



TDOT's Journey to Integrated Corridor Management TSITE Summer Meeting

TDOT's Journey to Integrated Corridor Management

Presentation Outline

- I-24 SC
 - Intro: Purpose and Need, Mission and Vision
 - Our Solution: I-24 Smart Corridor
 - Project Phases 1-3
 - Project Schedule and Status
 - Initial ICM Operation and Maintenance Needs
 - ICM Coordinator Role
 - Local Agency Operations Support
 - ICM Maintenance Expectations
 - Public Outreach for Project
 - Next Steps
- SWCS Upgrades
 - ATMS upgrade and background
 - ATCMTD Grant Project for ICM DSS
 - ICM Decision Support System
 - SWCS Expansion – Next Steps



I-24 SMART Corridor Update



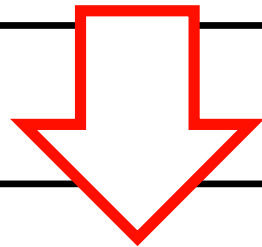
WWW.TN.GOV/TDOT/PROJECTS/REGION-3/I-24-SMART-CORRIDOR

<https://www.youtube.com/watch?v=c5HOIYXyszs>

I-24 Smart Corridor Mission & Goals

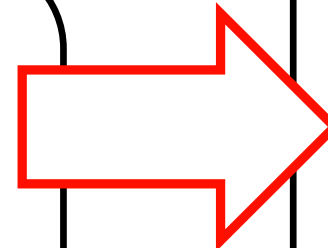
TDOT Mission:

*To provide a **safe and reliable transportation system** that supports economic growth and quality of life.*



I-24 Smart Corridor Mission:

*To improve the **safety and reliability of all travel** along the corridor through the proactive management of intelligent and connected infrastructure, and the formation of strong operational partnerships between local and state agency stakeholders.*



I-24 Smart Corridor Goals:

Goal 1: Increase Travel Time Reliability

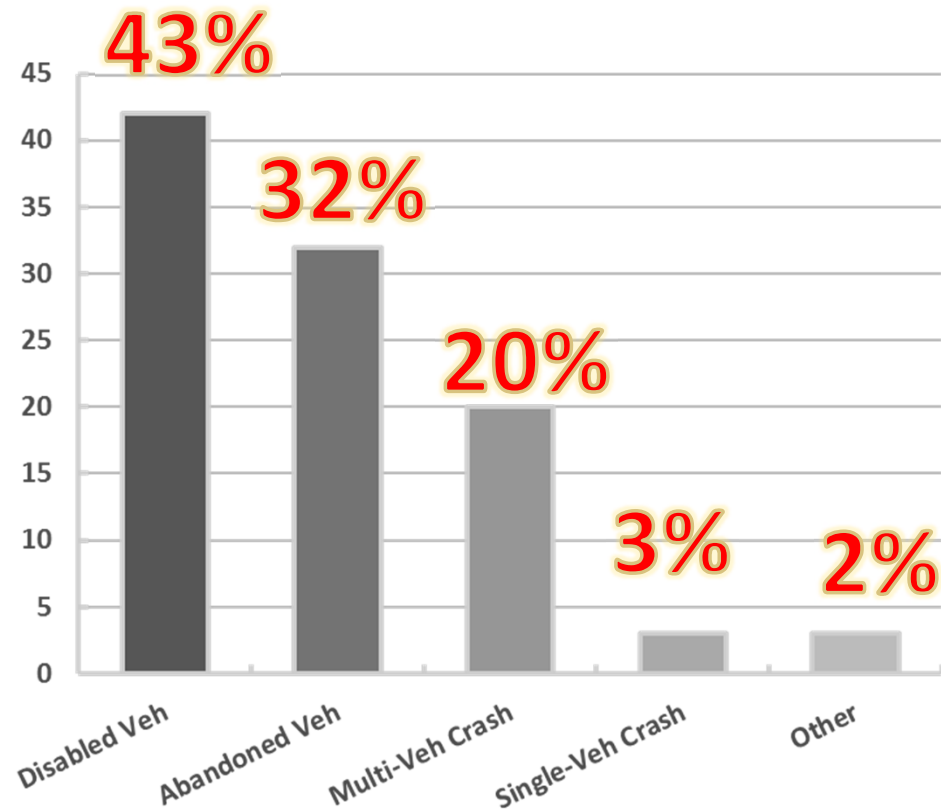
Goal 2: Increase Mobility of all Modes

Goal 3: Reduce the Concentration of Crashes

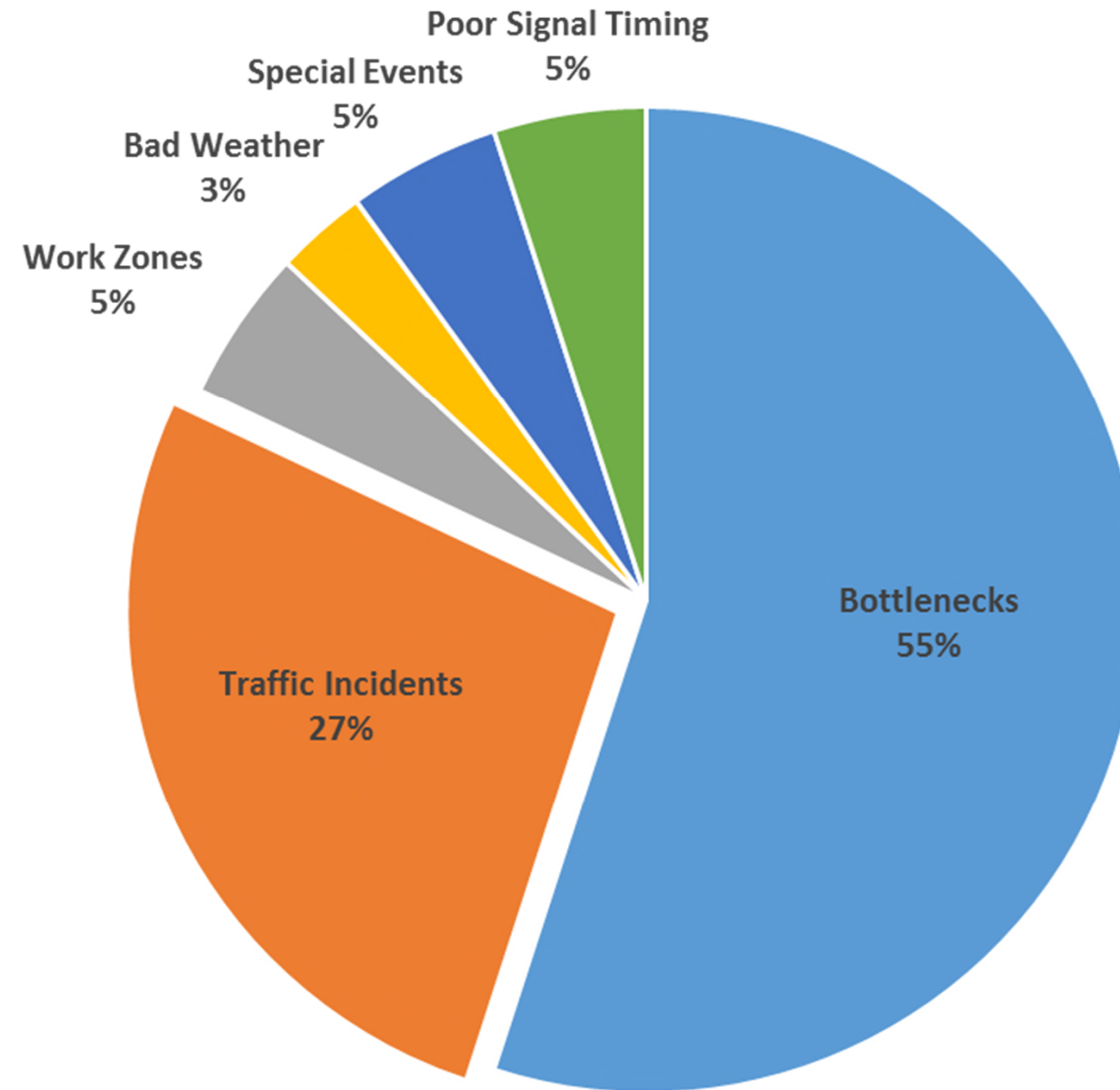
Goal 4: Develop Agency Coordination

I-24 Congestion Contributors

Traffic Incidents 27%

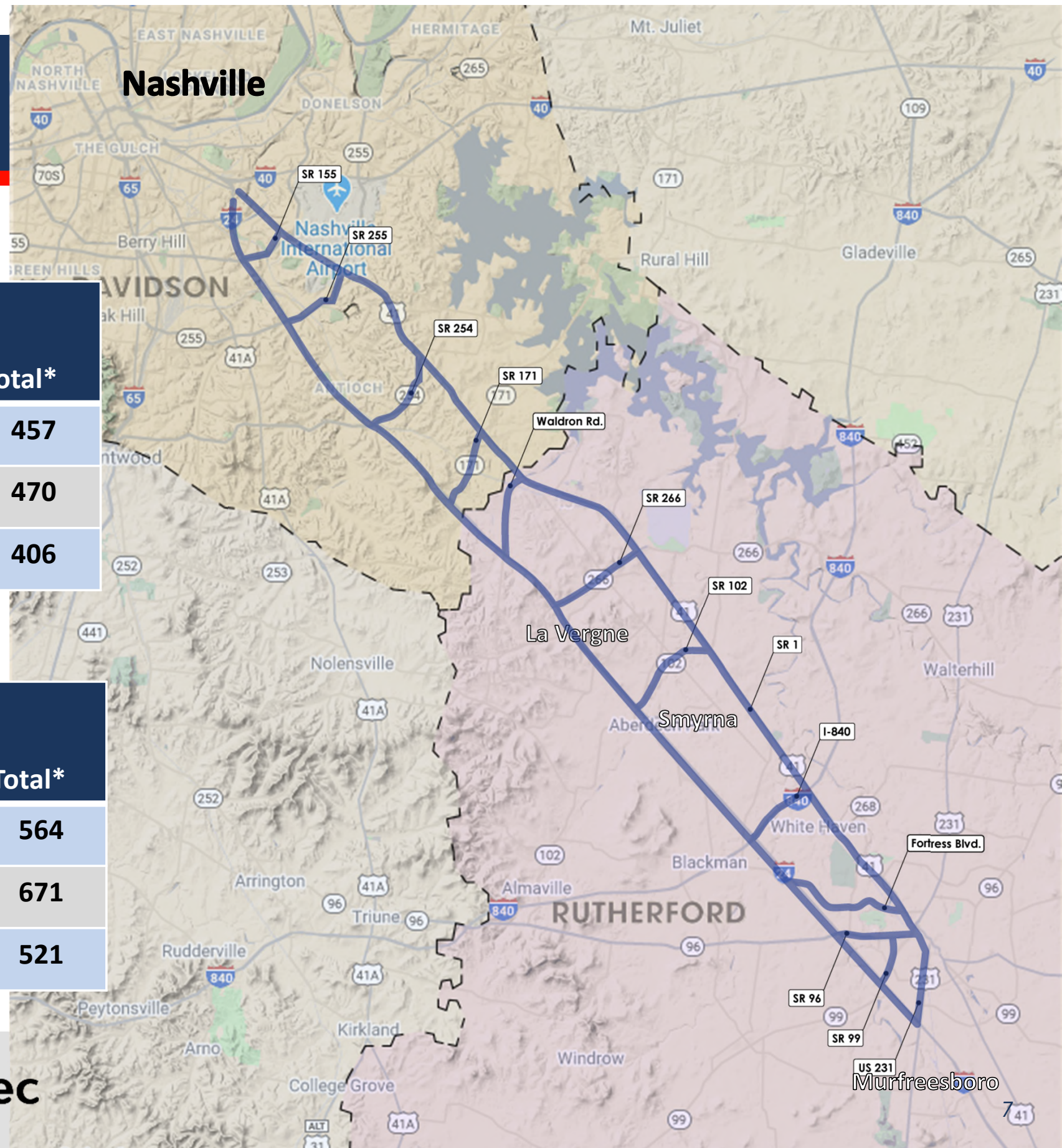


Incidents Breakdown 2015
(Total Crashes:1,661)



Contributors to Congestion

I-24 Smart Corridor Purpose and Need



Safety

I-24	Fatal Crashes	Major Injury Crashes	Minor Injury Crashes	Prop Damage Crashes	Total	Total*
2018	5	26	184	567	776	457
2019	3	10	200	663	876	470
2020*	1	17	82	306		406

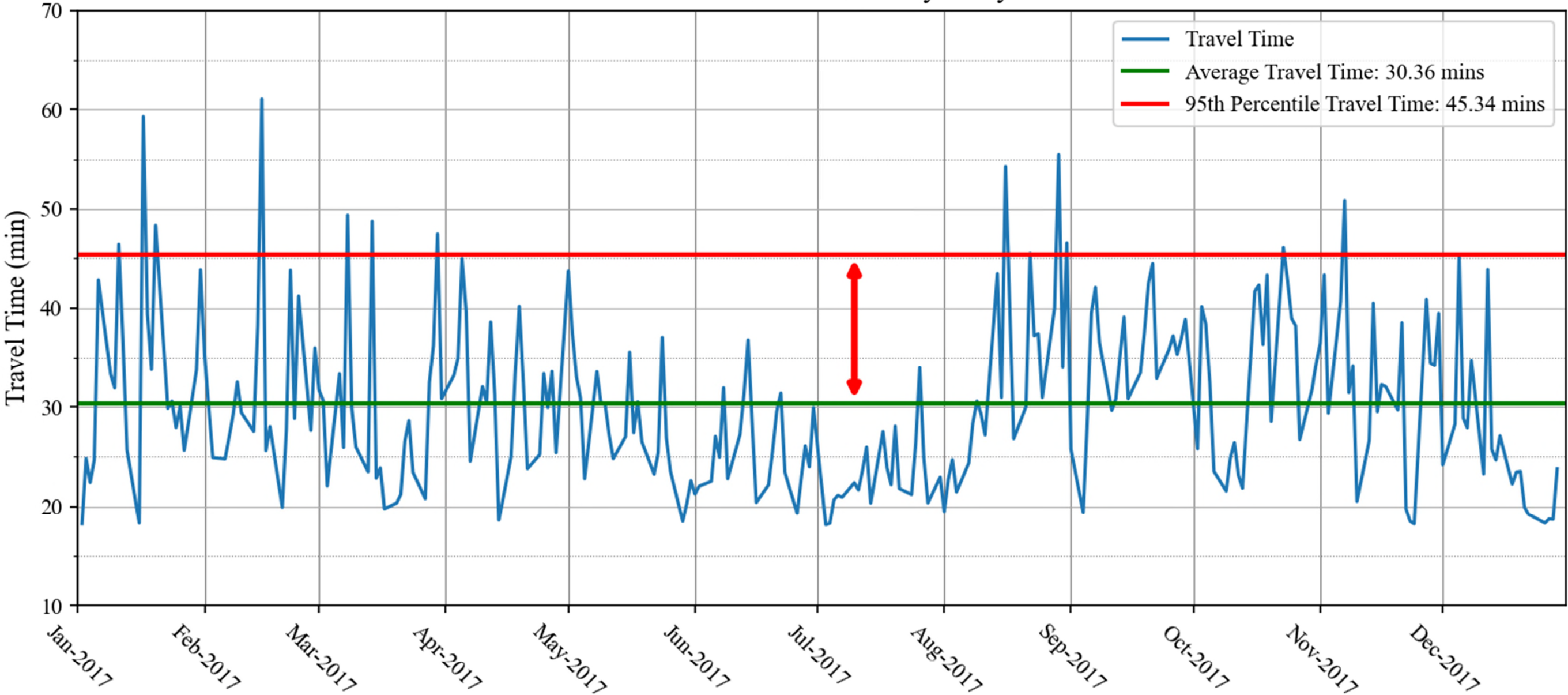
*Data as of mid-August 2020

SR-1	Fatal Crashes	Major Injury Crashes	Minor Injury Crashes	Prop Damage Crashes	Total	Total*
2018	2	14	223	764	1003	564
2019	4	23	261	802	1090	671
2020*	3	10	126	372		521

*Data as of mid-August 2020

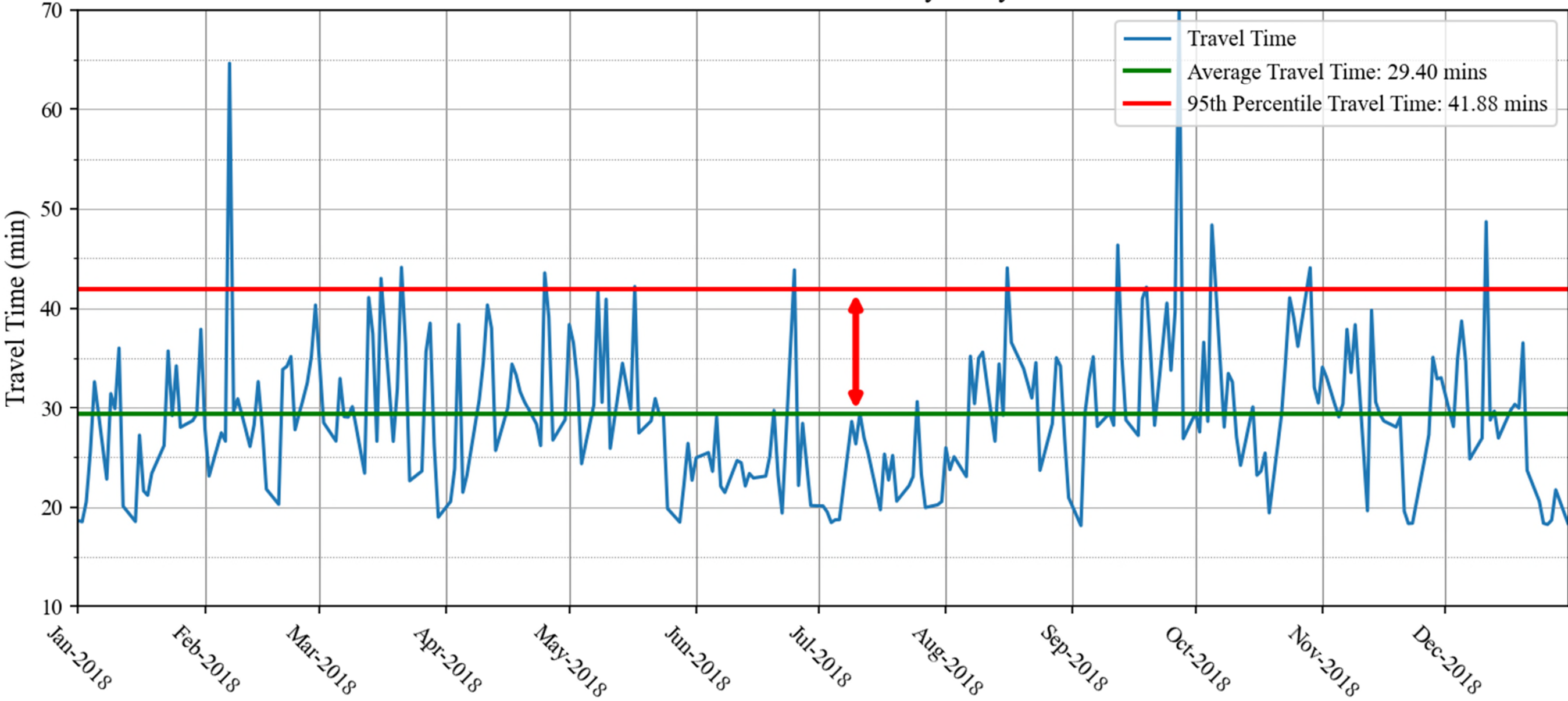
Historical Travel Time Data - 2017

Weekday AM Peak Period Travel Time
I-24 From I-840 to Briley Pkwy



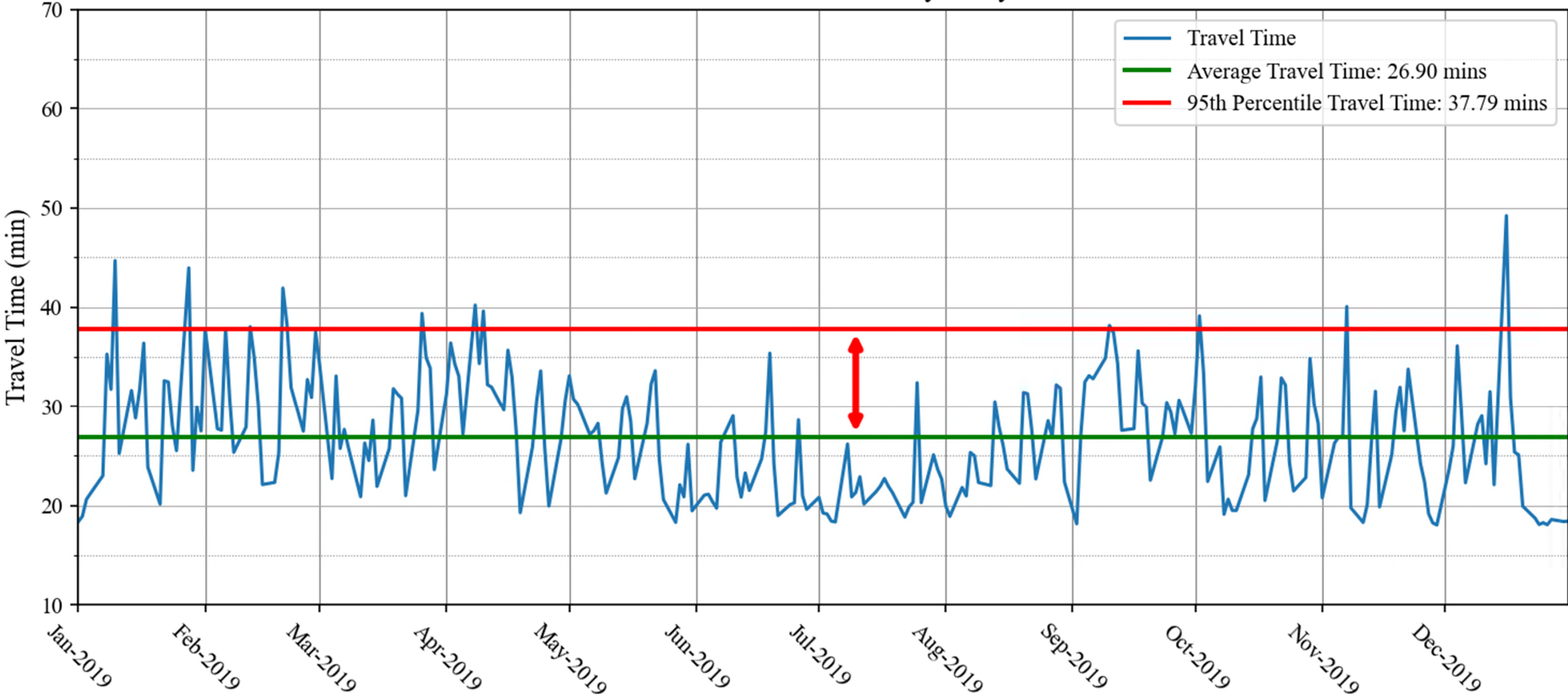
Historical Travel Time Data - 2018

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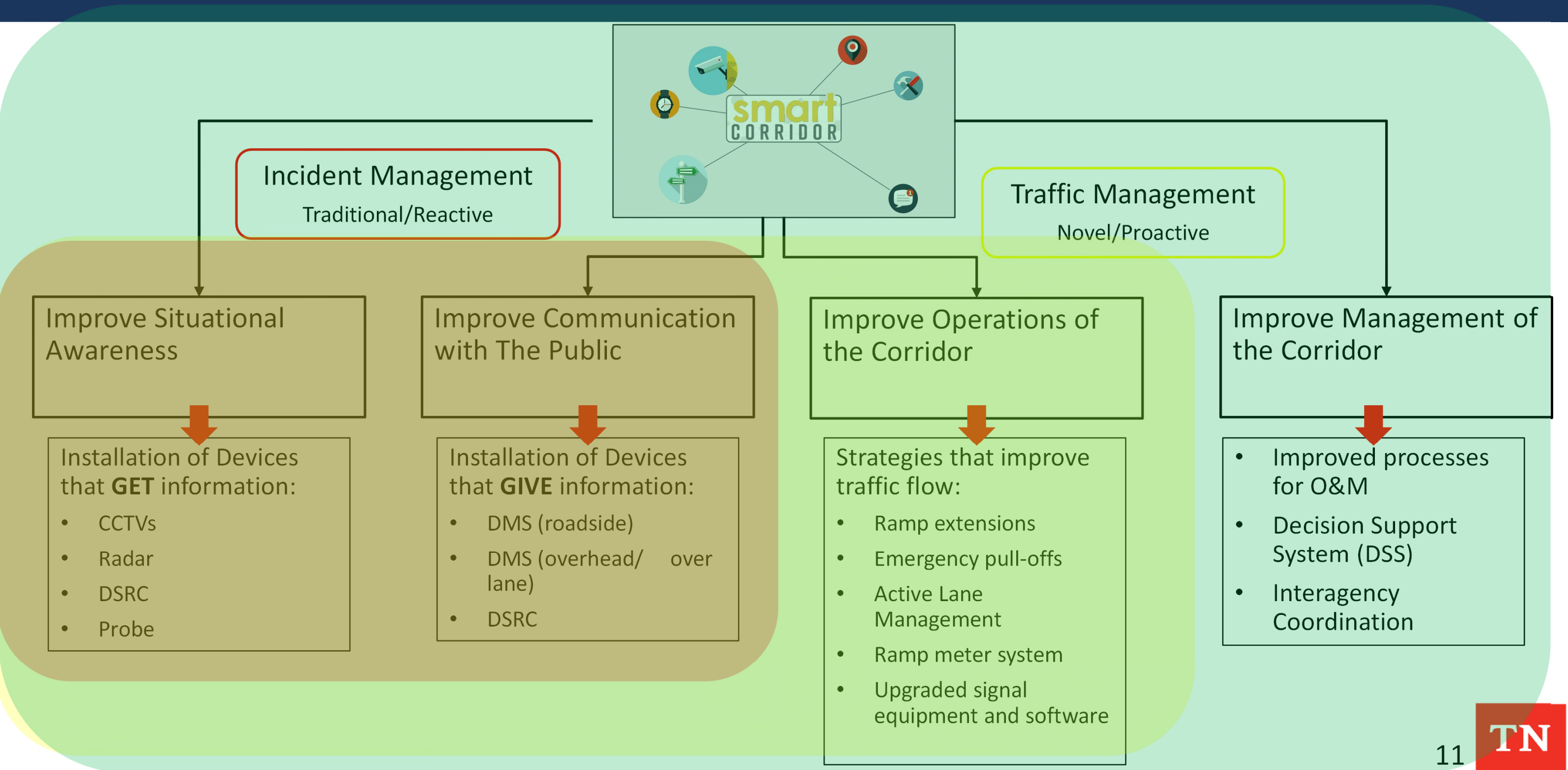
Historical Travel Time Data - 2019

Weekday AM Peak Period Travel Time
I-24 From I-840 to Briley Pkwy

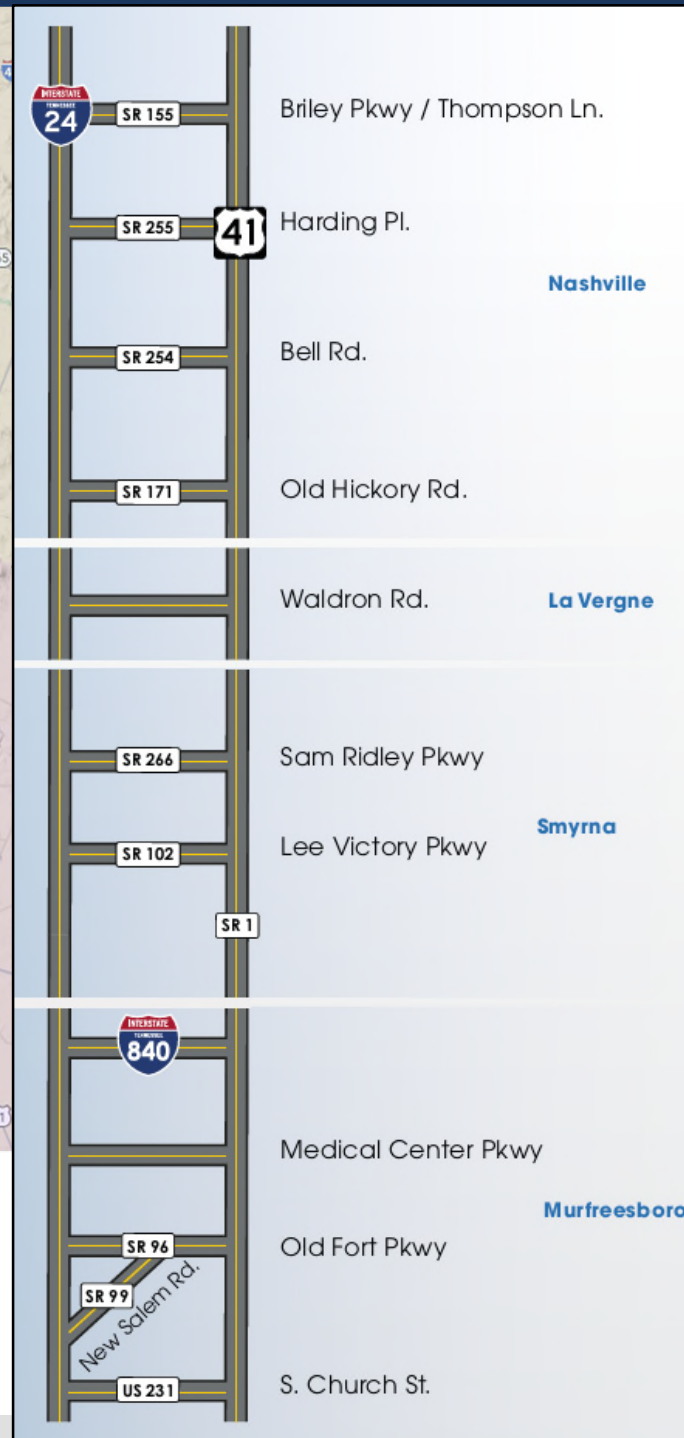
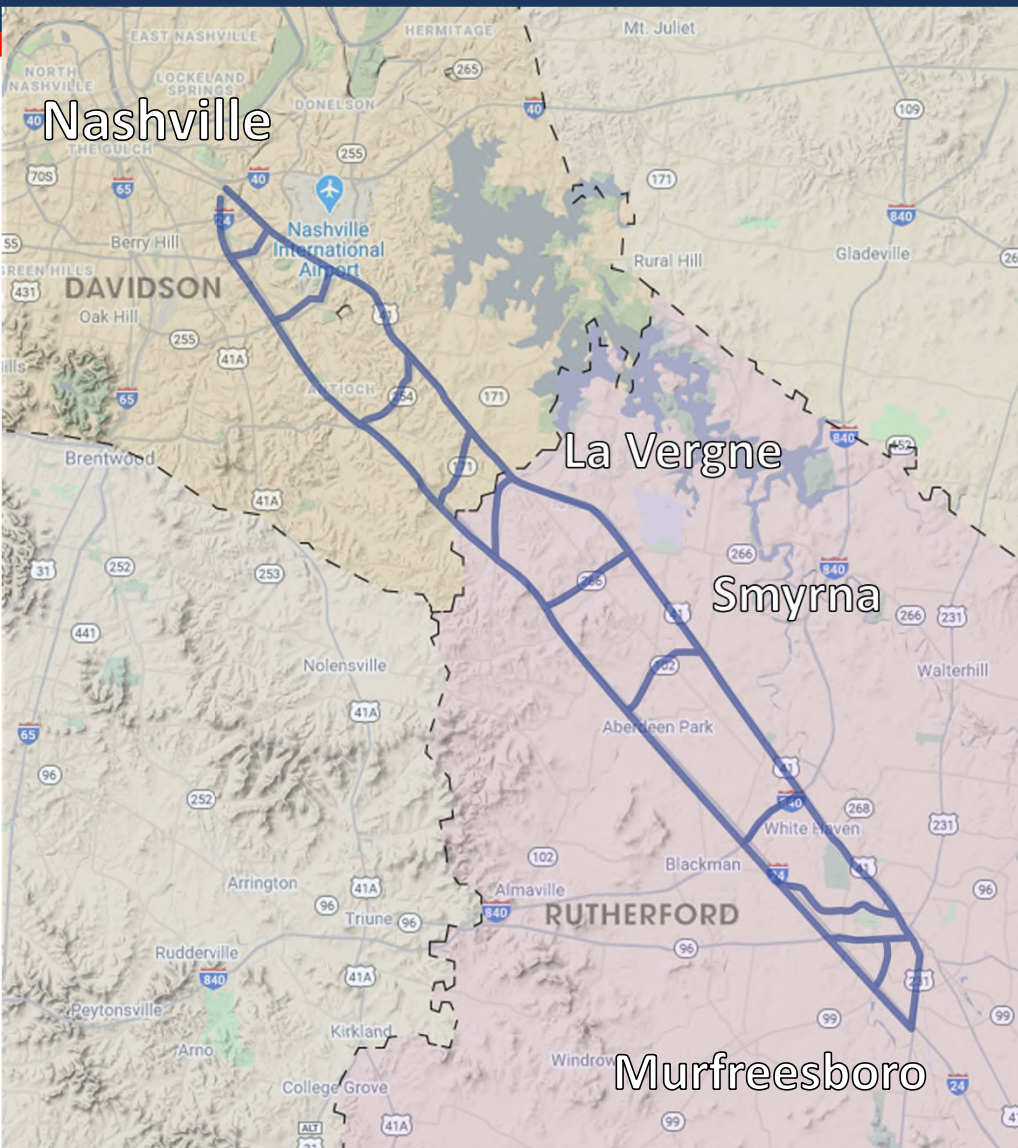


Our Solution: I-24 Smart Corridor

Integrated Corridor Management (ICM)



I-24 Smart Corridor - Phases 1 & 2



Length: 94.10 Total Miles (29.5 Miles along I-24)

Termini:

- I-24 from I-440 to SR-231
- SR-1 from I-24 to SR-231
- Various connector routes

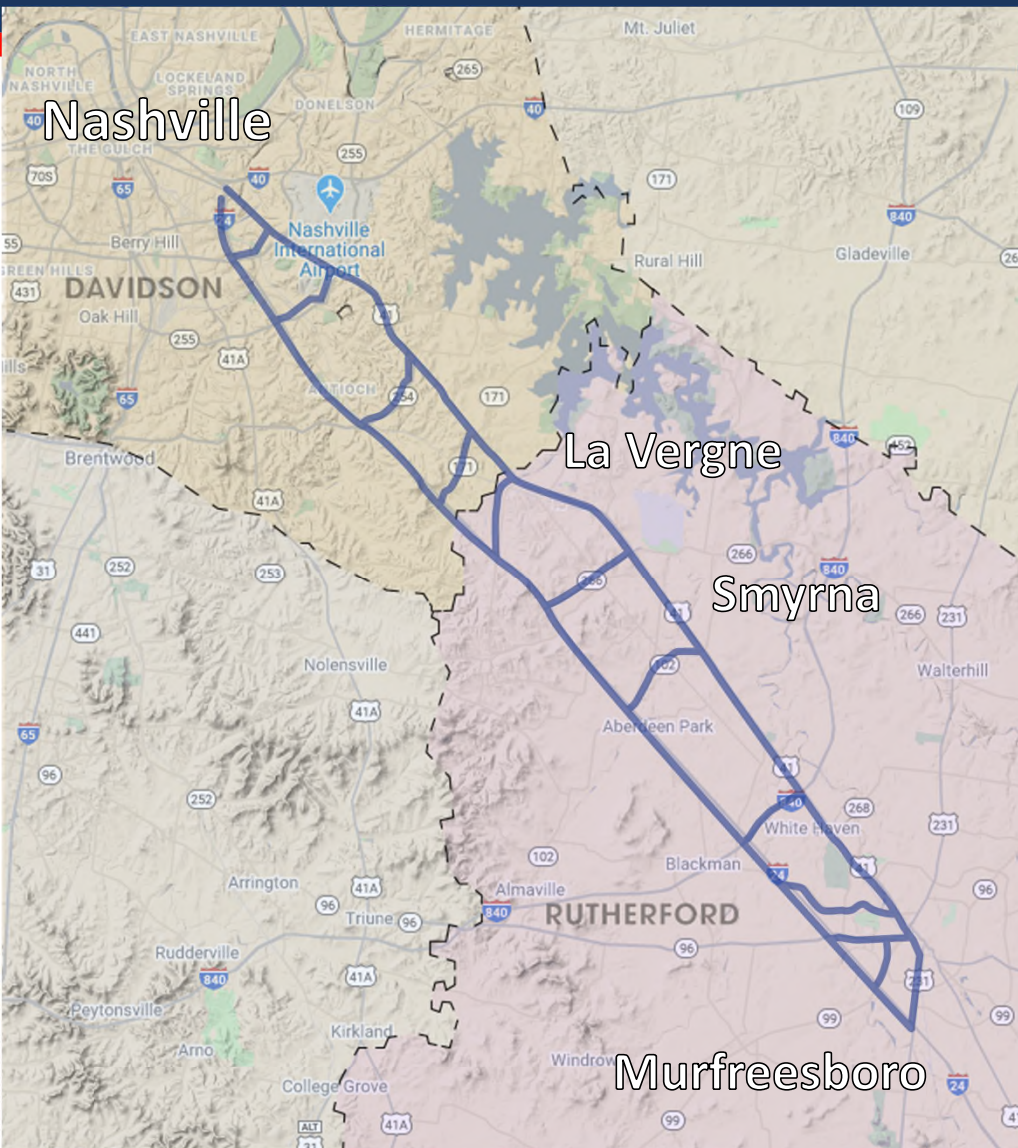
Phase 1

- **Scope of Work:**
- ITS and signal improvements on all project roadways
- Connected Vehicle Infrastructure
- Interchange ramp improvements along I-24
- Emergency pull-offs along I-24
- **Let to Contract:** October 2018
- **Contractor:** Stansell Electric
- **Award Price:** \$18.7 Million
- **Estimated Completion:** December 2021

Phase 2

- **Scope of Work:**
- Install 67 overhead dynamic message signs on I-24 between I-440 and SR-102
- Traffic Signal upgrades: radar and video detection
- Implement Active Traffic Management (Arterial & Freeway)
- **Let to Contract:** October 2019
- **Contractor:** Stansell Electric
- **Award Price:** \$45.8 Million
- **Estimated Completion:** December 2022

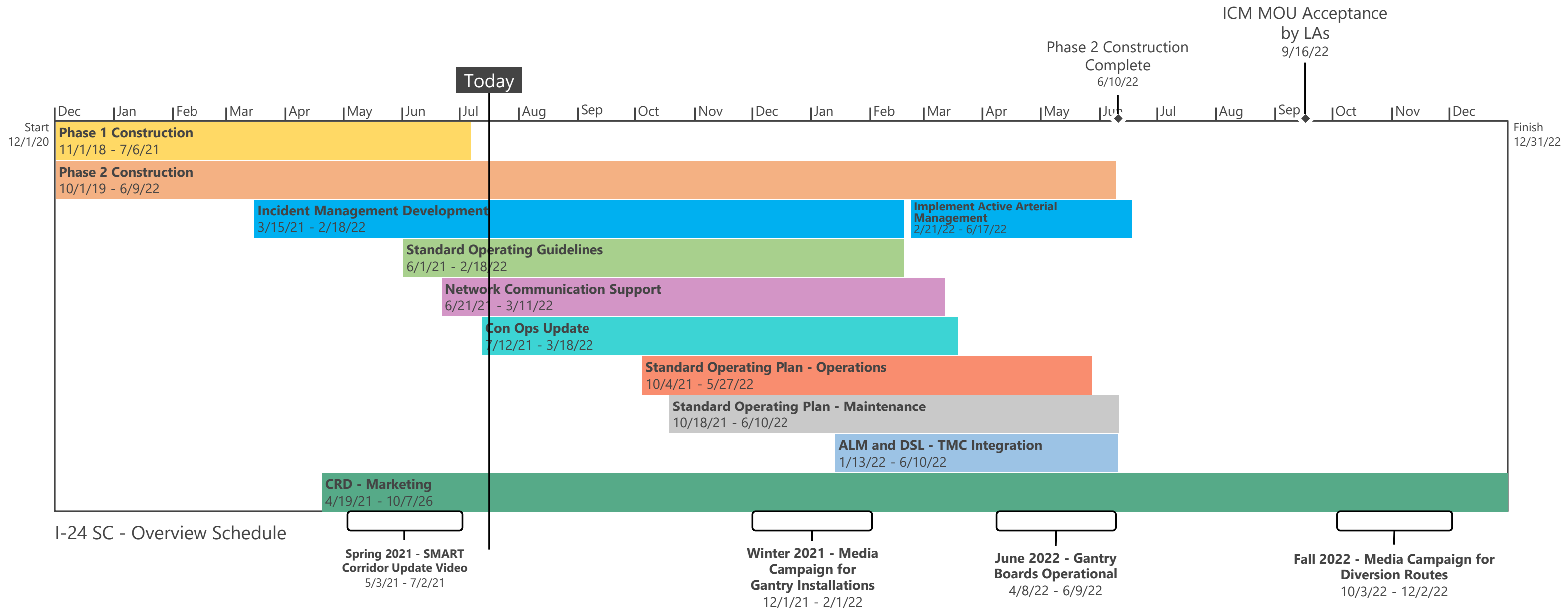
I-24 Smart Corridor - Phase 3



- **Phase 3**
- **Length: 94.10 Miles**
- **Termini:**
 - I-24 from I-440 to SR-231
 - SR-1 from I-24 to SR-231
 - Various connector routes
- **Scope of Work:**
 - Ramp Meters
 - Arterial Fiber Optic expansion
 - Arterial DMS Trailblazers
 - Arterial CCTV Cameras
 - Intersection Operations Improvements (ADA, Pedestrian Signals, etc)
- **Estimated Construction Cost: \$45M**
- **Earliest Letting: CY 2022**

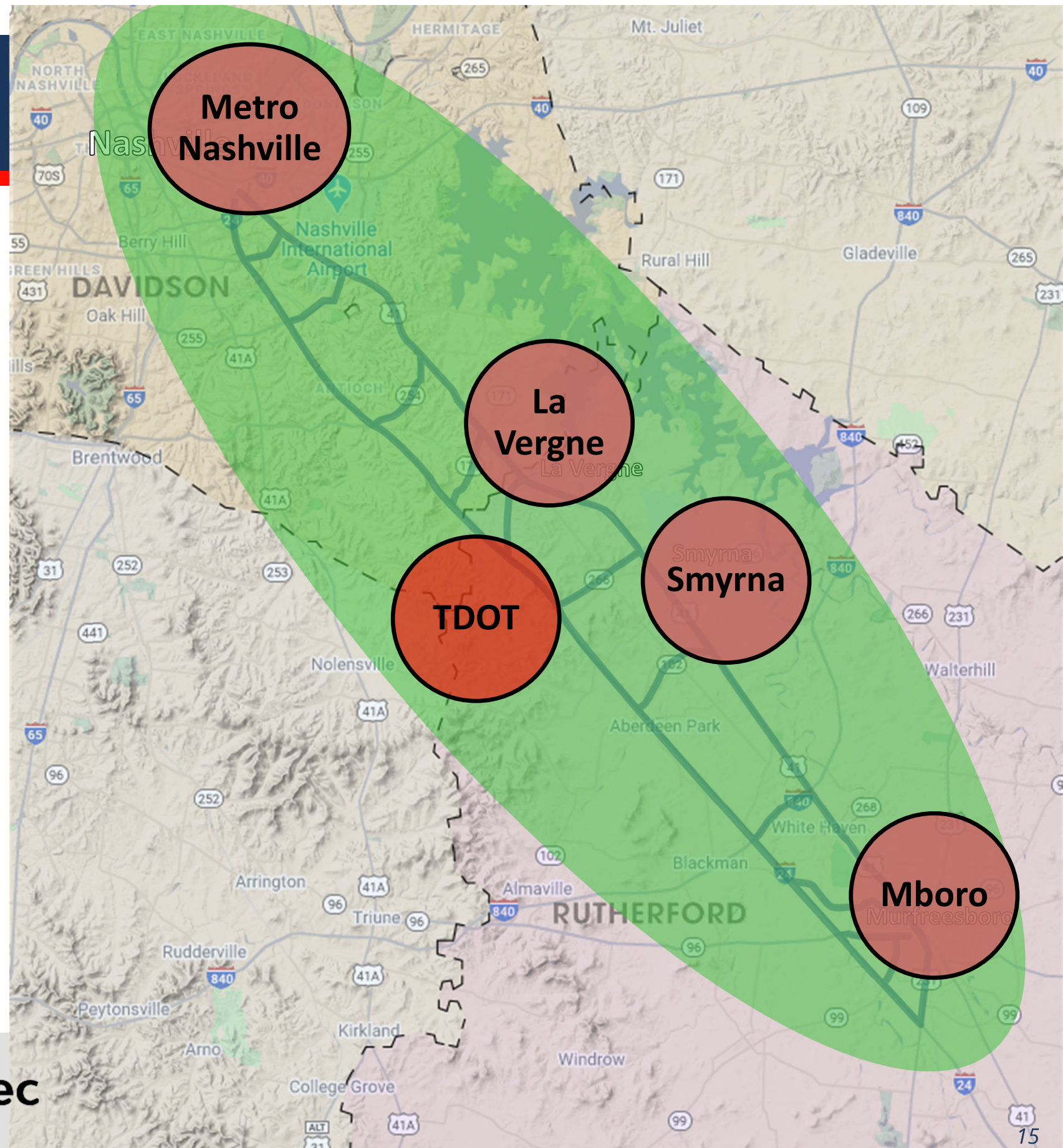


I-24 Smart Corridor – Operations & Maintenance Program Schedule



Initial ICM O&M Needs

- Local Agency Operations Support
 - Assists and trains Local Agencies on active arterial operation.
 - Assists local agencies in planning and execution of ICM strategies.
 - Assists and trains staff in maintenance of ICM components within their jurisdictions.
 - Provide supplemental TOC support.



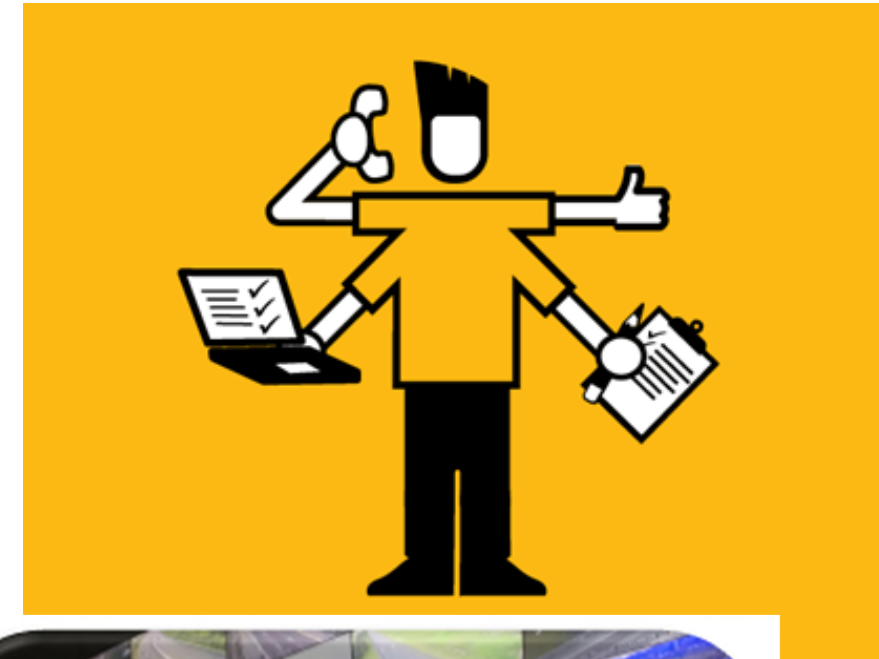
I-24 Smart Corridor – O&M Support and training for Local Agencies

- Provide Agency Specific training:
 - BlueTOAD units / BlueARGUS Dashboard
 - DSRC / CAV Training
 - Traffic Responsive Operation
 - Miovision Cameras (Intersection Stopbar Detection)
 - Wavetronix (Advanced Detection)
 - Centracs (Signal Controller central management software)
 - RITIS Training



I-24 Smart Corridor - Initial ICM Operation and Maintenance Needs

- ICM Coordinator Roles
 - Defines and coordinate training needs
 - Support the TMC on active freeway and arterial management strategies
 - Support DSS Development based on lessons learned and TDOT SOPs
 - Define rules for implementation of diversion scenario plans
 - Coordinates with Local Agencies on the implementation of an incident management signal timing plans.
 - Corridor Specific TIM Coordination



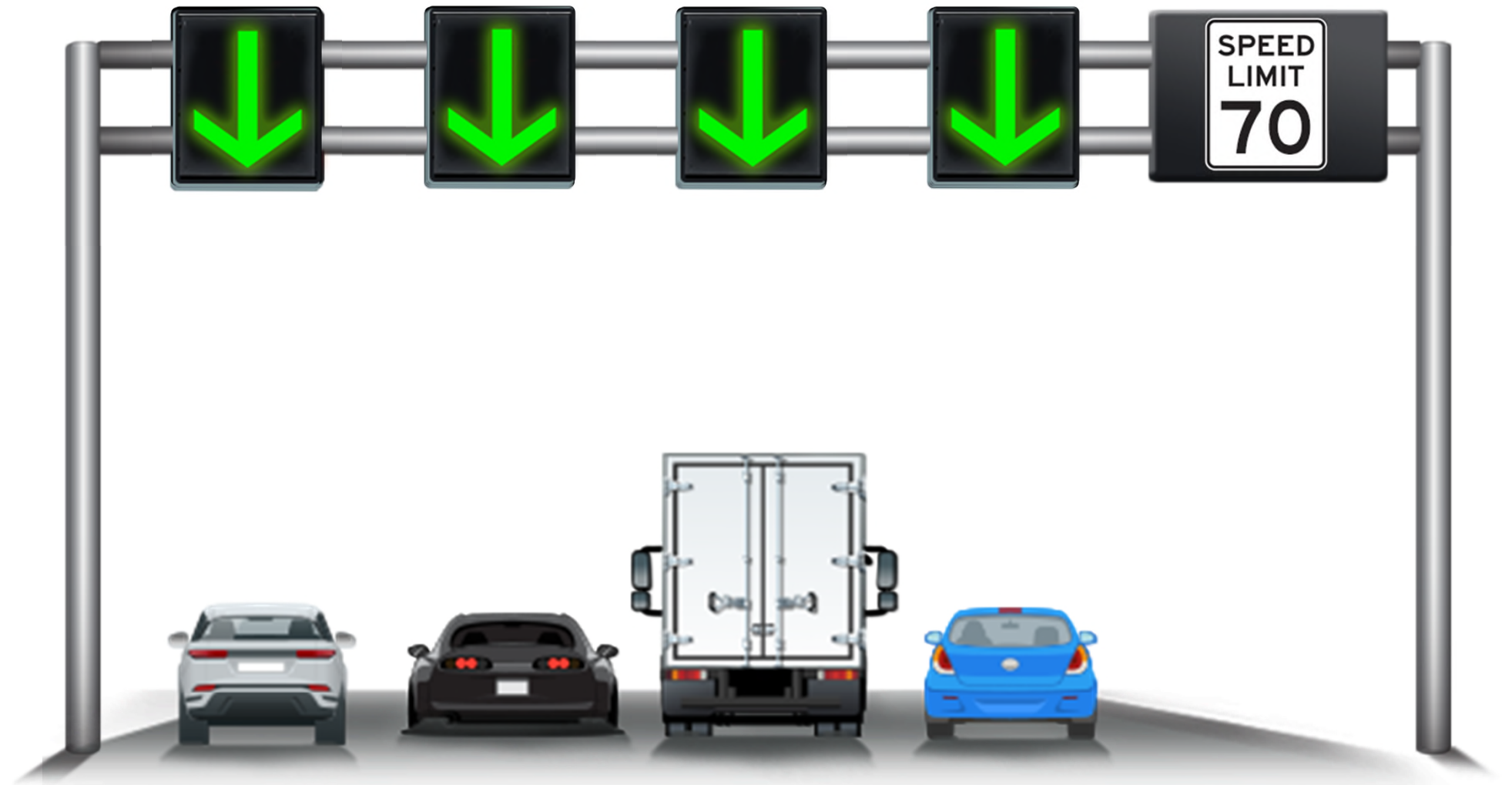
I-24 Smart Corridor - Initial ICM Operation and Maintenance Needs

- ICM Maintenance Expectations
 - Set maintenance goals and expectations for the local agencies
 - Identify critical field assets
 - Define KPIs such as percent uptime
 - Establish expected repair times
 - Establish maintenance budgets
 - TDOT's role if local agency cannot repair critical asset within accepted duration
 - Paradigm Shift for Traffic Signal O&M in TN
 - TSM&M



I-24 Smart Corridor - Public Outreach for Project

- Providing relevant and timely information to the public is critical to this project's success
 - Media campaigns in advance of project milestones
 - Update of the project website as well as Social Media Outlets.



Challenges for Initial ICM Deployment in Tennessee

- Multiple TSMO / ICM Strategies deployed for the first time in Tennessee
 - AAM, LCS, VSL, Ramp Metering
 - Local Agency Coordination, Collaboration, Communication
 - Motorist Education
- TDOT's Role
 - I-24 ICM policies
 - Active Arterial Management during peak hours
 - Preventive / Routine Maintenance
 - Timely Detector, Communication, and Surveillance Repair
- Local Agency Role
 - Funding (Staffing + Capital improvements)
 - Training
 - Operational Priorities
- Maintenance requirements
- Measures of Effectiveness (MOE)
- Inter-agency MOUs
 - Communication protocols
 - Control of equipment
- Dedicated funding for:
 - Staffing
 - Infrastructure maintenance and improvements



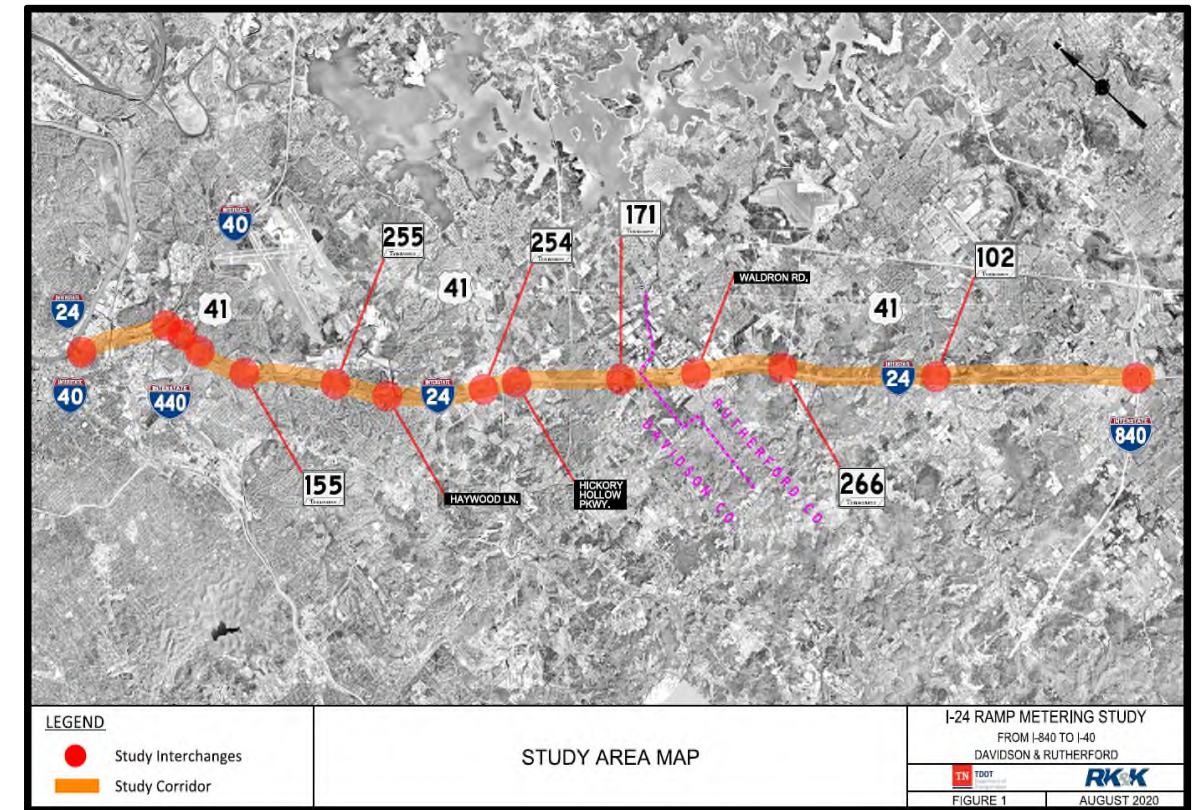
I-24 Smart Corridor - Next Steps

- LCS and VSL Operations
 - Develop Scenarios, Algorithms, SOGs
- Continue Interagency Coordination
 - Monthly TAC meeting with the Local Agencies and First Responders
 - Ongoing individual meetings to work on specific ICM strategies

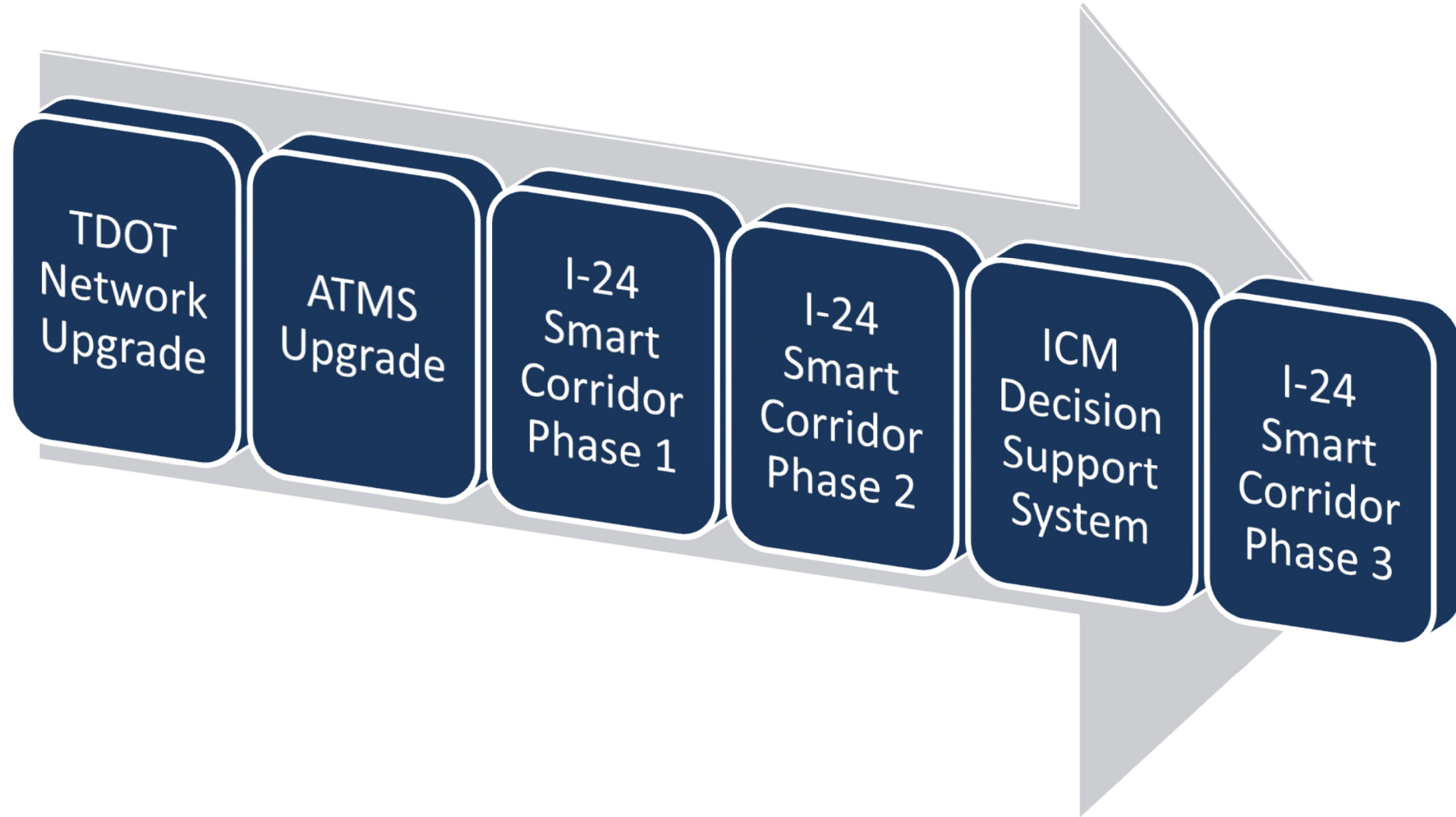


- I-24 Smart Corridor Phase 3 Design
 - Ramp meter design study by RK&K is complete
 - Con Ops Update to align with Phase 3 Design
 - Preliminary Plans Development is underway

- Gather ICM operations best practices
 - Peer Exchanges with FHWA: WSDOT (Seattle) and FDOT (Orlando)
 - Peer Agency Reviews with Arcadis: TxDOT (Dallas), and Caltrans (San Diego) with Arcadis

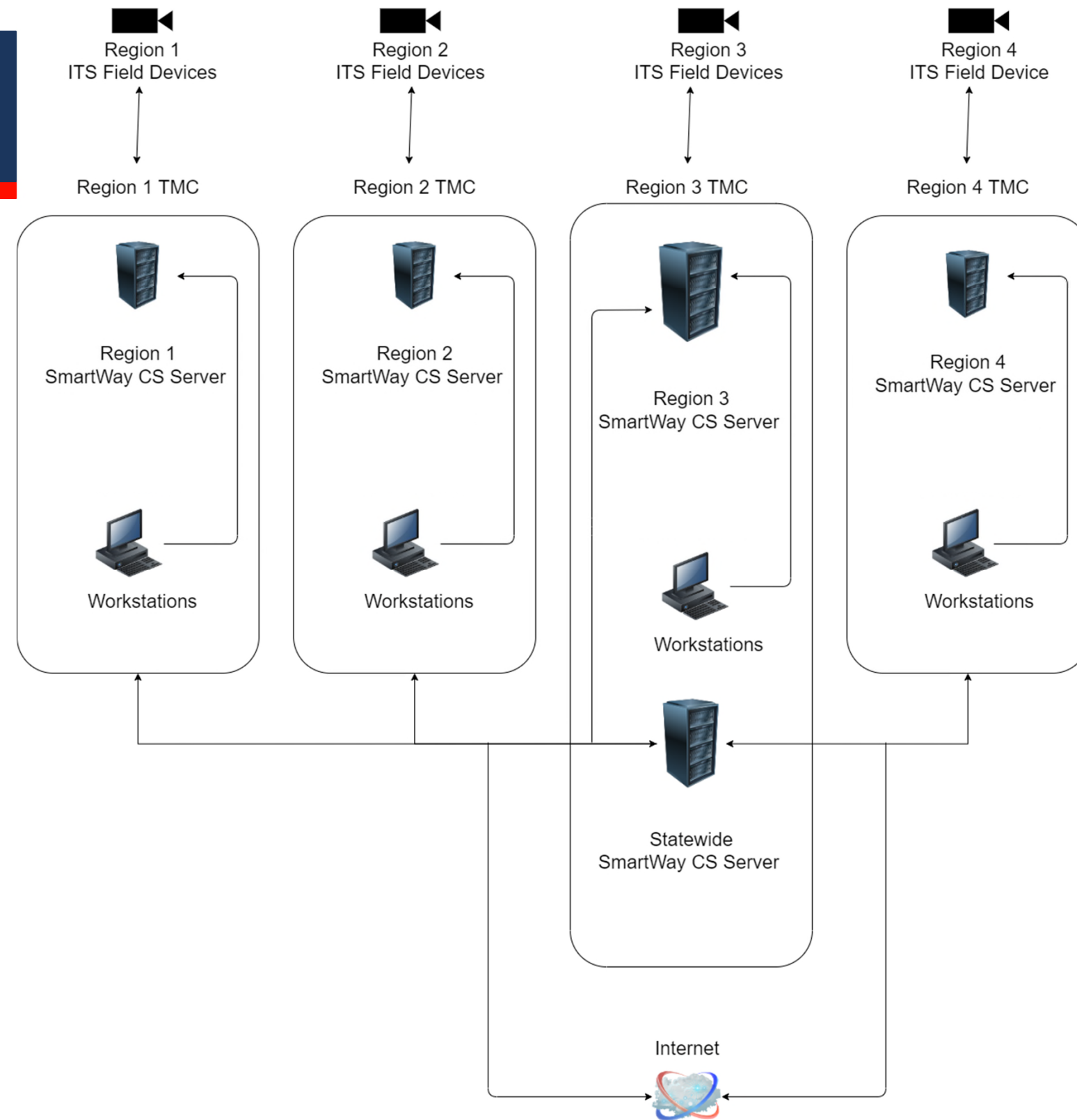


TDOT's Journey to Integrated Corridor Management



TDOT Network Upgrade

- Cisco Networking Equipment
- Replacement of all Layer 2 and Layer 3 Switches
- Addition of 829 Routers
- Updated security and IP-Scheming



Why was SWCS needed?

- Efficient incident/HELP Truck management
- Recurring congestion management
- Establish a unified software platform
- Integrated Corridor Management (ICM) support
- Data exchange between different TMCs/TOCs

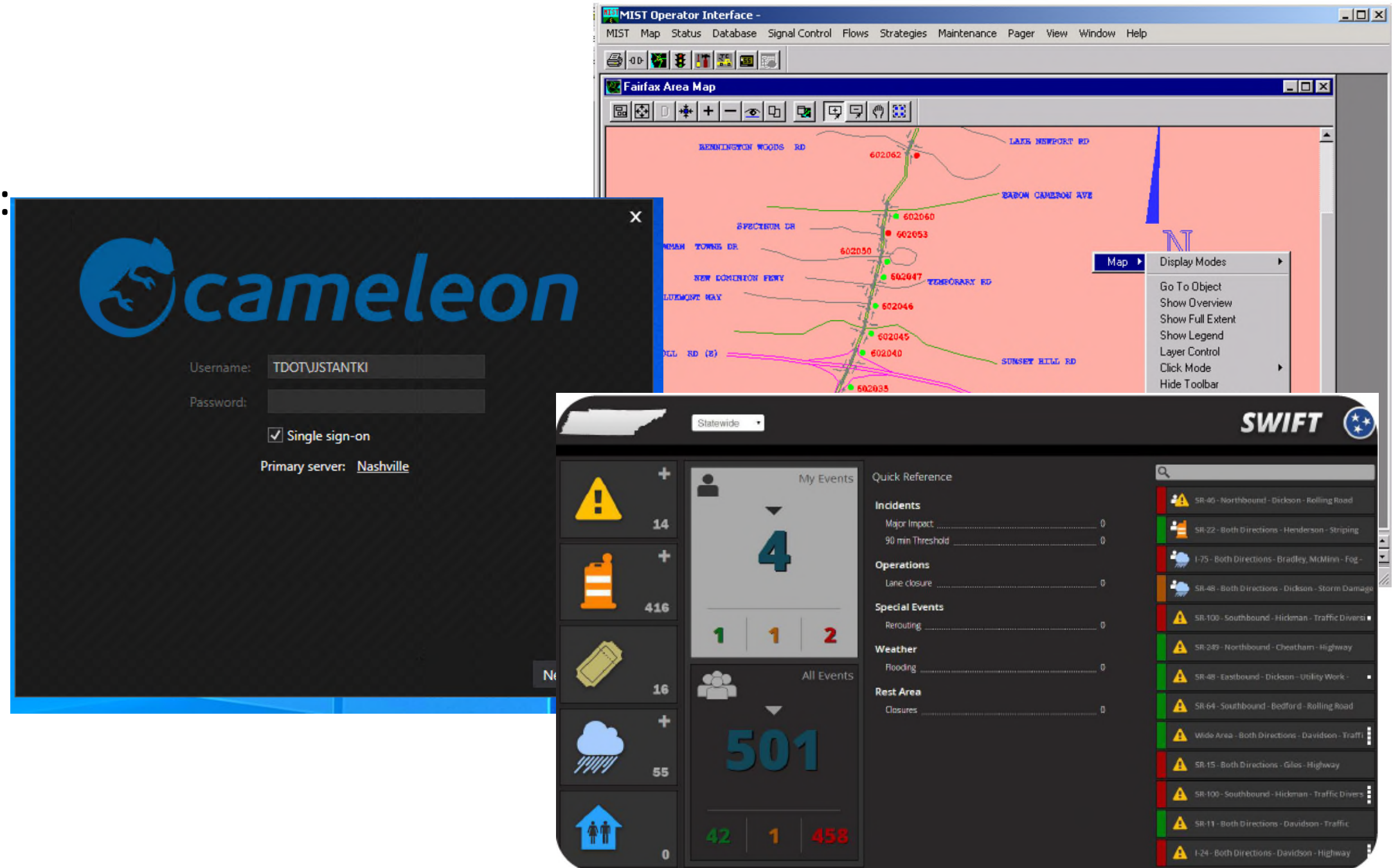


Tennessee roads experience **410** vehicle crashes everyday on average!

Where did we start?

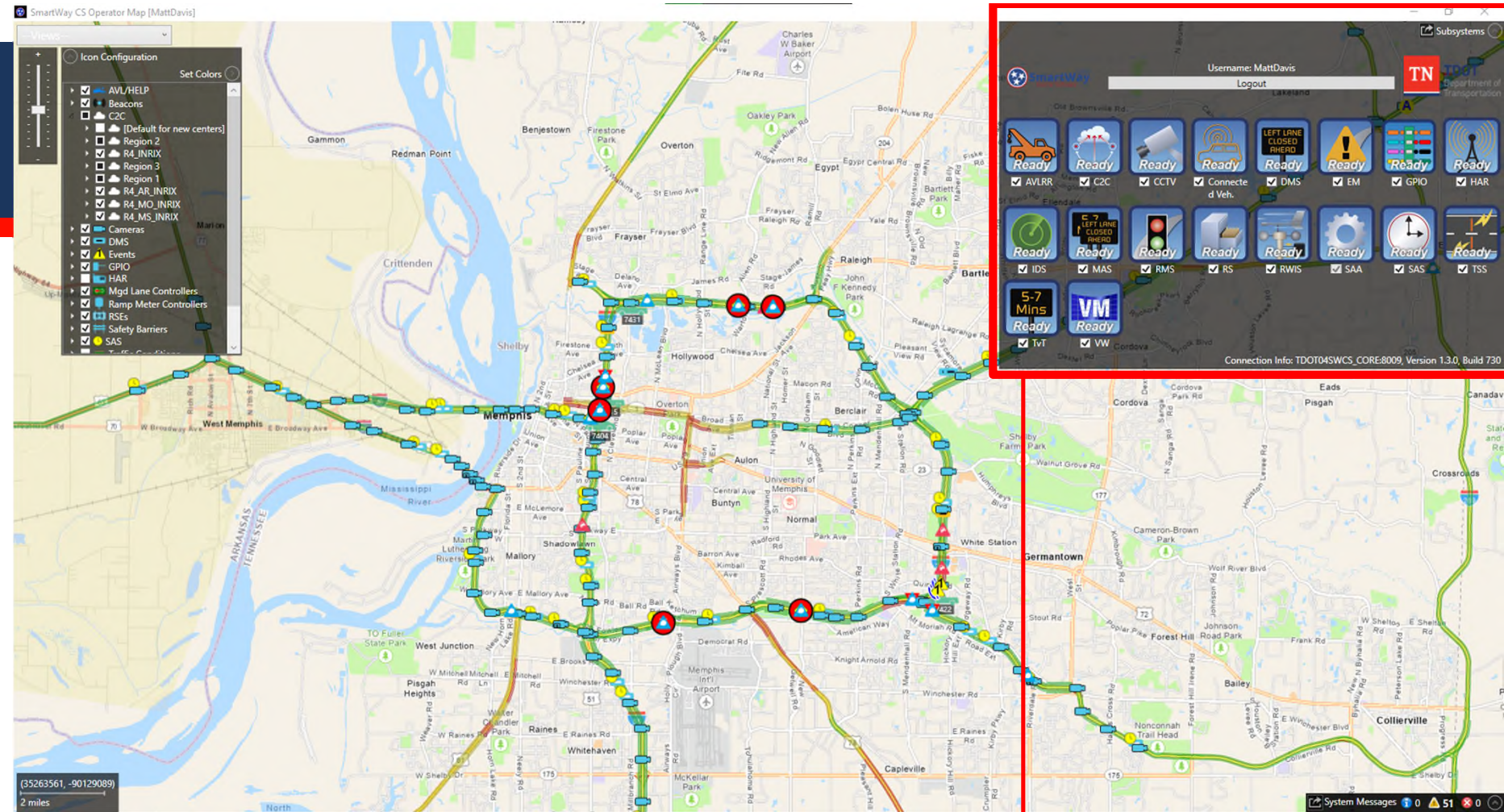
Multiple software for Incident Management:

- MIST
- IM/LOCATE
- Cameleon
- SWIFT
- Vero
- Platinum



Where are we now?

- All modules in one package
- Unified map interface
- Statewide consistency
- Single databus to facilitate automation
- Center to Center Communications



SWCS Capabilities

**Event/Incident
Management**

**Help Trucks
Management**

**Traffic
Congestion
Management**

**Device
Management**

Reporting

Event/Incident Management

- Incident Location
- Lane Maps
- Event Type
- Involved Vehicles
- HELP Dispatch



Event Details - 15693

Event Type: Overturned Vehicle

Vehicle Dispatch: 7404, 7415, 7431

Involved Vehicles: Red Tractor Trailer TAG# U989935

Location/Congestion: SHELBY on Interstate 40 Westbound, Before MILE MARKER 18.2. No congestion.

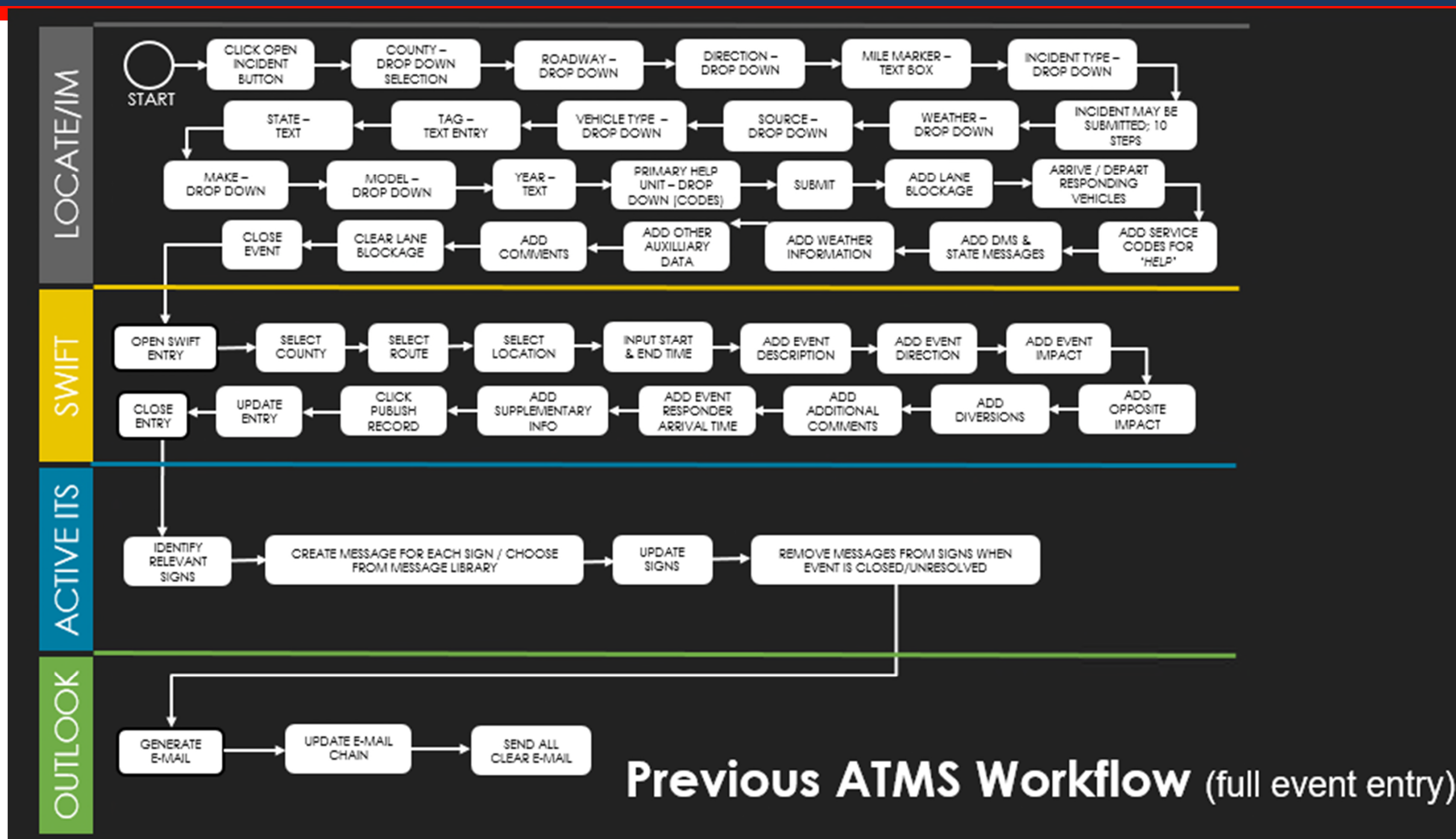
Lane Blockage: Left Lane (of 2 Lanes) Blocked, Left Shoulder Blocked.

Administrative Details: Organization: Region 4 TMC, Notifying Agency: TMC Operator, Notifying Contact: Richard Frederick.

Vehicle	Status	Status Timestamp	Activities	Dispatch Timestamp	Arrival Timestamp	Depart...
		04/30 09:58	<Click to add activity>	04/30 04:45	04/30 05:04	
		04/30 09:58	<Click to add activity>	04/30 05:05	04/30 05:24	
		04/30 09:58	<Click to add activity>	04/30 07:11	04/30 07:11	

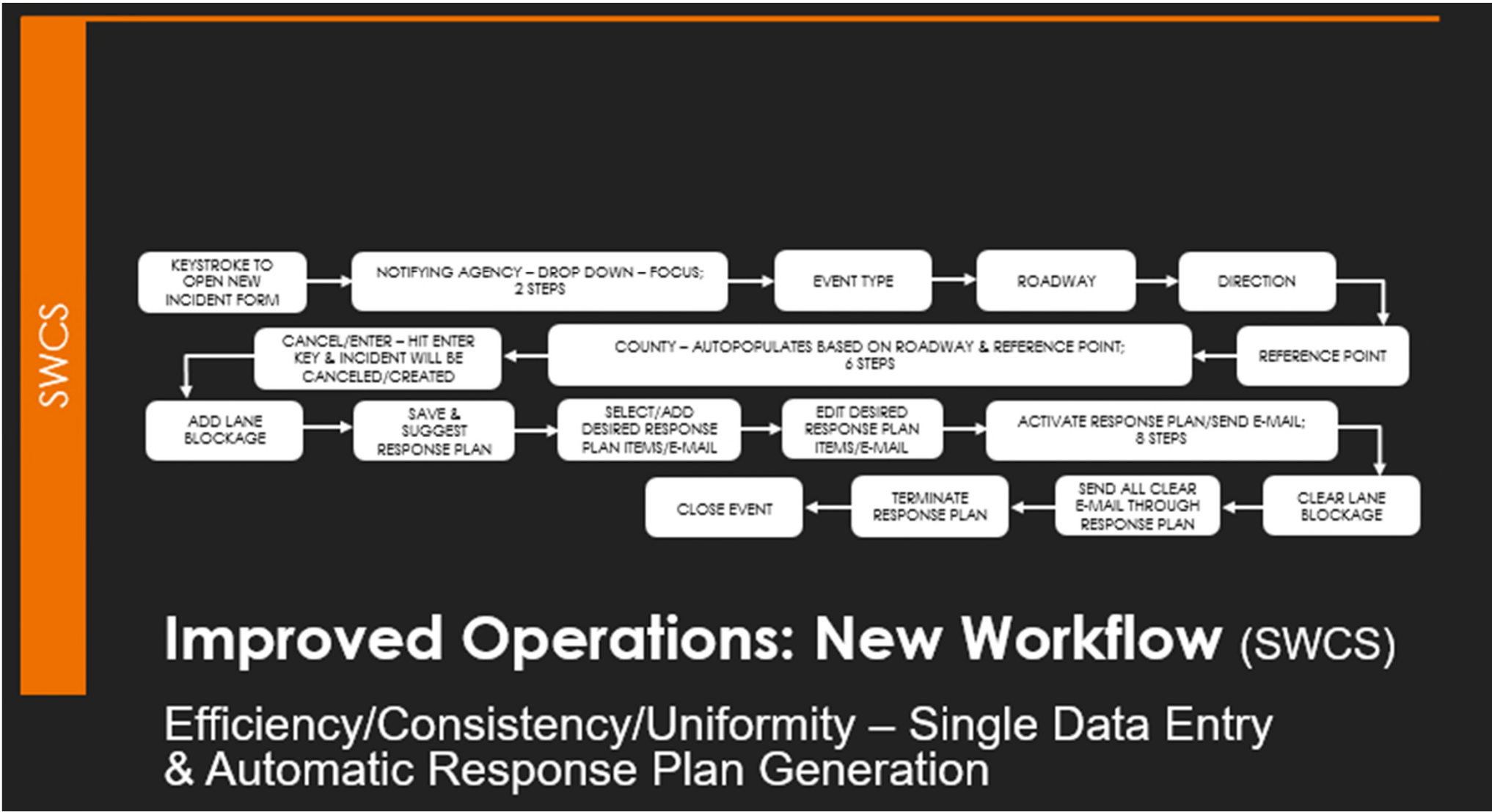
Agency	Notified By TMC?	Notified	O
HELP Operator	<input checked="" type="checkbox"/>	04/30 04:45	0
Memphis Police Department	<input type="checkbox"/>		0
Memphis EMS	<input type="checkbox"/>		0
Memphis Fire Department	<input type="checkbox"/>		0
TDOT Region 4 Queue Truck	<input type="checkbox"/>		0
Towing	<input type="checkbox"/>		0
Towing - Zone 1	<input type="checkbox"/>		0
Towing - Zone 2	<input type="checkbox"/>		0
Towing - Zone 3	<input type="checkbox"/>		0

Event Workflow



Previous ATMS Workflow (full event entry)

Event Workflow


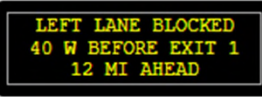


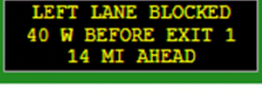
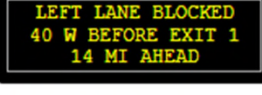


Response Plans

Response Plan: Event 15693

Activate Plan | Terminate Plan | Add Item | Edit Item | Remove Item | Find Devices on Map | Accept | Load Predefined | Get New Suggestion |
 DMS Dist: 5 | HAR Dist: 0 | TIM Dist: 0

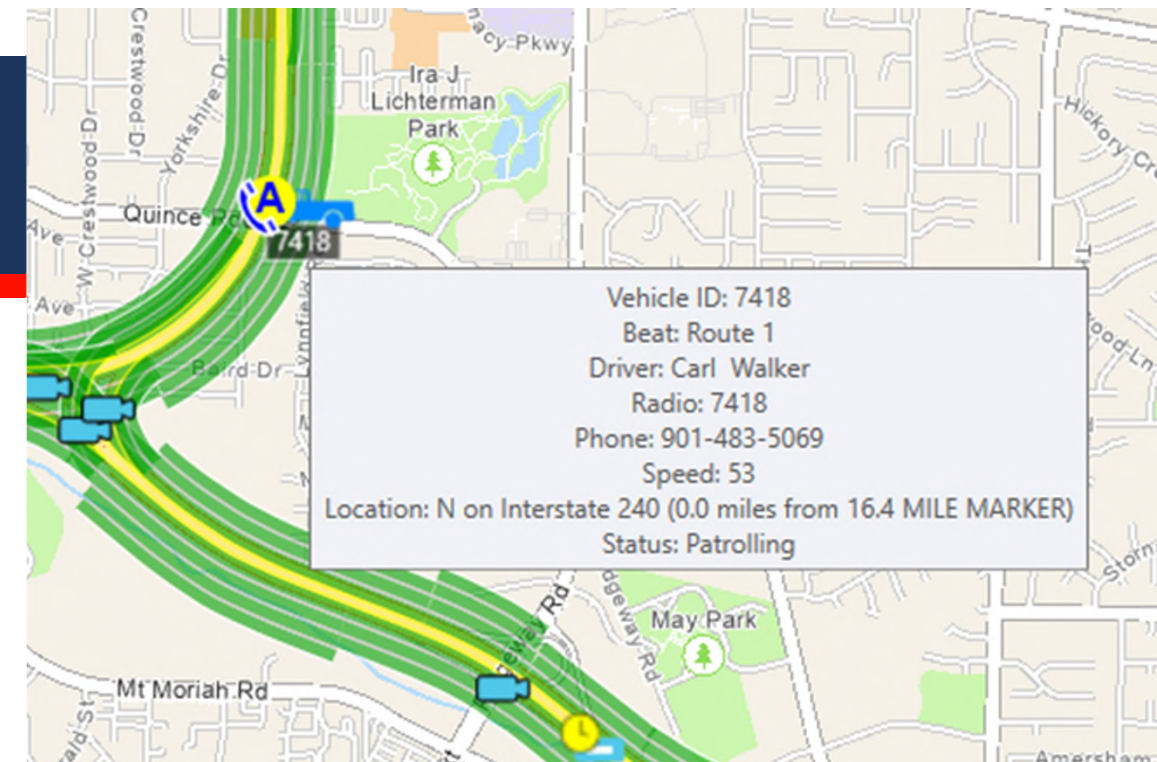
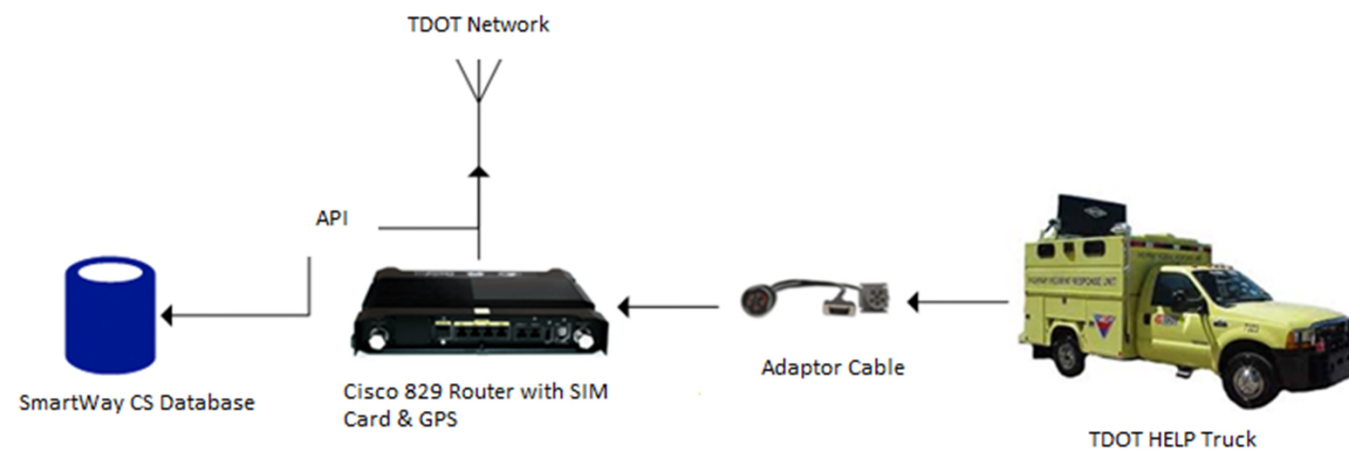
Event: 15693 Plan: Active

Device Details	Response Plan Message Details	Currently Active Message Details
Email Email Groups: TDOT Region 4 Notifications Subject: Active Level 2 Title: Location: SHELBY I0040 WB Before Exit 1D MM 1B.2 Body: Location: SHELBY I0040 WB Before Exit 1D MM 1B.2 Incident: Overturned Vehicle Impact: Left Lane (of 2 Lanes) Blocked, Left Shoulder Blocked Expected Duration: 0 minutes TDOT Incident Commander on Scene: TMC Operator Notes: Traffic is being allowed to pass in lane two and on the right shoulder.		
511 ATIS Incident in SHELBY county, going Westbound on Interstate 40 before MILE MARKER 1B.2 with Left lane blocked Last updated 4/30/2021 8:49:12 AM		
DMS R4E-01240-012.9E (39) [Region 4] Active	 Until Canceled Displayed 14	 Until Canceled 15693 14
DMS R4E-SamCooper-001.0E (19) [Region 4] Active	 Until Canceled Displayed 16	 Until Canceled 15693 16
DMS R4E-01240-014.4E (37) [Region 4] Active	 Until Canceled Displayed 16	 Until Canceled 15693 16

0 1 0 Suggested response plan received.

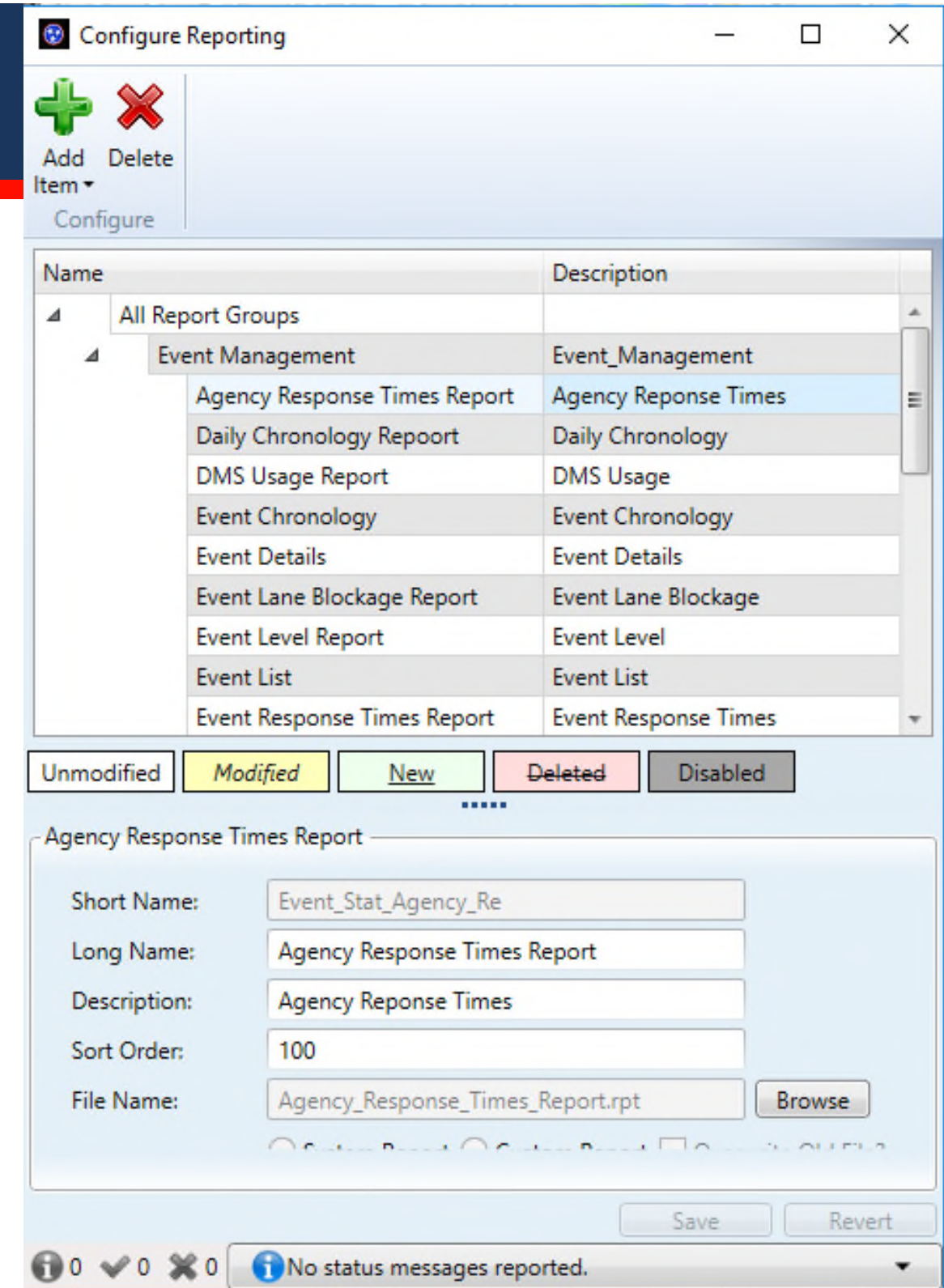
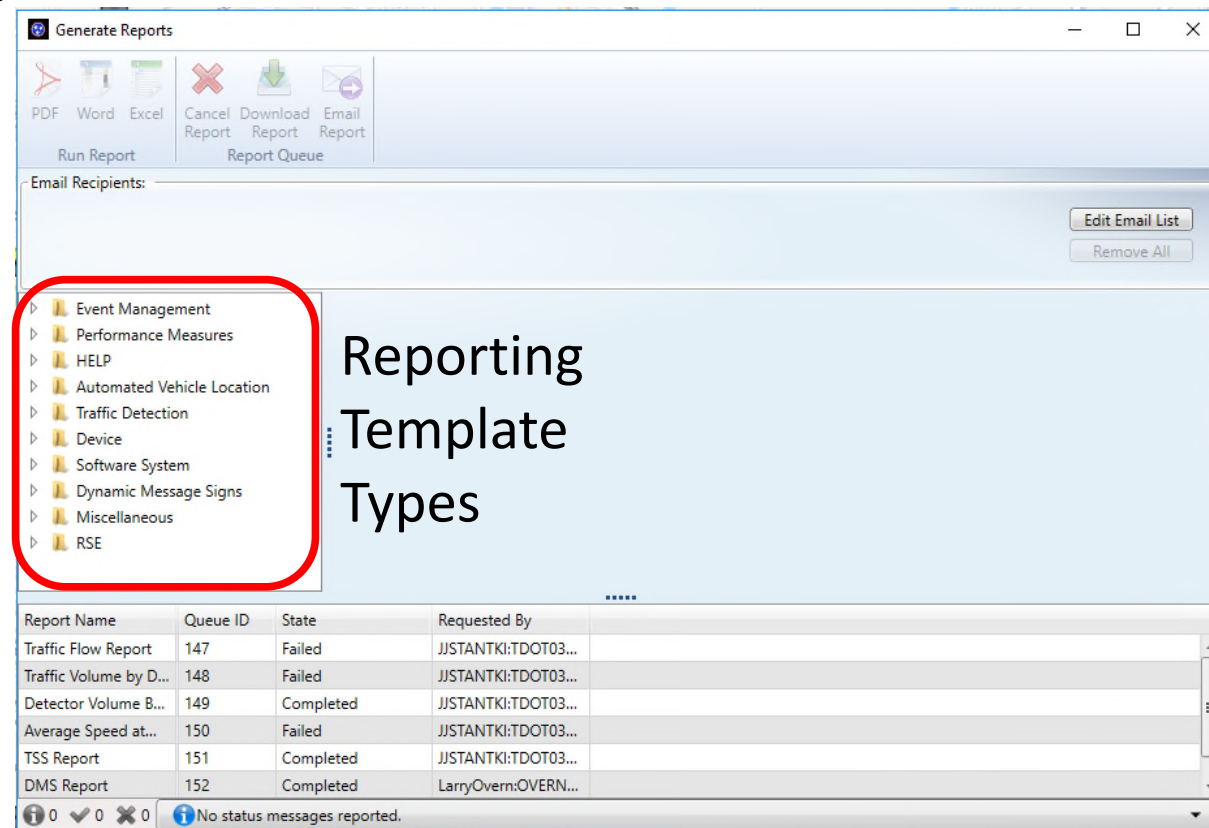
Automated Vehicle Location (AVL)

- Cisco IE 829 routers connect HELP trucks to operator's map
- Application developed using Cisco Kinetic
- Facilitate capabilities for operators to enter incidents
- Additional future benefits



Reporting

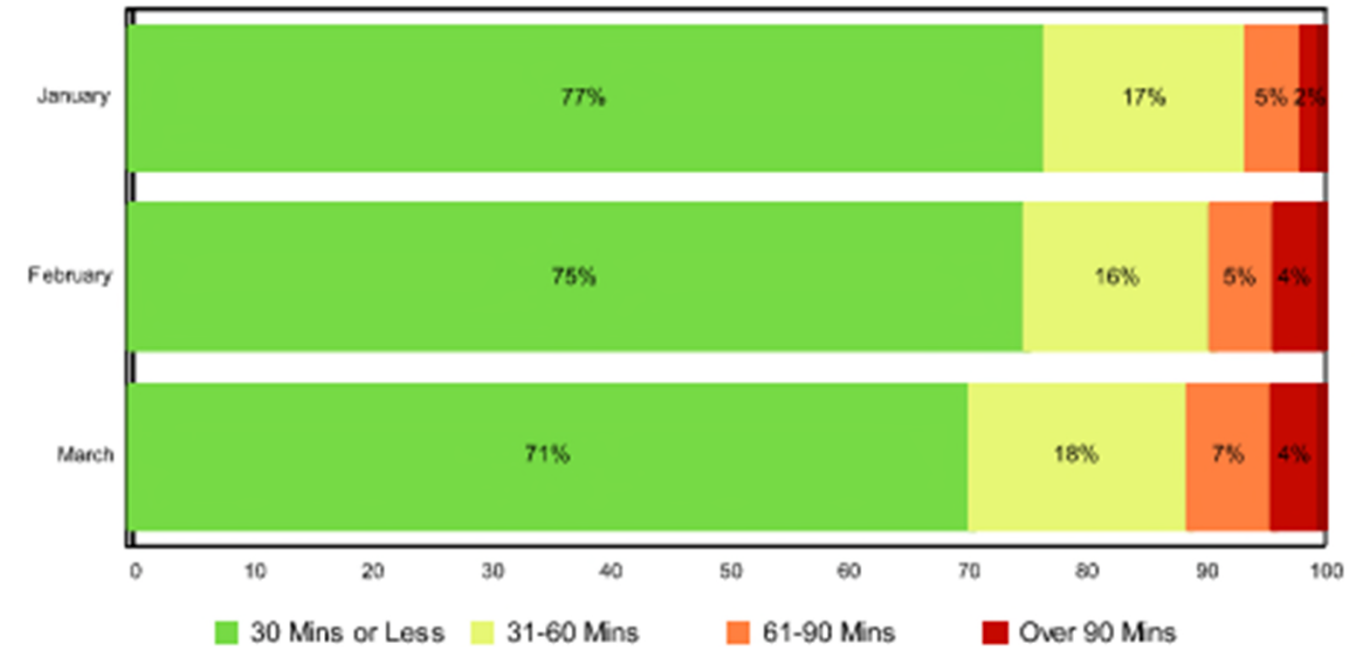
- A wide variety of report templates that can export reports
- These templates are initially grouped by similar type or functionality but are configurable



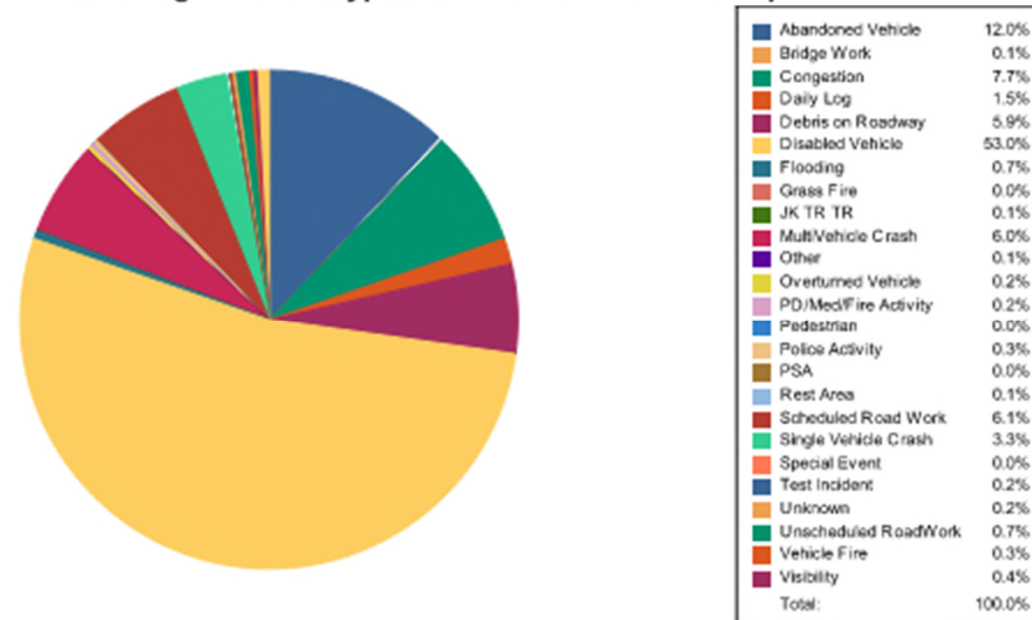
SWCS Performance Metrics

- Developed in Crystal Reports
- Quarterly Performance Measures Report
- Performance Measures for HELP Truck Operations

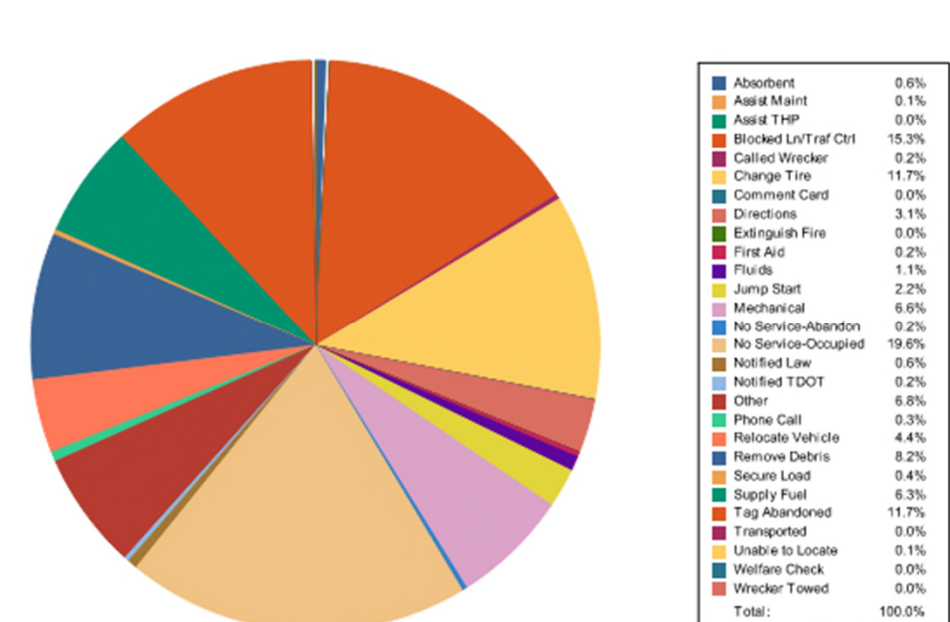
Lane Blockage Clearance Times - with HELP Truck Response



Percentage of event types for all events in current quarter



Percentage of Activity Types for HELP Truck Activities in Current Quarter



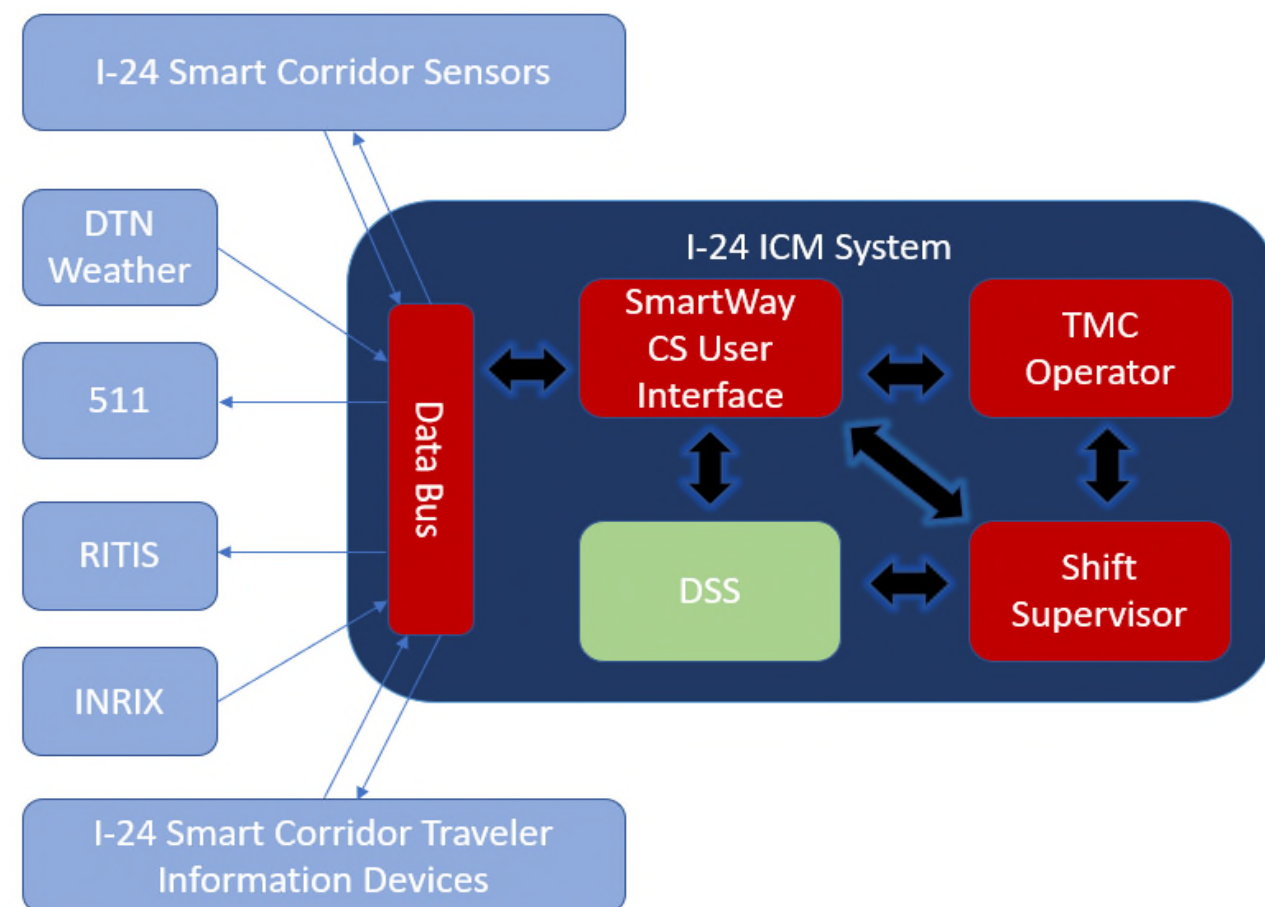
ICM DSS - Goal: Maximize the Performance of the I-24 ICM System

The ICM DSS:

- aggregates all relevant data generated about the corridor,
- fuses the data into its most meaningful and valuable representations, and
- provides actionable intelligence to the TMC Operators when appropriate and/or requested



Generates response plans with limited intervention!



SmartWay Expansion: Paving the Way for the Future!

**Statewide
Expansion of
SmartWay ITS**

**Platform for
Innovation
and Research
Grants**

**Overcoming
Traffic
Congestion
Growth**

**Connected
Automated
Vehicles (CAV)**

**Over-height
Detection**

**I-24 Smart
Corridor**

**Construction
Activities**

**Traveler
Information**

ICM DSS

**Wrong Way
Driver
Detection**

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Thank You!

