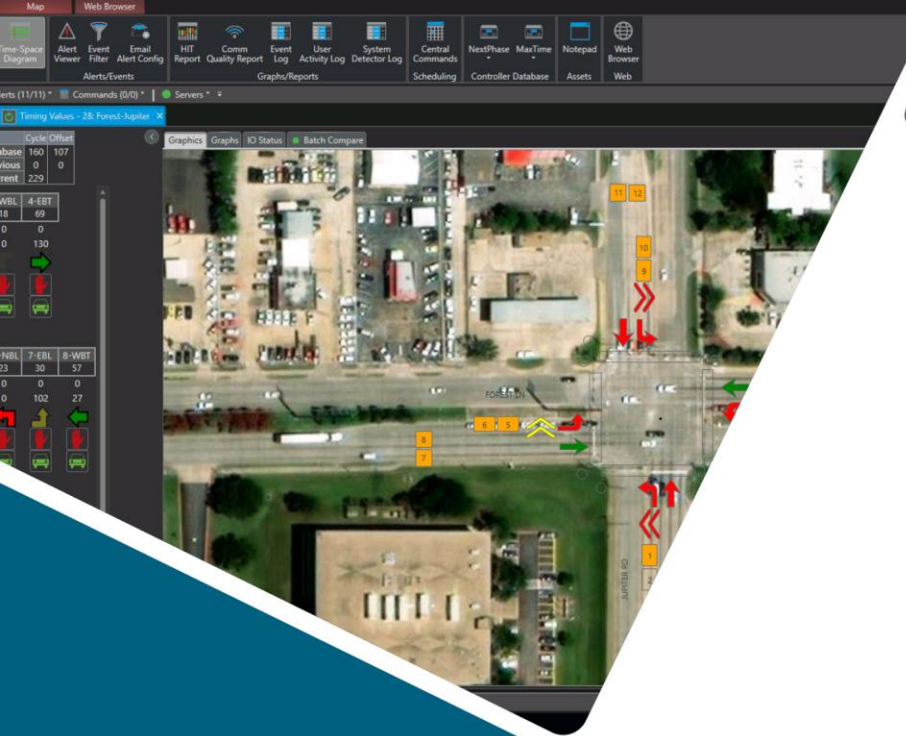




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VDOT ATSPM Deployment

Matthew Bonacci & Mark Wood

»»KITS

A Kimley-Horn Software Solution

»»Kadence

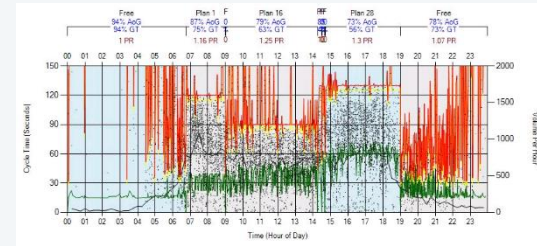
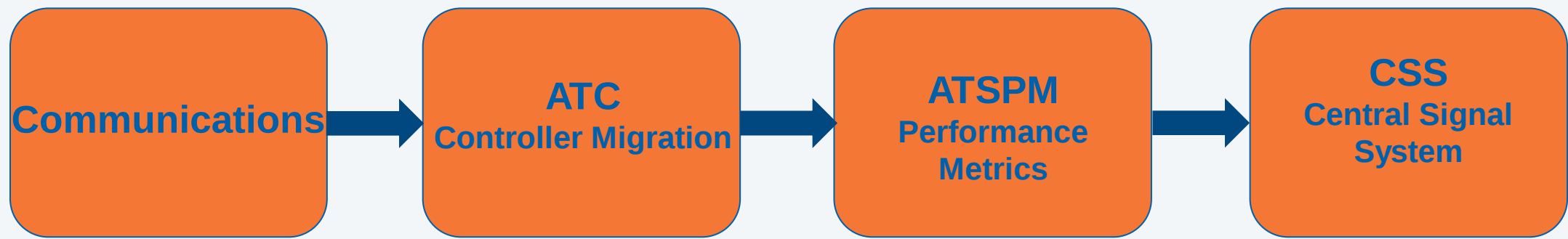
A Kimley-Horn Software Solution

»»Traction

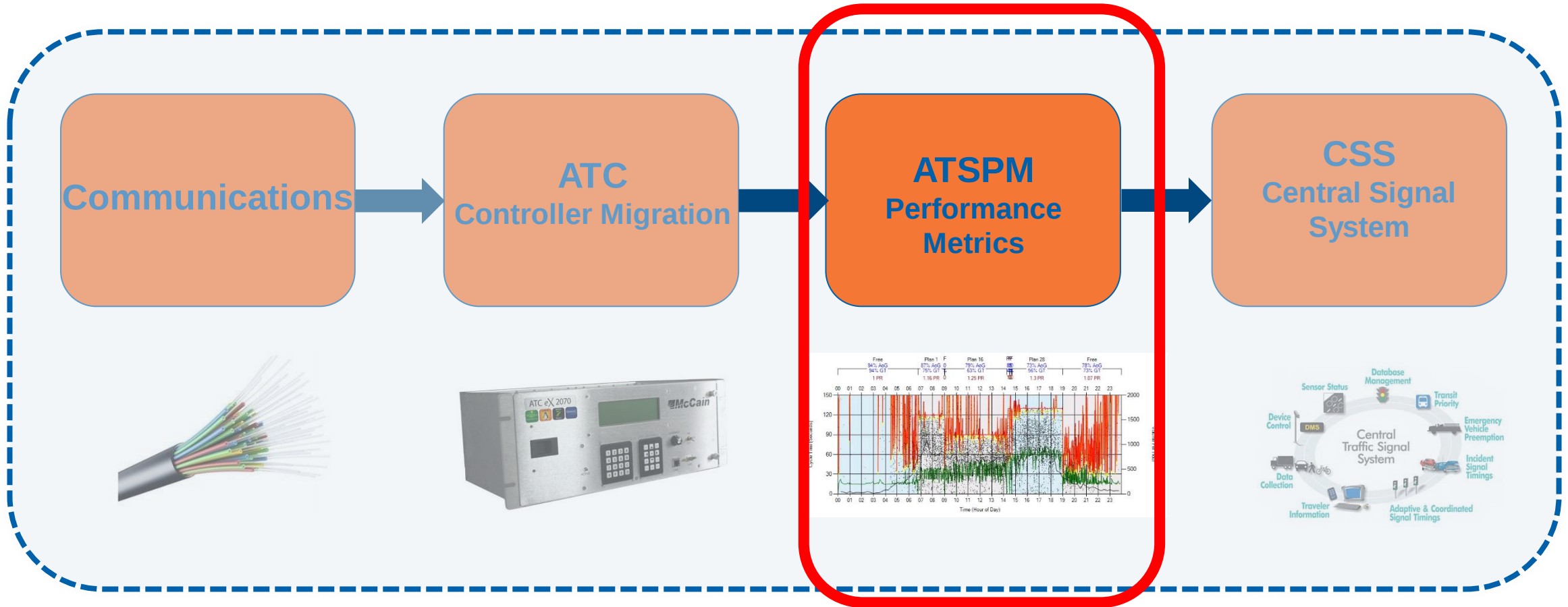
A Kimley-Horn Software Solution

Agency History with ATSPM

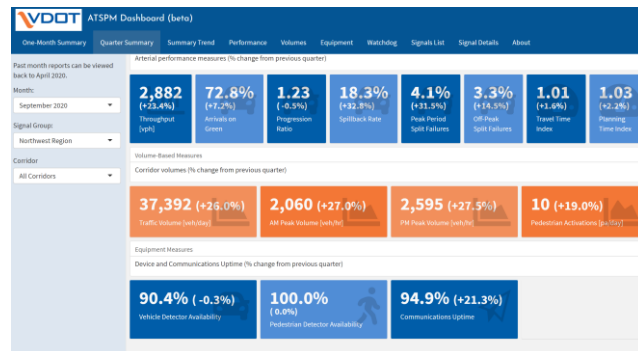
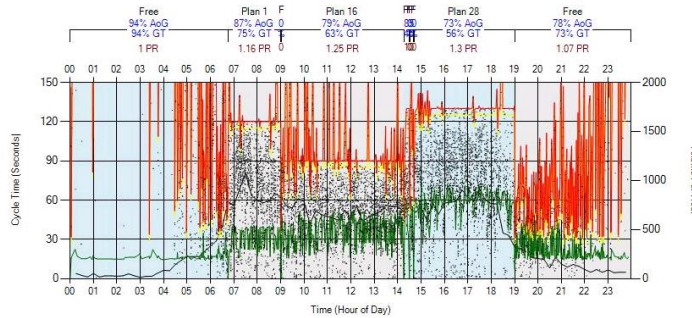
Signal & Arterial System Technology



Signal & Arterial System Technology



Performance Metrics Technology



- Data driven support system (ATSPM)
 - Individual intersection performance
 - Informed performance-based maintenance and operations strategies
- Dashboard for reporting
 - RTOP (SigOps) Pilot
 - Corridor level performance
 - Location priority tool

Who does ATSPM Benefit?

PLANNERS

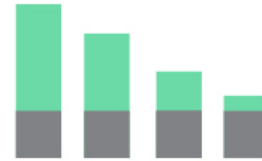
Is traffic changing?



Volume Profiles

DESIGNERS

Which equipment works best in different scenarios?



Alarm Ticker

SIGNAL TIMERS

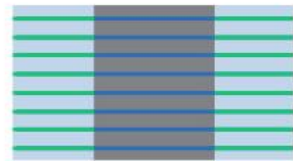
Are vehicles arriving when the signal is green?



Arrivals on Green

SIGNAL TECHNICIANS

Is equipment functioning properly?



Phase Termination

DECISION-MAKERS

Are investments improving conditions over time?



Travel Time Distributions

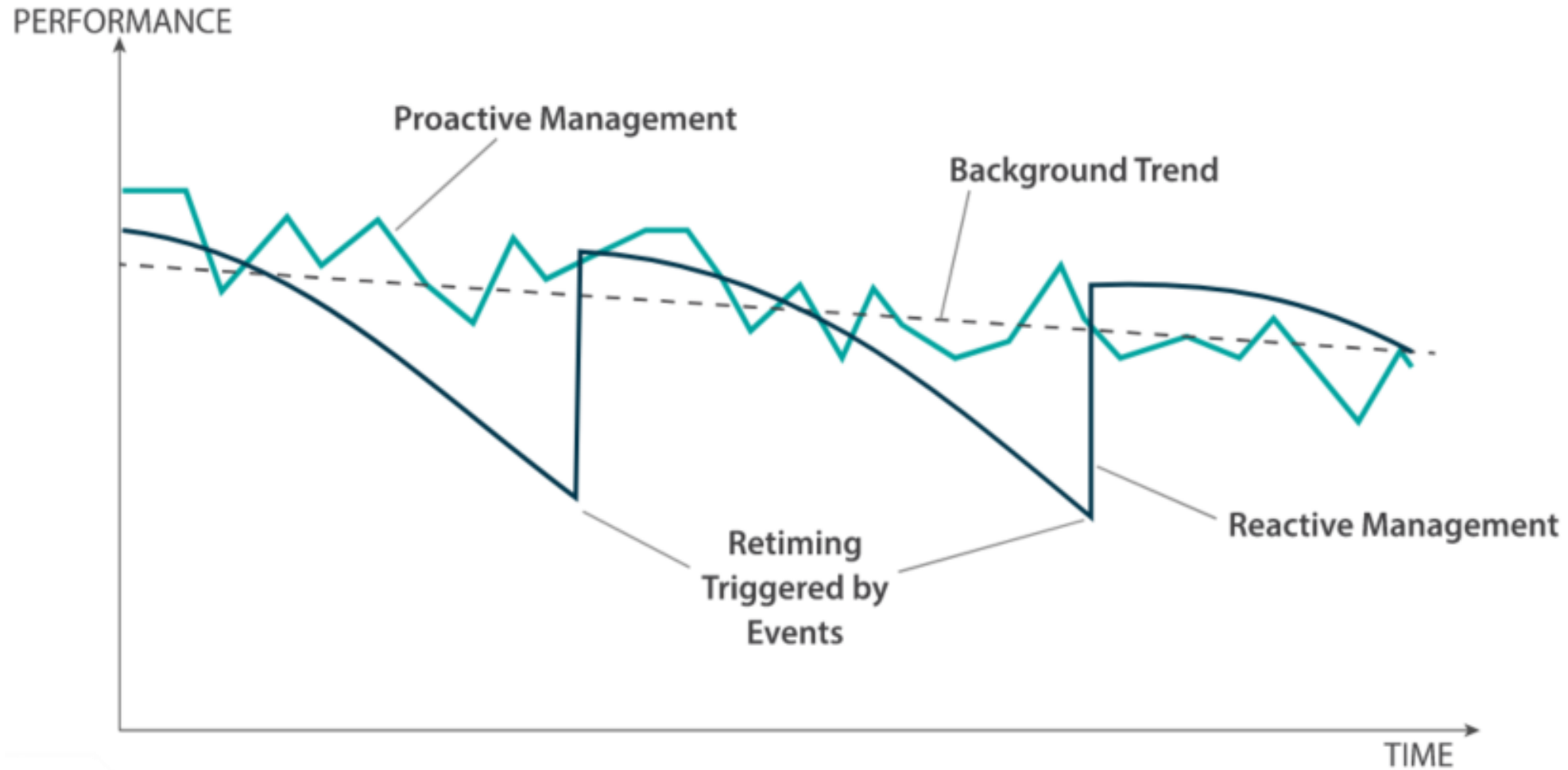
THE PUBLIC

Is my agency making trips safer and more reliable?



Report Card

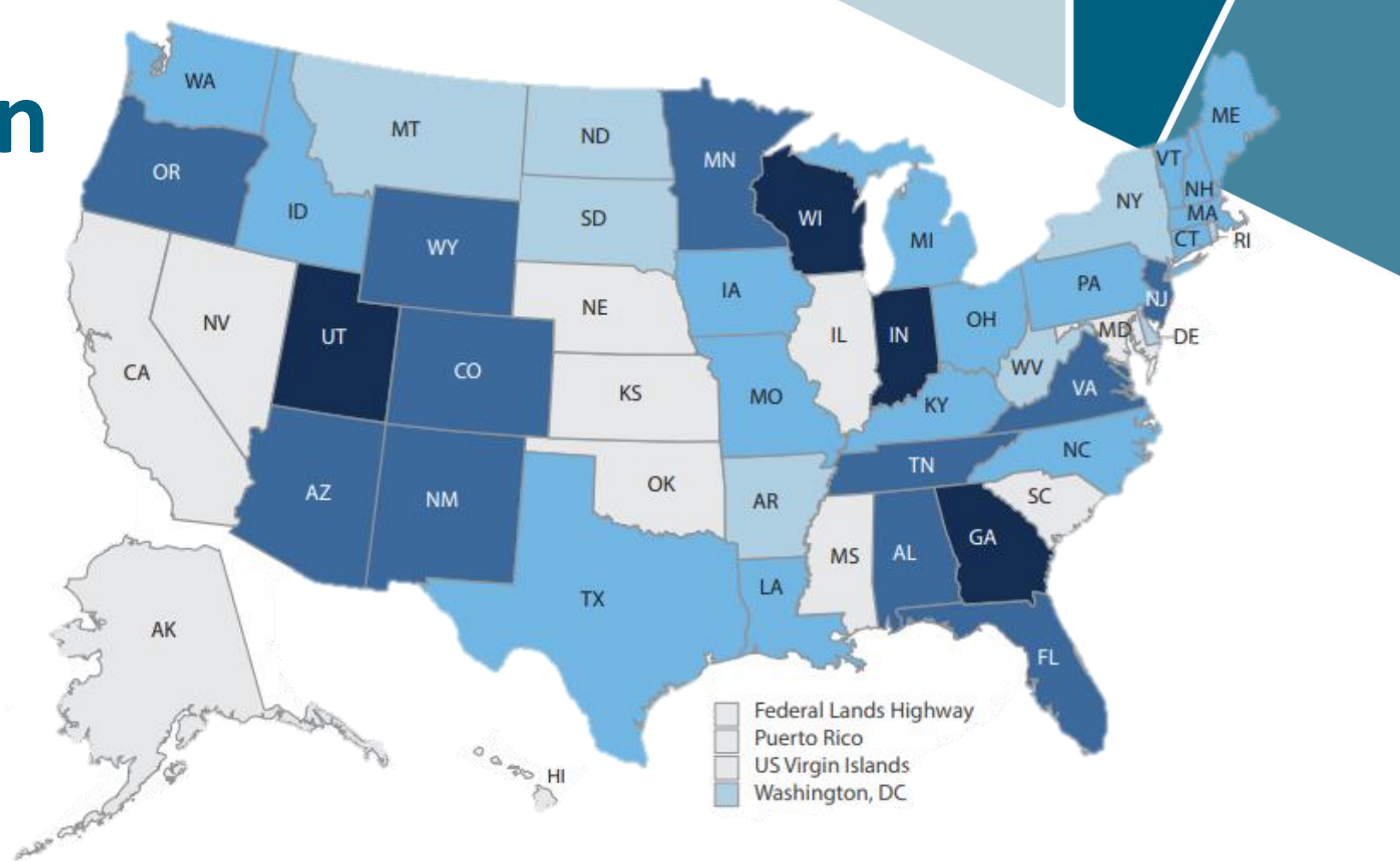
Benefit of Proactive vs Reactive



Source: FHWA

ATSPM Adoption

- ▶ VDOT's ATSPM pilot is at the forefront of industry practice while also building from the lessons learned by early adopters of the technology



INSTITUTIONALIZED

The State has adopted the innovation as a standard process or practice and uses it regularly on projects.

ASSESSMENT STAGE

The State is assessing the performance of and process for carrying out the innovation and making adjustments to prepare for full deployment.

DEMONSTRATION STAGE

The State is testing and piloting the innovation.

DEVELOPMENT STAGE

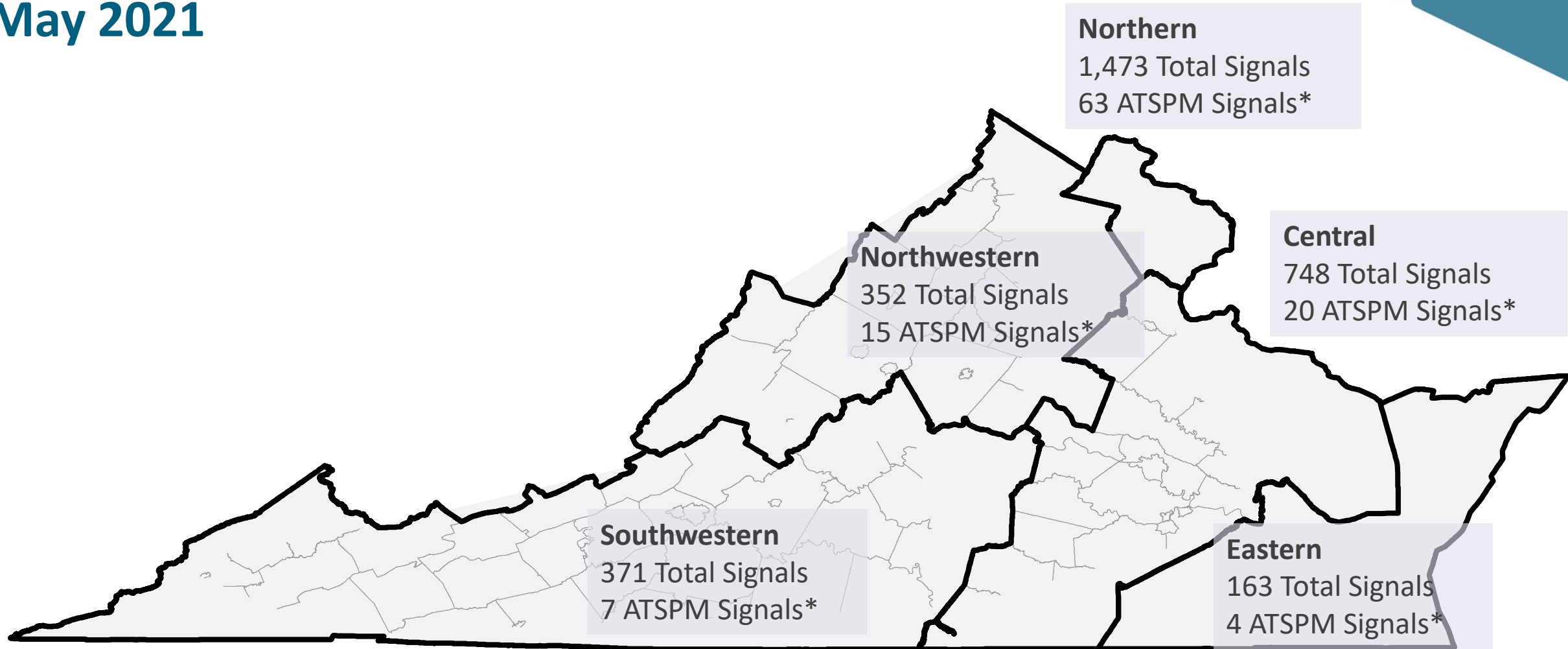
The State is collecting guidance and best practices, building support with partners and stakeholders, and developing an implementation process.

NOT IMPLEMENTING

The State is not currently using the innovation anywhere in the State and is not interested in pursuing the innovation.

VDOT ATSPM Pilot Deployment

May 2021



**active or planned*

ATSPM reporting further aligns agency goals and objectives with measurable performance to optimize public benefit.

Performance measure reports include:

- Purdue phase termination
- Split monitor
- Pedestrian delay
- Preemption details
- Turning movement counts
- Purdue coordination diagram
- Approach volume
- Approach delay
- Arrivals on red
- Split failure
- Link-pivot
- Aggregate reporting

The screenshot displays the ATSPM web application interface. At the top, there's a navigation bar with links: Measures, Reports, Log Action Taken, Links, FAQ, About, Register, and Log in. The main content area is divided into several sections:

- Signal Selection:** Includes a dropdown for Signal ID (50086) and a button to select 'Lee Jackson Mem Hwy @ Fair Ridge Dr [VA Power Ent]'. Below this are buttons for 'Signal List' and 'Signal Map'.
- Signal Map:** Shows a map of the area with a callout for Signal #50086, Lee Jackson Mem Hwy Fair Ridge Dr [VA Power Ent].
- Chart Selection:** Includes a 'Metrics List' with options like Purdue Phase Termination, Split Monitor, Pedestrian Delay, Preemption Details, Turning Movement Counts, Purdue Coordination Diagram, Approach Volume, Approach Delay, Arrivals On Red, and Purdue Split Failure. 'Purdue Phase Termination' is selected.
- Phase Termination Options:** Includes settings for Y-axis Max (Auto) and Consecutive Count (1). Checkboxes for 'Show Plans' and 'Show Ped Activity' are checked.
- Date Selection:** Includes fields for Start Date (09/04/2019) and End Date (09/04/2019), and a calendar for September 2019.

A 'Create Chart' button is located at the bottom right of the interface.

Benefit-Cost Analysis Findings

5.5

Overall B-C Ratio

Northern Region

B-C Ratio: 2.0

14 ATSPM Signals

Eastern Region

B-C Ratio: 17.3

4 ATSPM Signals

In progress

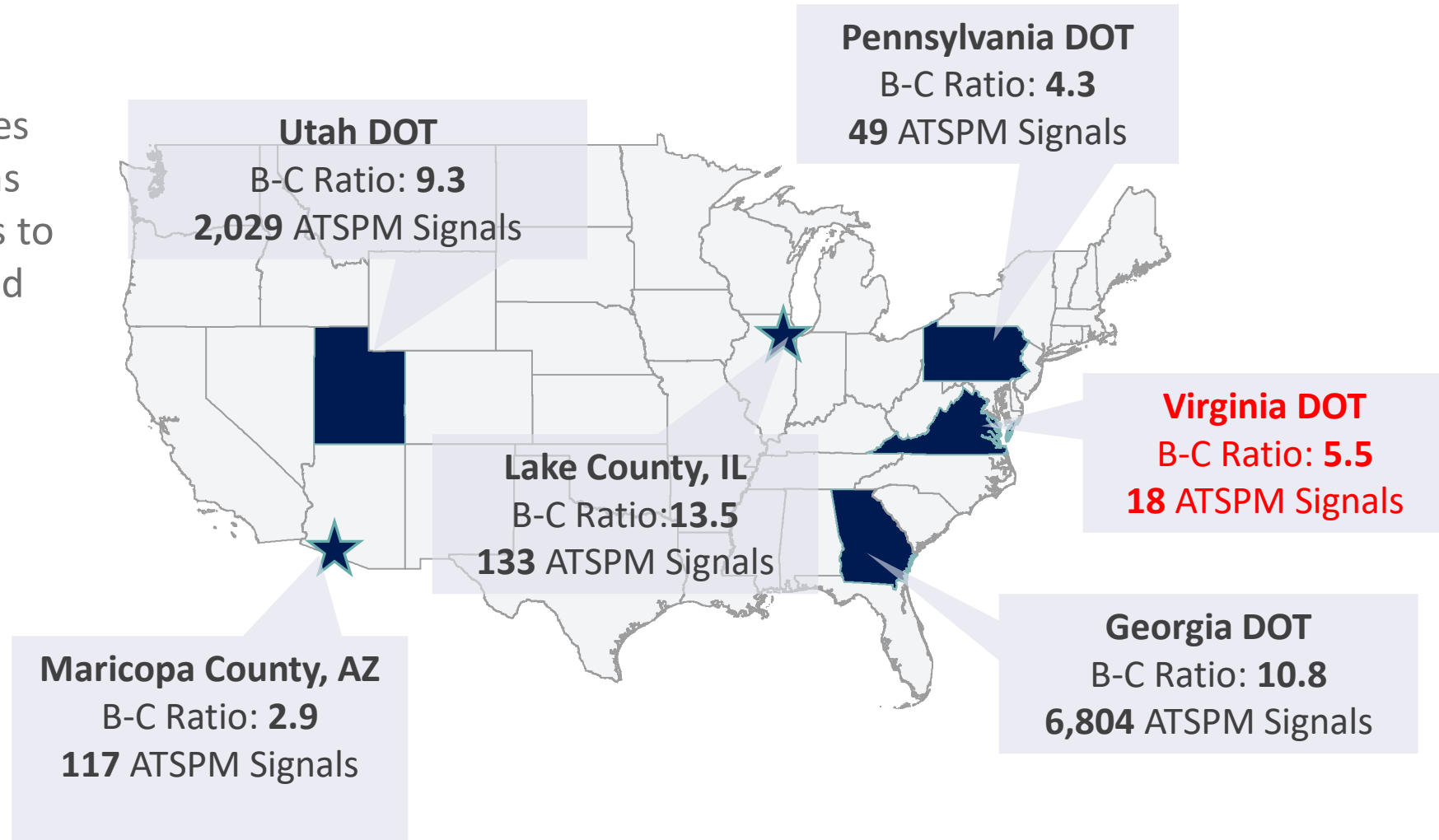
In progress

In progress

FHWA Case Studies

Benefit-Cost Ratios

- Potential for increases to VDOT's B-C ratio as deployment expands to more institutionalized ranges



Past month reports can be viewed back to February 2021.

Month:

November 2021

Signal Group:

Northern Region

Corridor:

US 50 (Fairfax)

☒ By Intersection

☐ By Sub-corridor

Performance

Arterial performance measures (% change from previous month)

2,808

(-4.7%)

Throughput [vph]

78.9%

(+0.6%)

Arrivals on Green

1.29

(-0.6%)

Progression Ratio

18.5%

(-6.3%)

Spillback Rate

7.7%

(+2.2%)

Peak Period Split Failures

4.1%

(+2.7%)

Off-Peak Split Failures

1.22

(-0.7%)

Travel Time Index

1.32

(+3.0%)

Planning Time Index

Volume-Based Measures

Corridor volumes (% change from previous month)

36,552 (-5.4%)

Traffic Volume [veh/day]

2,572 (-9.0%)

AM Peak Volume [veh/hr]

2,718 (-6.1%)

PM Peak Volume [veh/hr]

412 (+33.8%)

Pedestrian Activations [pa/day]

Equipment Measures

Device and Communications Uptime (% change from previous month)

94.8% (-0.4%)

Vehicle Detector Availability

100.0% (0.0%)

Pedestrian Detector Availability

83.1% (-2.4%)

Communications Uptime

Over time,
dashboard
reporting may
provide
enhanced
agency
accountability
for corridor-level
performance

Past month reports can be viewed back to February 2021.

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November 2021

Signal Group:

Northern Region

Corridor:

US 50 (Fairfax)

☒ By Intersection

☐ By Sub-corridor

Dashboard provides a pulse for arterial-level performance across a range of measures

Performance

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☒ By Intersection

☐ By Sub-corridor

Opportunity to serve as a key resource for **planning-level metrics**, including indications for changes in activity across modes

Performance

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US 50 (Fairfax)

☒ By Intersection

☐ By Sub-corridor

Equipment measures provide information on system vitality with opportunity to inform investment needs for critical gaps.

Performance

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☒ By Intersection

☐ By Sub-corridor

Watchdog
provides alert
patterns to help
signal engineers
focus their
efforts on
priority
locations.

Date Range:

01/31/22

02/14/22

Alert:

Bad Vehicle Detection

Phase:

All

Intersection Filter:

Plot

Table

Darker colors mean more consecutive days in which the alert condition is active.

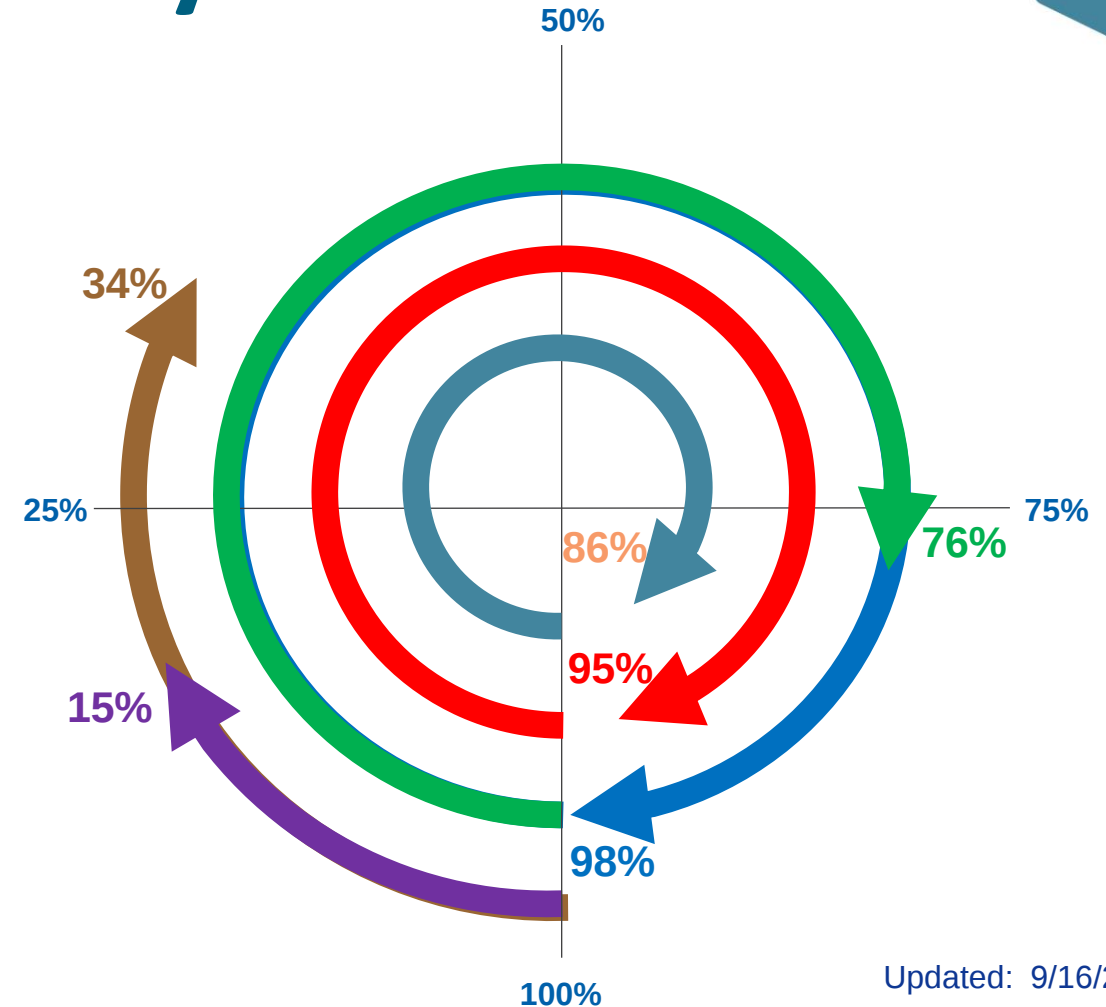
Use the 'Intersection Filter' box to reduce the size of the list. Filter on the intersection name or ID number.



Statewide Traffic Signal System Status

3,153 Traffic Signals Statewide

- High Speed Communications (2699 – 86%)
- ATC / D4 Migration (2992 – 95%)
- KITS Configured (3102 – 98%)
- KITS Live (2410 – 76%)
- ATSPM Configured (1057 – 34%)
- ATSPM Active (485 – 15%)



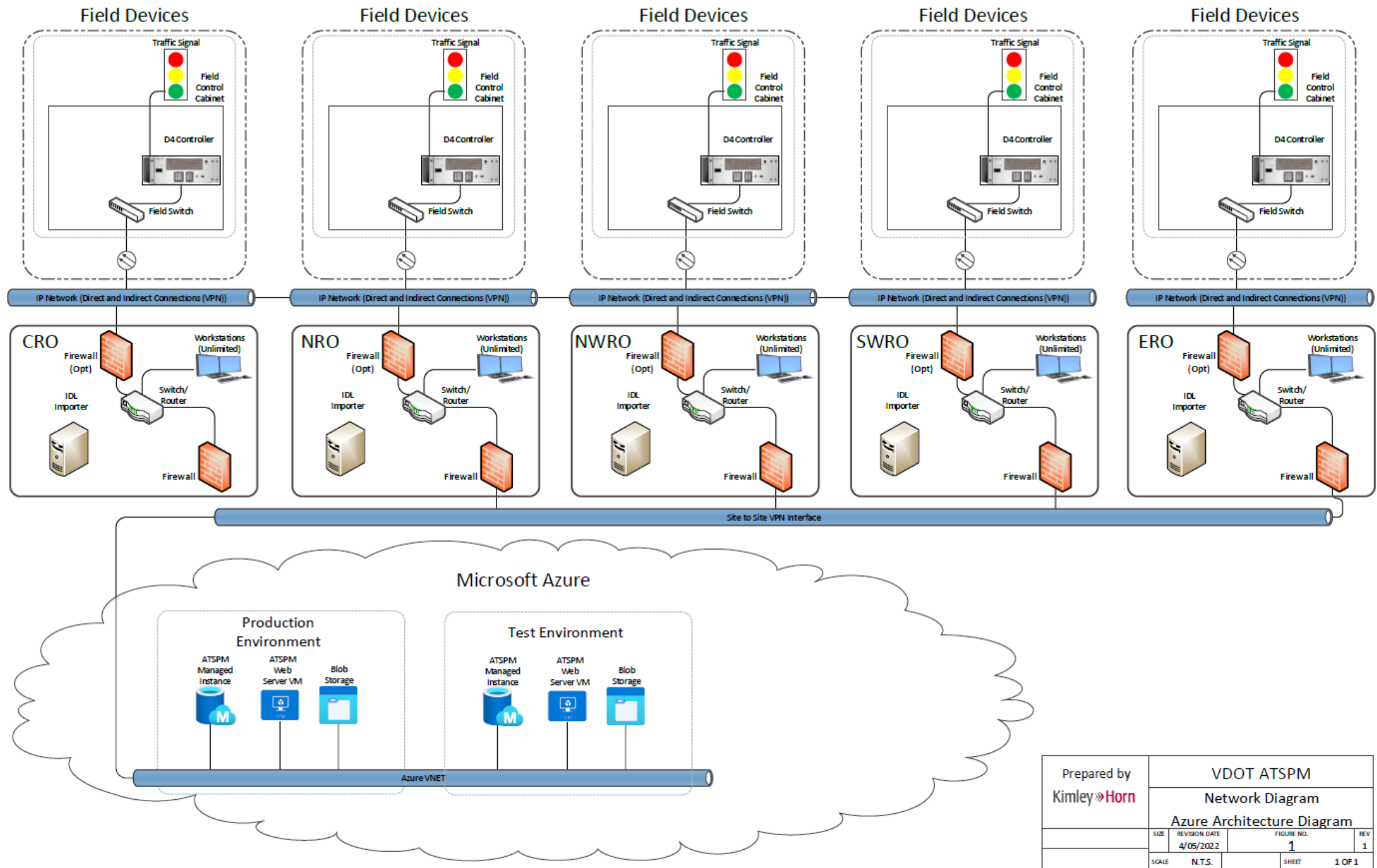
Updated: 9/16/2022



ATSPM Advancement

ATSPM Advancement Project

- Merge existing ATSPM installations into new statewide Azure system
- Upgrade to ATSPM 4.3
- Add additional regions to statewide system
- Database storage optimization (parquet)
- Enhanced user role access in ATSPM
- New detector configuration screen in KITS
- Signal creation automation



Phoenix Software Advanced Traffic Management System

AdminHomeIntersectionsDMSCCTVSystem DetectionITSNetworkATMAdaptiveSchedulingEvent ManagementTSPSmart PriorityMap

Intersections

DetectorsRegionsArterials

LinesSectionsLinks

Definition

Real-Time

EconoliteEOSBitran233Bitran233DAD4LACO4ENextPhasePeek3000EPeekATC-1000SEPACMaxTimeTrafficwareTSCPZDCSynchroImport/ExportCycle Summary

Detector HealthSignal HealthHistory Reports

Central PreemptionPriority Phases Usage Report

Time UploadTime Download

Schedule

Intersections (9/43)CCTV (1/30)DMS (0/254)DS (39/39)RM (5/5)Stop Time (0)Alerts (0/0)New Alerts (16/16)ATMCommands (0/0)ServersDatabase

KITS MapDetector Configuration: 1: Alma School Rd-Baseline Rd

Configuration Filter

All DetSystem/Count/Local/Speed Trap DetATSPM DetKadence DetTMC Det

SaveRevert

Detector Configuration

Full Text Search

Drag a column header and drop it here to group by that column

Detector Number	Detector Name	Phase/Approach	Direction	Lanes	Hardware	Protected Phase Number	Permissive Phase Number	Protected Phase Overlap	Permissive Phase Overlap	Advanced Count	Advanced Speed	Lane-By-Lane Count	Lane-By-Lane w/ Speed Restriction	Stop Bar Presence	Advance Presence	Latency Correction	Movement Type	Lane
1		2	NB	1	Video	2	0										Thru	Vehicle
2		2	NB	2	Video	2	0										Thru	Vehicle
3		6	SB	1	Video	6	0										Thru	Vehicle
4		6	SB	2	Video	6	0										Thru	Vehicle
5		0				0	0											
6		0				0	0											
7		0				0	0											
8		0				0	0											
9		0				0	0											
10		0				0	0											
11		0				0	0											
12		0				0	0											
13		0				0	0											
14		0				0	0											
15		0				0	0											
16		0				0	0											
17		0				0	0											
18		0				0	0											
19		0				0	0											
20		0				0	0											
21		0				0	0											
22		0				0	0											

AdminHomeIntersectionsDMSCCTVSystem DetectionITSNetwork

Intersections

DetectorsRegionsArterials

LinesSectionsLinks

Areas

Real-Time

EconoliteEOSBitran2

(1/30)DMS (0/254)DS (39/39)RM (5/5)

Configuration: 1: Alma School Rd-Baseline Rd

List

New Intersection

Edit Intersection

Delete Intersection

Phase Mnemonic Editor

Export Signal Configuration

10/13/2022mark.wood22County

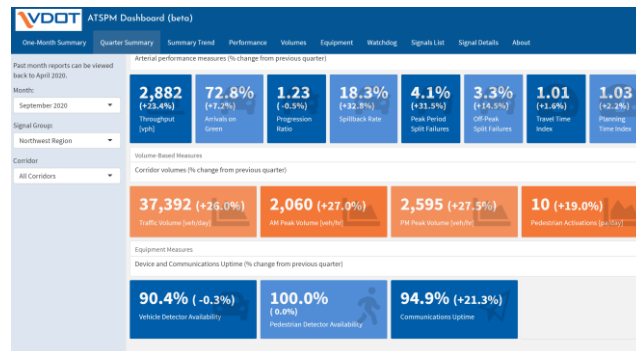
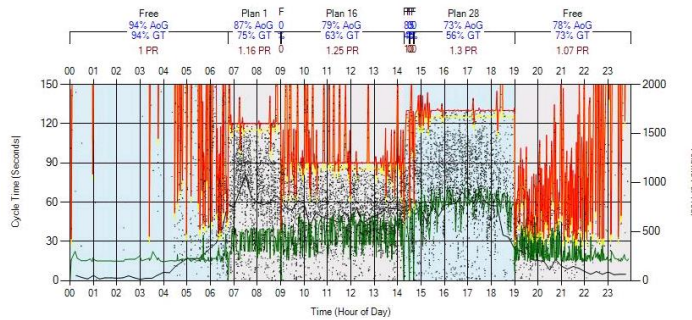
Signal Creation Automation

[illegible][illegible]

The background is a solid teal color with several darker teal geometric lines and shapes. A vertical line runs down the right side. A diagonal line runs from the top left towards the center. Another diagonal line runs from the bottom left towards the center. These lines intersect to form various triangular and quadrilateral shapes. The text 'Next Steps' is positioned on the right side, overlapping the vertical line and the diagonal line that runs from the bottom left.

Next Steps

Next Steps



- Assess relative benefit of ATSPM deployments across all districts
- Partner with districts on process integration
- Steps toward data centralization
- Dashboard modifications
- Statewide deployment on the horizon

The background features a dark gray gradient. On the left side, there are large, overlapping, semi-transparent geometric shapes in shades of gray, resembling stylized buildings or abstract architectural elements. At the bottom of the image, there is a silhouette of a city skyline with various building shapes, some with small square windows. The text "Thank you!" is positioned in the upper right quadrant.

Thank you!