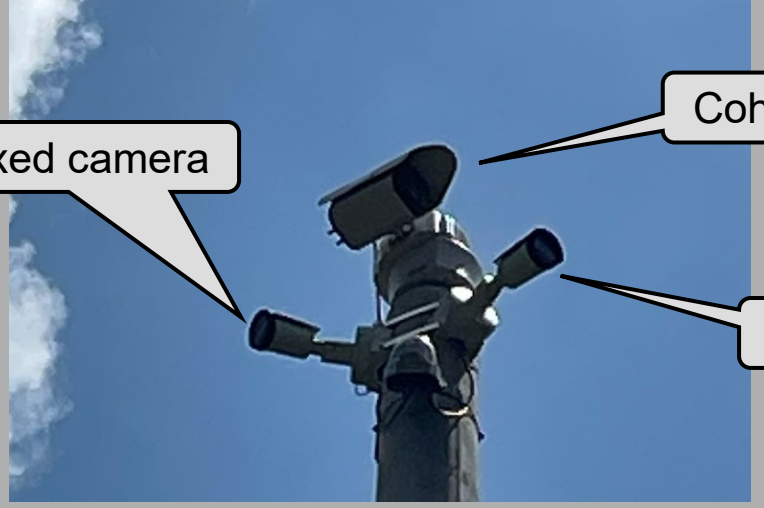
- Freeway Construction nearly complete
  - few weeks
- Fiber communication from Freeway to UA (Cyber Hall)
  - Being established
- Nearly $1 million worth of signal detection & equipment on it way
  - Installation expected 6-9 months

## Going forward, hopefully:

- Data to RTMC/Cyber Hall
- Software and platform integration
- RTMC will monitor Freeway before end of summer 2023
- 100% of project (Freeway + Arterial) before summer 2024
- Project evaluation, BCA, final report to FHWA by end of 2024




Pole mounted ITS cabinet – 20+


Axis Fixed camera
Cohu PTZ camera
Axis Fixed camera


Wavetronix
Permanent counter
Roadside Unit (RSU)


COSTAR HD
RISE COMMAND CORE
Setup
Image
Positioner
Media
Action Engine
Video Analytics
Users
Protocol
Date and Time
On-Screen Display
Privacy Mask
Accessories
System
Profile1
user: Admin
Select Preset
Control Panel
PTZ
Presets & Tours
Advanced
Play
Stop
Profile1
Pan/Tilt Speed
Slow
Medium
Fast
Magnification
1x
1x
Digital
Zoom Speed
Slow
Medium
Fast
Focus
Auto Focus On
Near
Far
Focus
Iris
Auto Iris On
Close
Open


1:1

# Lesson learned from the 1st ATCMTD

- Over-budget $$ estimates as much as possible
  - > 50%
- Propose longer project duration… to the extent possible

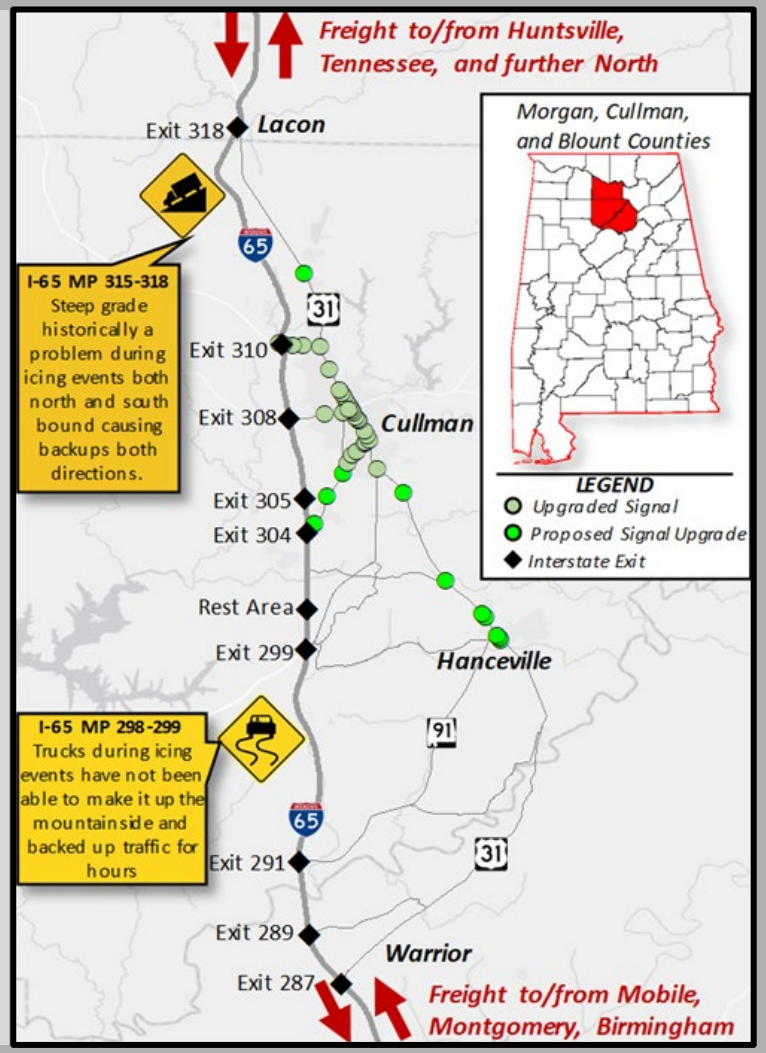
- Technology will become obsolete… prepare for back-up plan

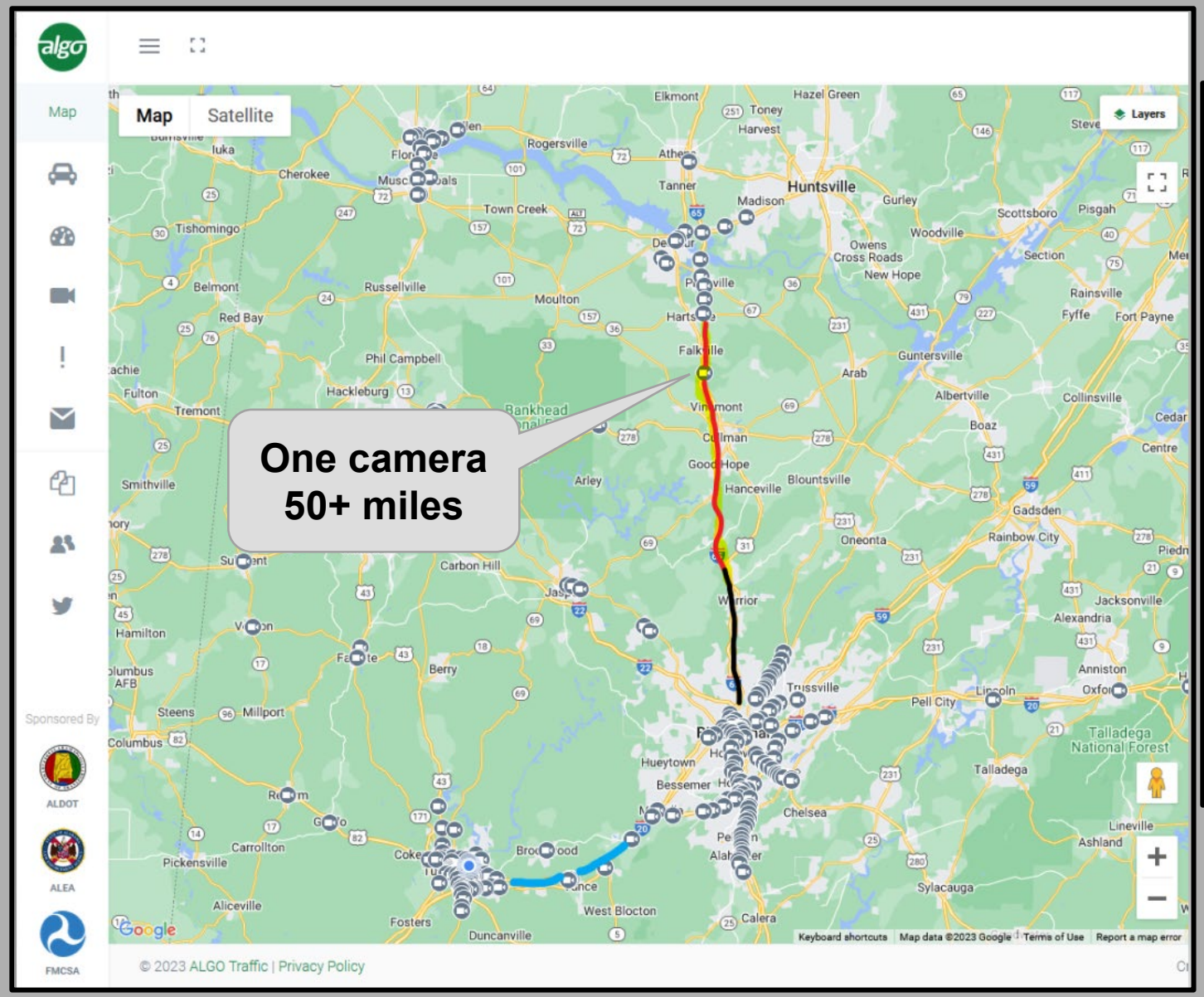
# ATCMTD 2.0 in North Alabama *(2022 - present)*

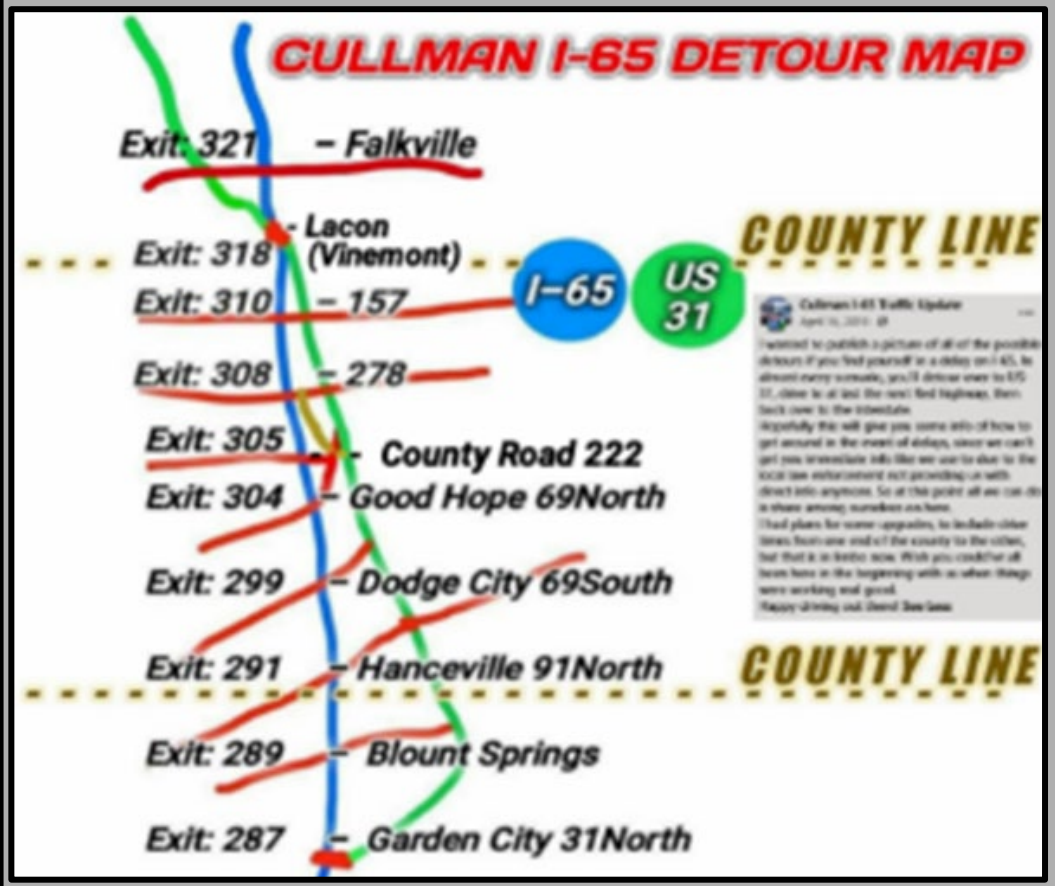
Proactive Route Operations to Avert Congestion in Traffic

**PROACT** - $10.5 million (USDOT $5m, ALDOT $5m, UA $0.5m)

- Freeway - I65 in Cullman Area (Warrior to Lacon)
- Arterials - Detour routes
- Oct 2022 – Sep 2026






# Unofficial Facebook Detour for I-65

# PROACT - Objectives and Goals

***Alleviate*** *non-recurring congestion through the use of technology and data analytics.*

***Measure and improve*** *the operational performance to enhance machine learning tools.*

***Reduce*** *the number and severity of crashes within the project area.*

***Collect and disseminate*** *real time transportation related information to improve mobility.*

# PROACT - technology deployment

- **Advanced Road Weather Monitoring** and Forecasting Tools and Technologies
- **Advanced Transportation Management System** & Connected Vehicle Probe Data
- **Central Traffic Management System** and Machine Vision for Signalized Intersection Operations and Safety
- **Connected Vehicle Hardware** and Freight Priority Application
- Communications and **Traveler Information System** Applications

# PROACT - Current Status

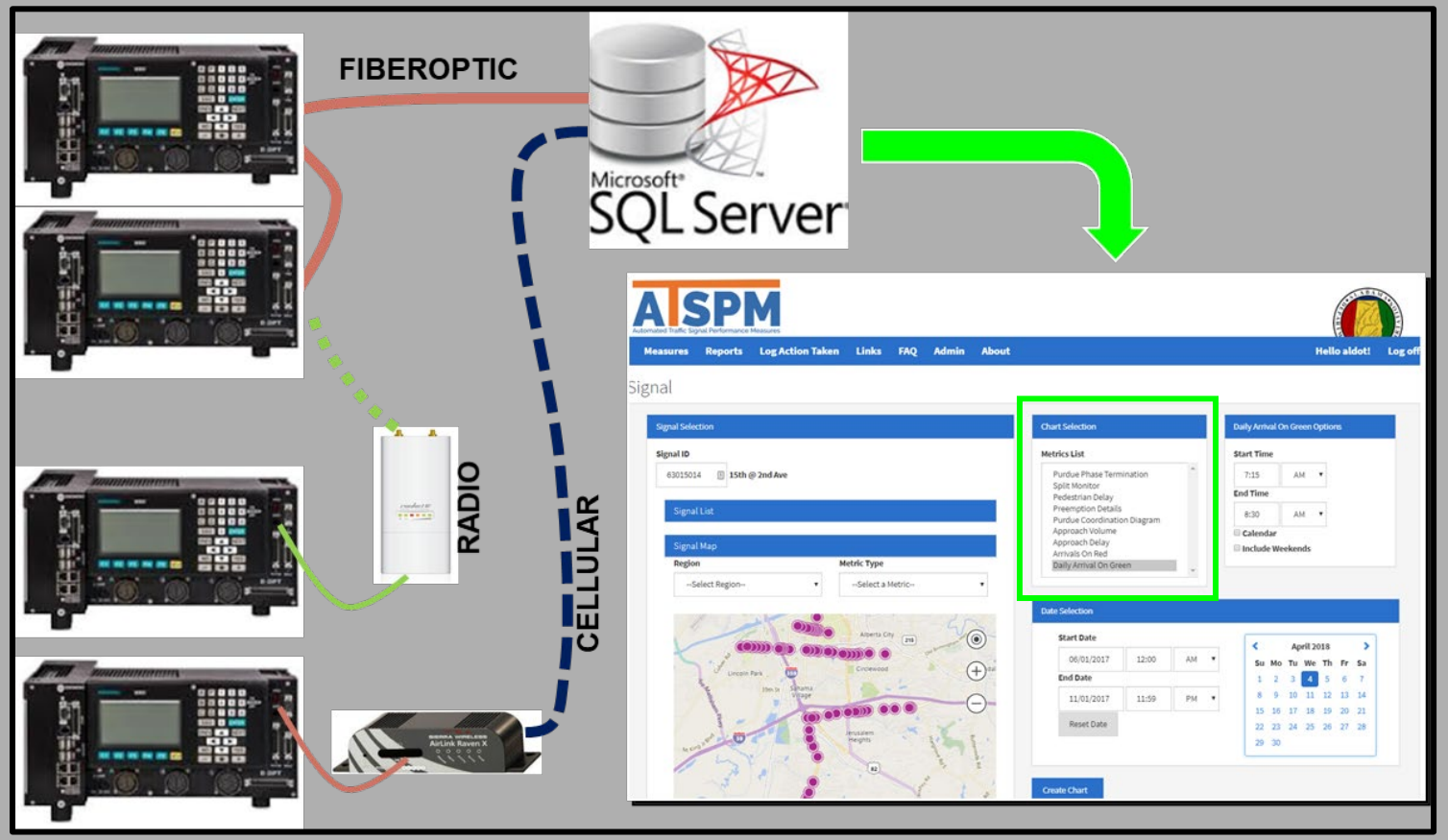
- At the initial stages of  PS&E (Plan, Specification and Estimate)
- Consultant selected few months back
- Initial survey using Drone in June
- Possibly letting in 6-9 months?

# Automated Traffic Signal Performance Measures (2016 – present)

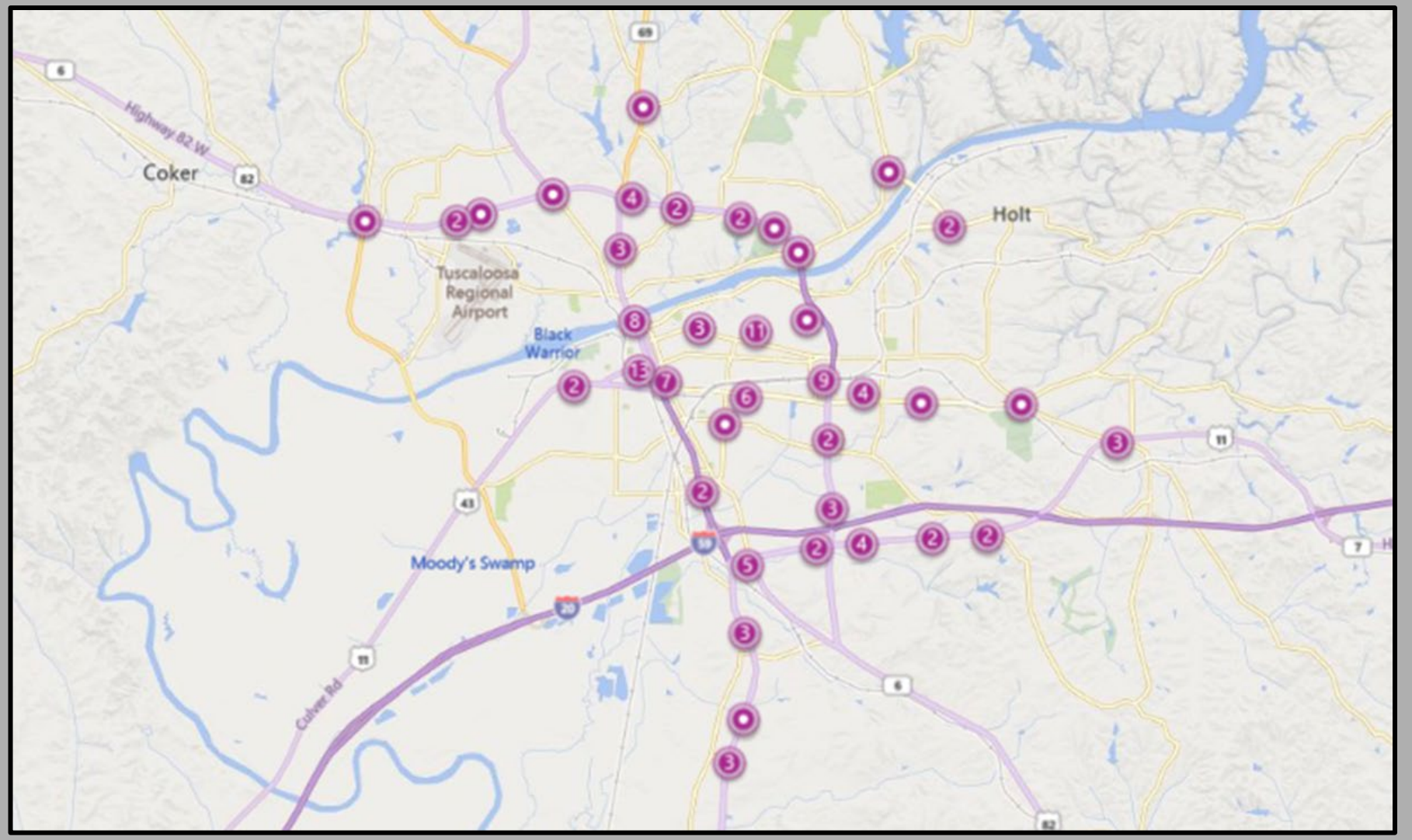
## ATSPM $3.2 million

**Initial Goals and Objectives:**

- Upgrade 85 signals controllers in WCR
- Upgrade detection
- Establish communication to Central server
- Optimize signals on major corridors

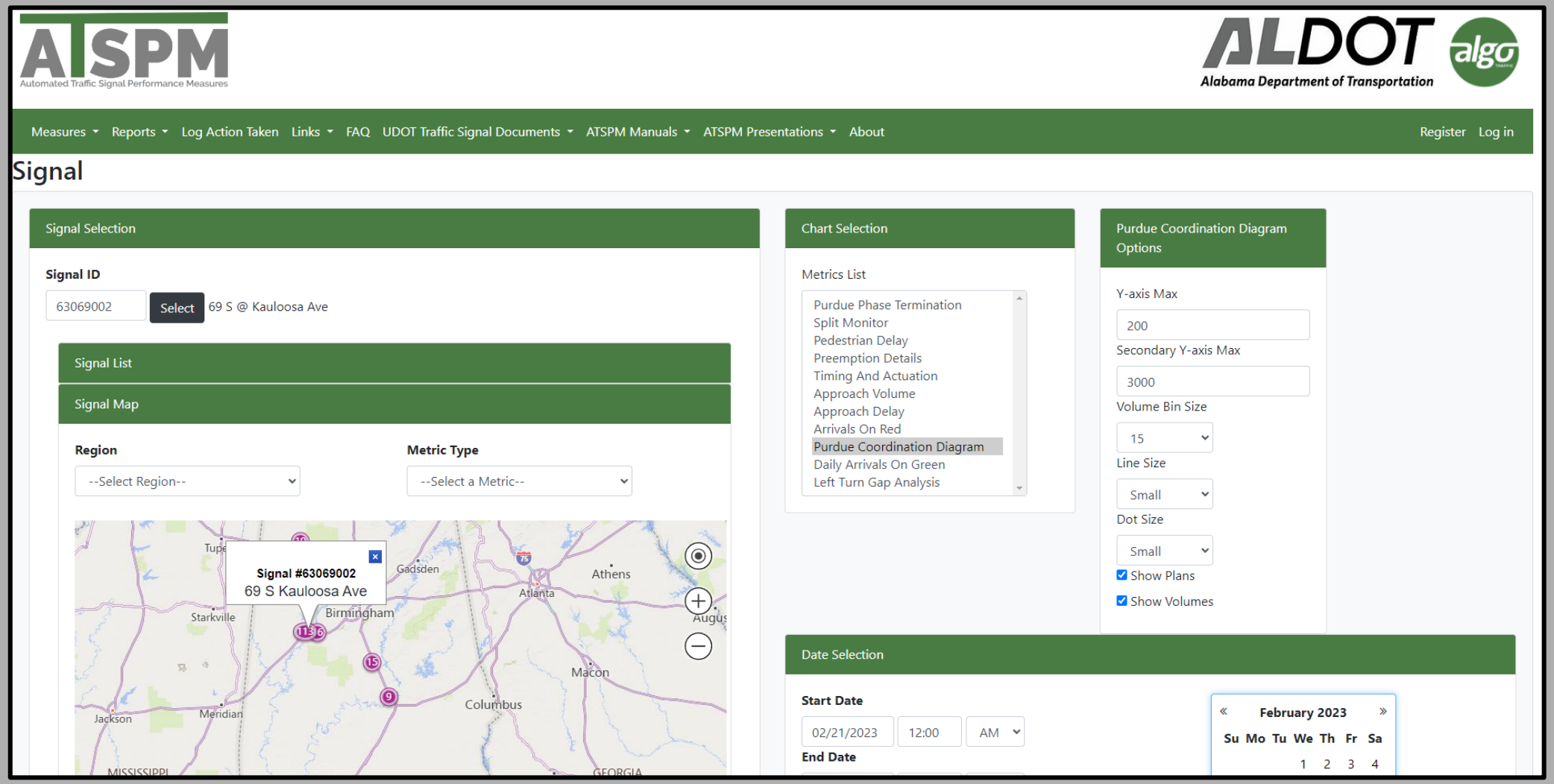


# ATSPM – around Tuscaloosa (2016-2020)

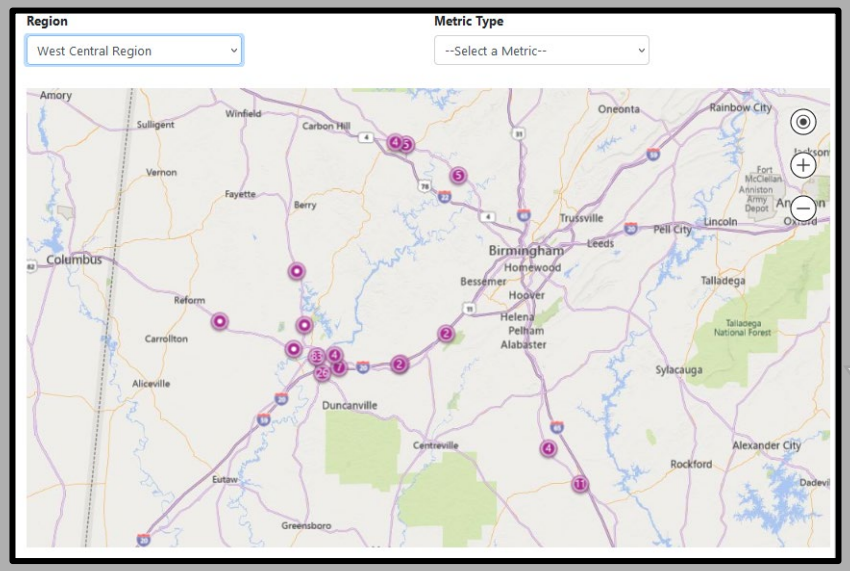


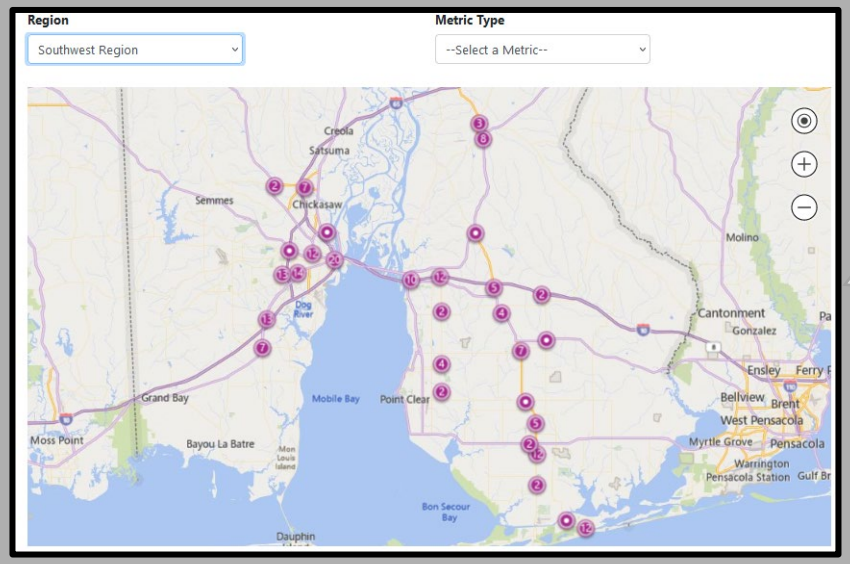
# ATSPM (updated Algo Suite) – 500 signals (2021)

*Expanding Statewide! Working with RTOP and ALDOT*

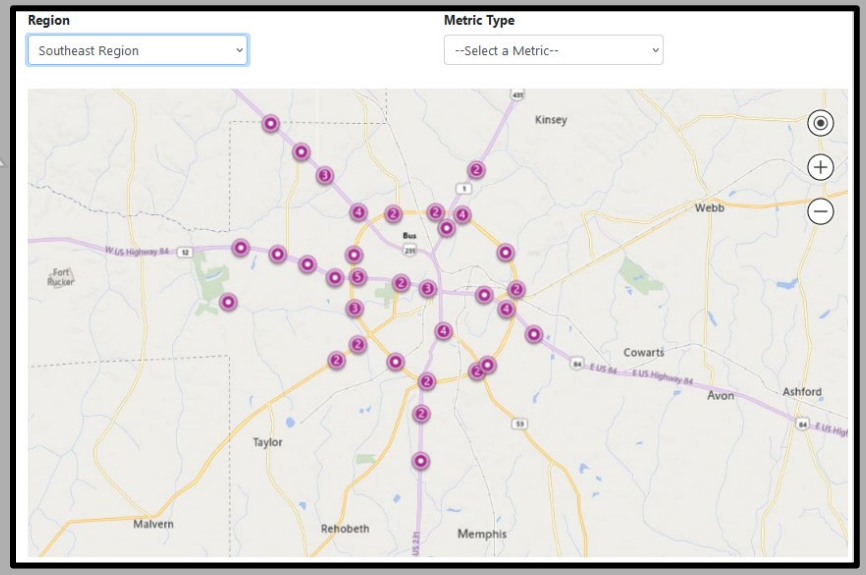


# ATSPM - statewide





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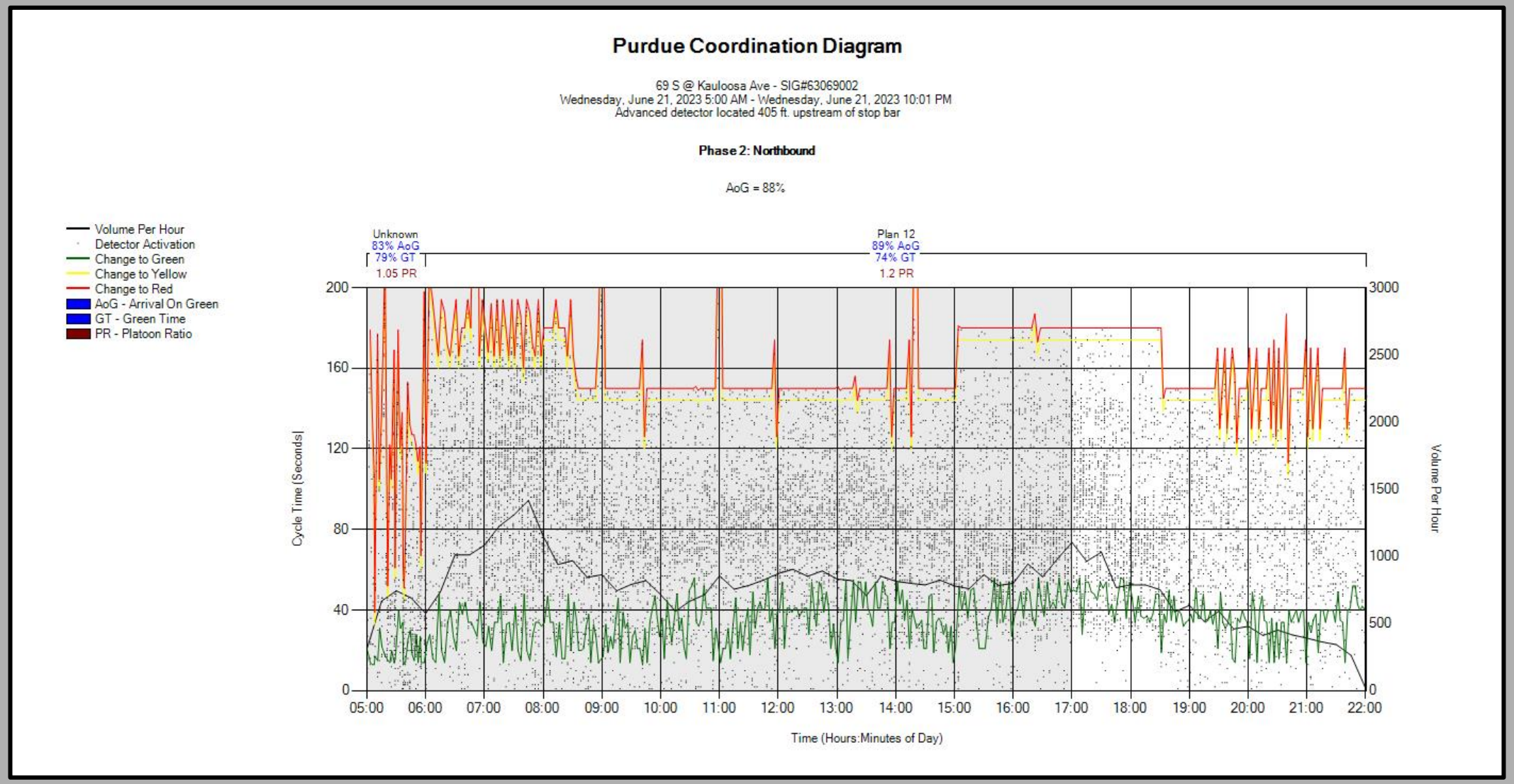
# ATSPM - Performance Metrics



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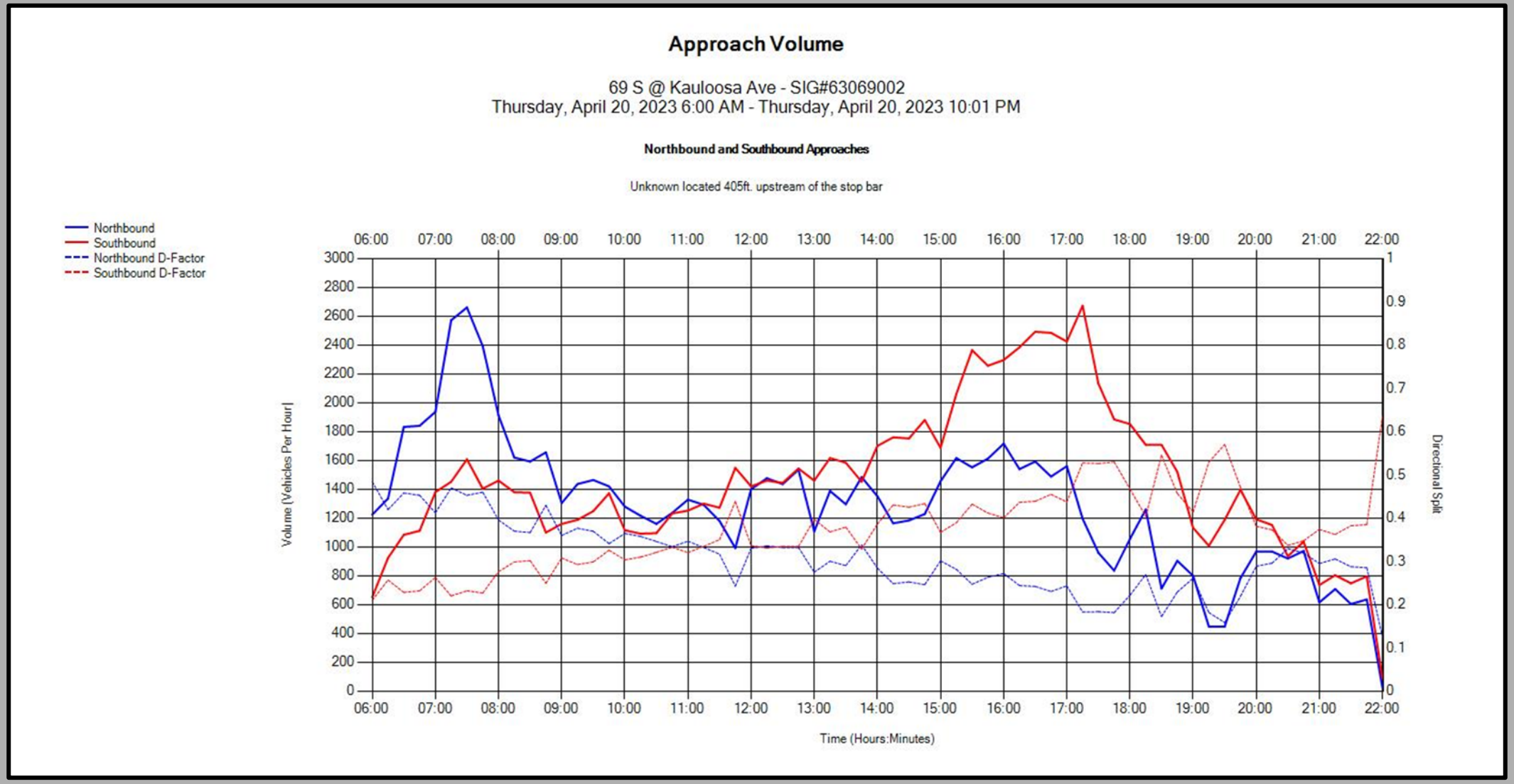

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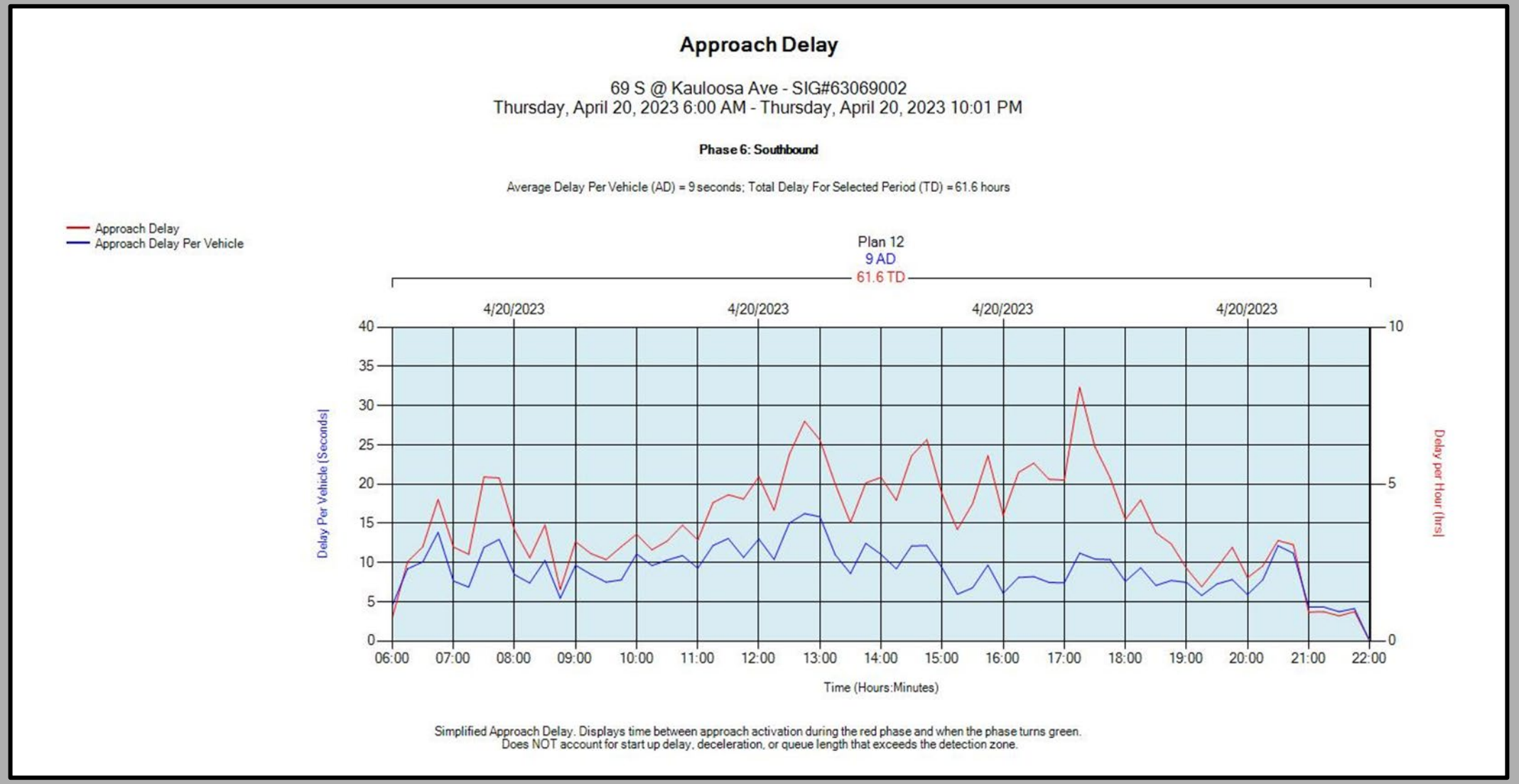
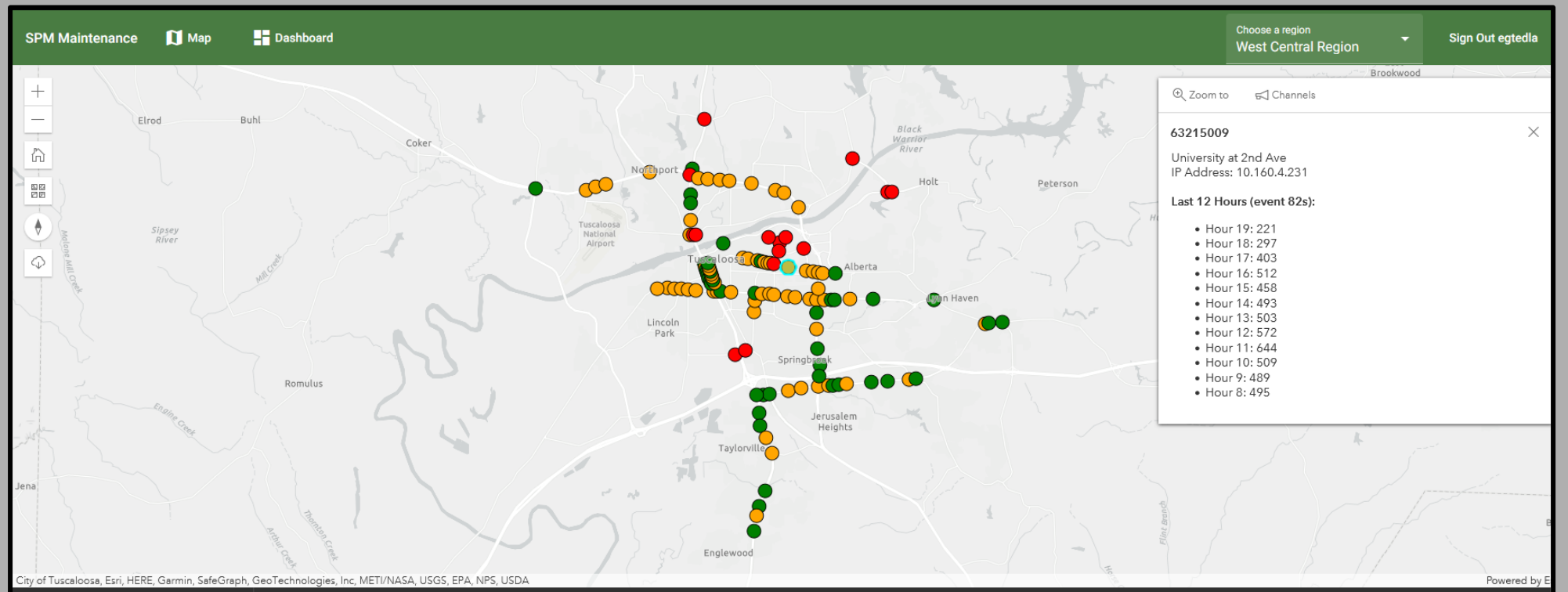
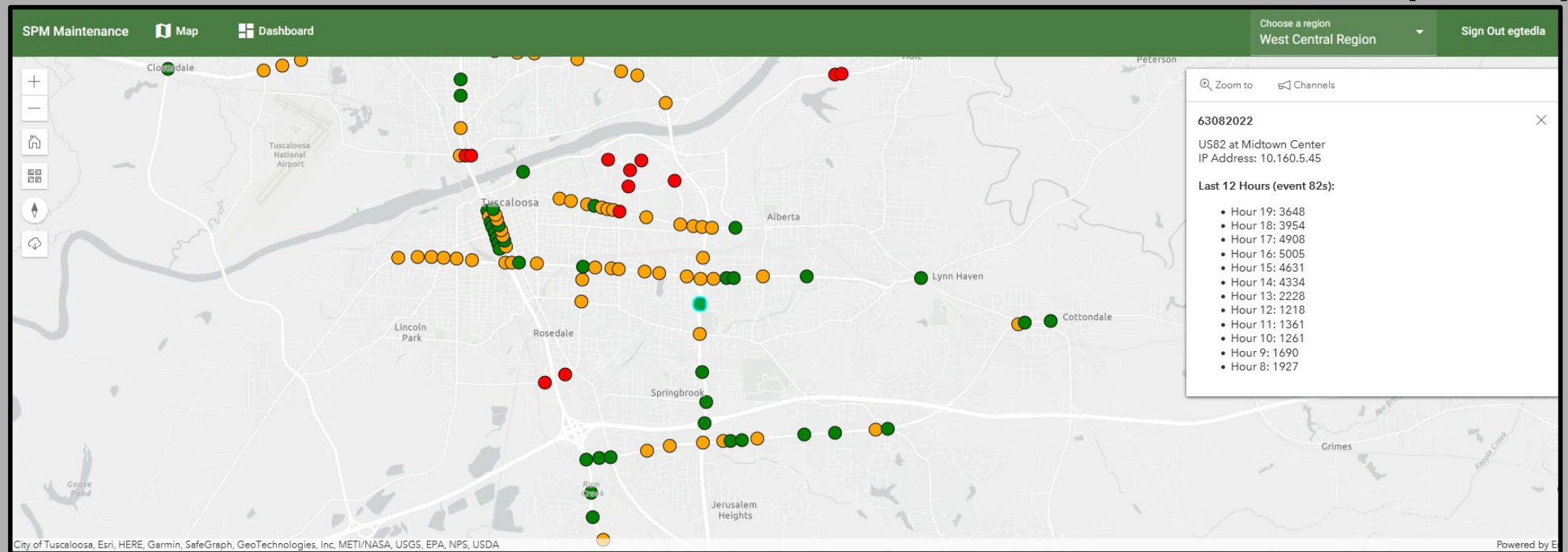


# ATSPM – Detection Maintenance dashboard (2022)




| Hour | CH 1 | CH 2 | CH 3 | CH 4 | CH 5 | CH 6 | CH 7 | CH 8 | CH 9 | CH 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 7/20 19:00 | 3 | 82 | 12 | 35 | 39 | 27 | 6 | 17 | 0 | 0 |
| 7/20 18:00 | 6 | 106 | 11 | 52 | 51 | 36 | 10 | 25 | 0 | 0 |
| 7/20 17:00 | 8 | 111 | 30 | 72 | 58 | 66 | 19 | 39 | 0 | 0 |
| 7/20 16:00 | 12 | 99 | 31 | 89 | 103 | 90 | 31 | 57 | 0 | 0 |
| 7/20 15:00 | 14 | 108 | 29 | 91 | 70 | 94 | 10 | 42 | 0 | 0 |
| 7/20 14:00 | 21 | 132 | 23 | 98 | 86 | 83 | 12 | 38 | 0 | 0 |

# ATSPM – Detection Maintenance dashboard (2022)




| Hour | CH 1 | CH 2 | CH 5 | CH 6 | CH 7 | CH 8 | CH 9 | CH 10 | CH 11 | CH 12 | CH 13 | CH 17 | CH 18 | CH 19 | CH 20 | CH 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7/20 19:00 | 79 | 426 | 39 | 1070 | 31 | 54 | 36 | 76 | 177 | 167 | 181 | 23 | 24 | 394 | 355 | 488 |
| 7/20 18:00 | 25 | 505 | 31 | 1070 | 30 | 51 | 69 | 98 | 190 | 211 | 235 | 31 | 30 | 443 | 393 | 505 |
| 7/20 17:00 | 51 | 615 | 37 | 1295 | 26 | 54 | 50 | 84 | 256 | 235 | 262 | 39 | 37 | 639 | 552 | 642 |
| 7/20 16:00 | 19 | 643 | 42 | 1291 | 36 | 44 | 42 | 86 | 278 | 254 | 268 | 30 | 28 | 646 | 591 | 657 |
| 7/20 15:00 | 23 | 531 | 29 | 1302 | 27 | 43 | 41 | 84 | 211 | 256 | 199 | 36 | 19 | 621 | 537 | 632 |
| 7/20 14:00 | 21 | 430 | 36 | 1260 | 35 | 52 | 37 | 75 | 190 | 205 | 194 | 40 | 25 | 578 | 477 | 627 |

# NextGen Alabama Traffic Monitoring Program (aka. HPMS)

## 2012 – present , ~$1 Million annually

Policy and Governmental Affairs

Office of Highway Policy Information

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### Highway Performance Monitoring System (HPMS)

The HPMS is a national level highway information system that includes data on the extent, condition, performance, use and operating characteristics of the nation's highways. The HPMS contains administrative and extent of system information on all public roads, while information on other characteristics is represented in HPMS as a mix of universe and sample data for arterial and collector functional systems. Limited information on travel and paved miles is included in summary form for the lowest functional systems.

HPMS was developed in 1978 as a continuing database, replacing the special biennial condition studies that had been conducted since 1965. The HPMS has been modified several times since its inception. Changes have been made to reflect changes in the highway systems, legislation, and national priorities, to reflect new technology, and to consolidate or streamline reporting requirements.

HPMS and R

Quick Find Mileage Data (table

HPMS Field Manual

HPMS Software Guide

HPMS Primer (Overview of the HP

ARNOLD Guidance

State HPMS Program Guidance

HPMS Archive Item Descriptions

- 1982-1987 Archive
- 1988-1992 Archive
- 1993-1998 Archive
- Urbanized Area Codes 19

Use of Census Boundaries for HP

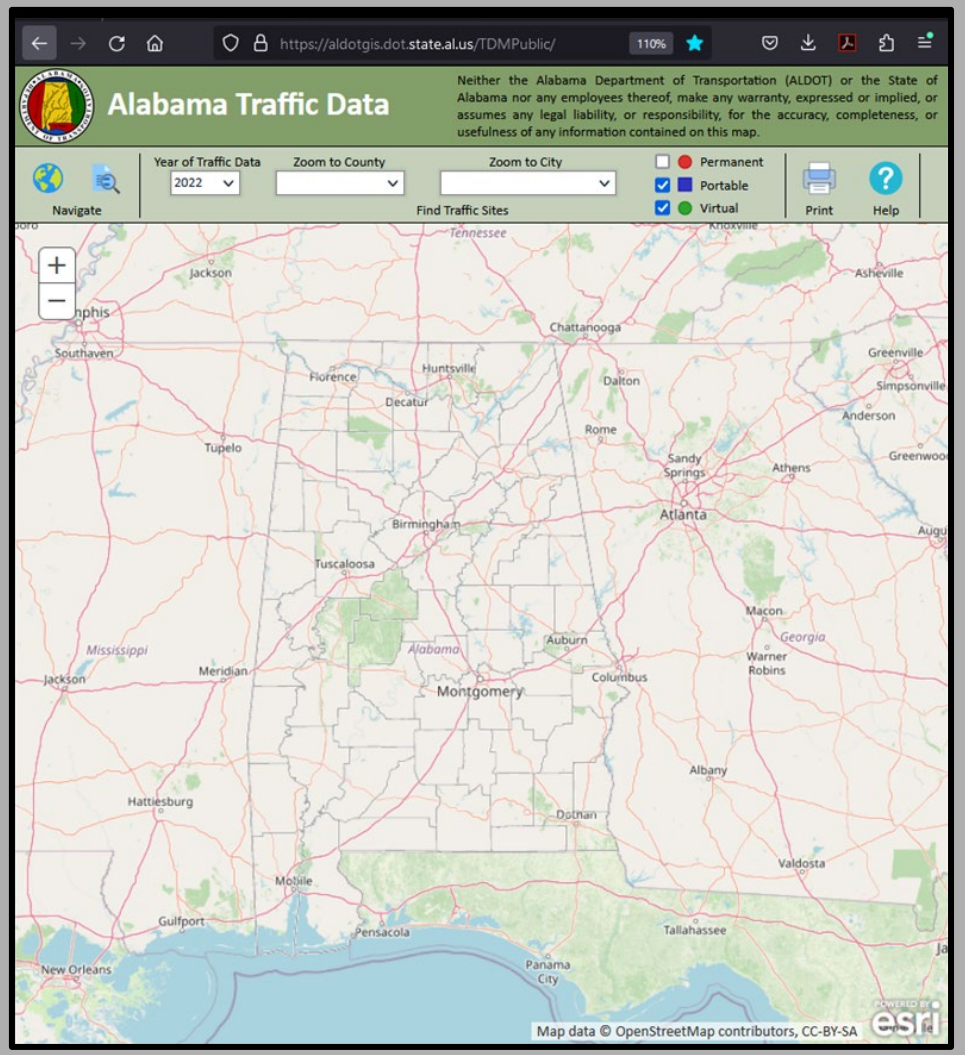
FAQs: Applying 2000 Census Da

Urban Area Boundaries

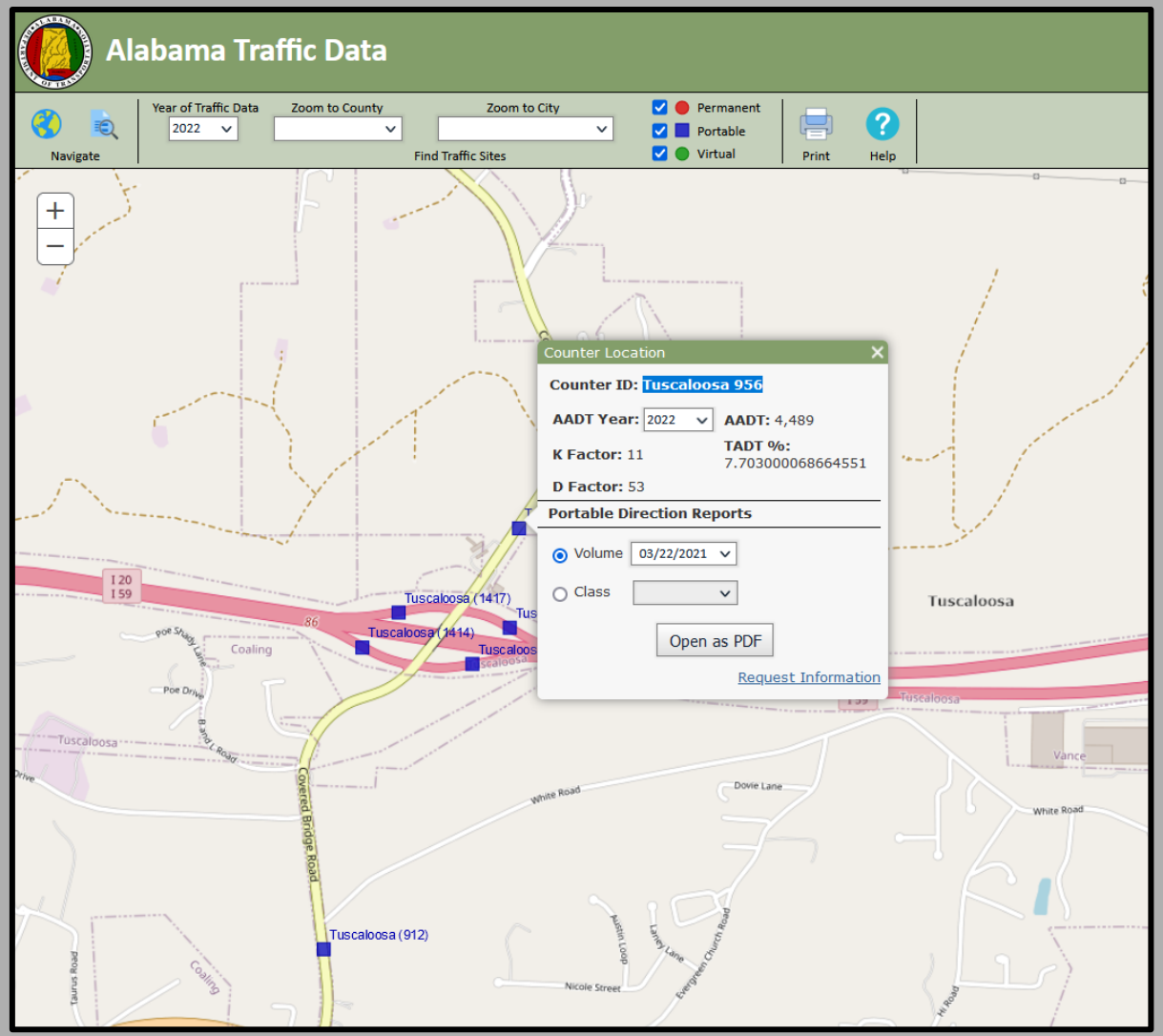
Highway Functional Classificatior

Highway Functional Classificatior

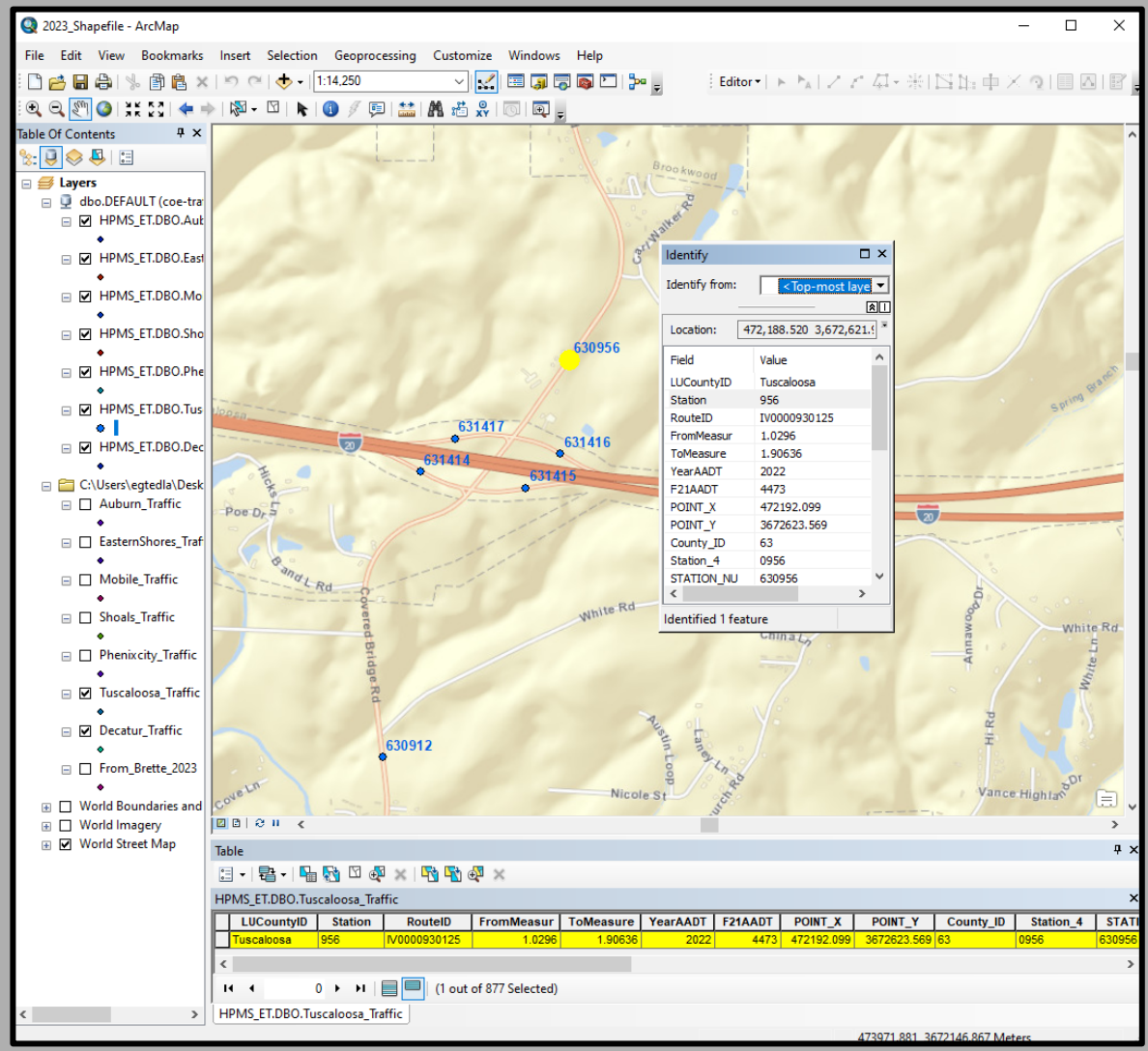
HPMS Travel Data Reporting



## Tuscaloosa 956




## Station 956



# Conclusion:

ATI co-located with TMC has
been a backbone of several research
collaborations and partnerships,
**Outstanding transportation projects!**